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2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

5 (ACRS)

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7 DIGITAL INSTRUMENTATION AND CONTROLS SUBCOMMITTEE

8 + + + + +

9 TUESDAY

10 JUNE 2, 2020

11 + + + + +

12 The Subcommittee met via Video
13 Teleconference, at 9:30 a.m. EDT, Charles Brown,
14 Chairman, presiding.

15 COMMITTEE MEMBERS:

16 CHARLES H. BROWN, JR. Member

17 RONALD G. BALLINGER, Member

18 DENNIS BLEY, Member

19 VESNA B. DIMITRIJEVIC, Member

20 WALTER L. KIRCHNER, Member

21 JOSE MARCH-LEUBA, Member

22 DAVID A. PETTI, Member

23 JOY L. REMPE, Member

24 PETER RICCARDELLA, Member

25 MATTHEW W. SUNSERI, Member

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1 ACRS CONSULTANT:

2 MYRON HECHT

3
4 DESIGNATED FEDERAL OFFICIAL:

5 CHRISTINA ANTONESCU

6
7 ALSO PRESENT:

8 ERIC BENNER, NRR

9 NORBERT CARTE, NRR

10 TEKIA GOVAN, NRR

11 WENDELL MORTON, NRR

12 WARREN ODESS-GILLETT, NEI

13 RICHARD STATTEL, NRR

14 STEPHEN VAUGHN, NEI

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P R O C E E D I N G S

9:30 a.m.

CHAIR BROWN: The meeting will now come to order. This is a meeting of the Digital Instrumentation and Control Subcommittee. I am Charles Brown, Chairman of the Subcommittee meeting. ACRS members in attendance are Dennis Bley, Matt Sunseri, Jose March-Leuba, Vesna Dimitrijevic, Joy Rempe, Ron Ballinger, Dave Petti, and our consultant, Myron Hecht.

Christina Antonescu of the ACRS staff is the Designated Federal Official for this meeting. She's already made sure the court reporter is there. So, we're good to go.

The purpose of this meeting is for the staff to brief the Subcommittee on the updated Draft Final Branch Technical Position BTP 7-19, Revision 8. Today, we have members of the NRC staff and NEI to brief the Subcommittee.

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

Interested parties who wish to provide

1 comments can contact our office requesting time. That
2 said, we set aside 10 minutes for comments from
3 members of the public attending or listening to our
4 meetings. Written comments are also welcomed.

5 A meeting agenda for today's meeting was
6 published on the NRC's public meeting notice website,
7 as well as the ACRS meeting website. On the agenda
8 for this meeting, and on the ACRS meeting website, are
9 instructions as to how the public may participate. No
10 requests for making a statement to the Subcommittee
11 have been received from the public.

12 Due to the COVID-19, we are conducting
13 today's meeting virtually. A transcript of the
14 meeting is being kept and will be made available on
15 our website. Therefore, we request that participants
16 in these meetings should first identify themselves and
17 speak with sufficient clarity and volume so that they
18 can be readily heard.

19 All presenters please pause from time to
20 time during your presentation to allow members to ask
21 questions. Please also indicate the slide number you
22 are on when moving to the next slide.

23 We have a bridge line established for the
24 public to listen to the meeting. The public line will
25 be kept in a listen-only mode until the time for

1 public comment. To avoid audio interference, I
2 request all attendees make sure they are muted while
3 not speaking.

4 Based on our experience from previous
5 virtual meetings, I would like to remind the speakers
6 and presenters to speak slowly. We will take a short
7 break after each presentation to allow time for
8 screen-sharing, as well as at the Committee's or
9 Chairman's discretion during longer presentations.

10 We do have a backup call-in number should
11 Skype go down, and it has been provided to the ACRS
12 members. If you need to go to this backup number, the
13 public line will also be connected to the backup line.

14 Lastly, please do not use any virtual
15 meeting feature to conduct sidebar technical
16 discussion. Rather, contact the DFO if you have any
17 technical questions so that we can bring those to the
18 floor.

19 Note that we have scheduled the ACRS Full
20 Committee meeting for this review for July 9th. That
21 date may change, I guess, based on the schedules, but
22 it will be in July, based on the outcome of this
23 Digital I&C Subcommittee meeting.

24 We'll now proceed with the meeting, and I
25 will ask Ms. Tekia Govan to share her screen with us

1 while Mr. Eric Benner, the Director of the Division of
2 Engineering and External Hazards from the Office of
3 Nuclear Reactor Regulation, makes any introductory
4 remarks before we begin today's presentations.

5 Tekia and Eric, it's all yours.

6 MS. ANTONESCU: May I interrupt for a
7 second? Walt Kirchner is also going to join us.

8 CHAIR BROWN: Okay. Thanks. Thank you,
9 Christina.

10 Tekia and Eric, could you hold for a
11 minute? Were there any members that wanted to say
12 anything in advance of the staff beginning their
13 presentation?

14 CHAIRMAN SUNSERI: Hey, Charlie, this is
15 Matt. I just had one question. You said there were no
16 members of the public wanting to make a comment. I
17 thought we did have a request for one public comment.

18 CHAIR BROWN: No, the paper's been sent
19 in. We had it and sent it to the staff. He will be
20 making an oral comment at the end of the meeting --

21 CHAIRMAN SUNSERI: Okay. Okay. Great.

22 CHAIR BROWN: -- during the public
23 commenting session. Okay?

24 CHAIRMAN SUNSERI: Thanks.

25 CHAIR BROWN: Does that answer your

1 question, Matt?

2 CHAIRMAN SUNSERI: Yes, it did. Thank you
3 for the clarification.

4 CHAIR BROWN: Okay. Thank you.

5 MR. BENNER: Okay. Thank you, Member
6 Brown. This is Eric Benner, as you said, Director of
7 the Division of Engineering and External Hazards.

8 I greatly appreciate the opportunity to
9 present before the Committee today. We came to the
10 Committee last year to discuss the draft of this BTP
11 before we went out for public comment. We actually
12 had some good learnings from that meeting, and we're
13 here today to talk about both how we resolved the
14 public comments we received and the feedback we heard
15 from that meeting.

16 The BTP covers a lot of ground. And as we
17 looked at the comments, I think that's part of the
18 challenge before the staff, is this BTP would be used
19 both for a new reactor applicant, in the design and
20 reviewing the wholesale design of their digital I&C
21 system, as well as amendments to operating reactors
22 for any incorporation of digital I&C into their plants
23 that requires a license amendment.

24 So, in trying to partition that, because
25 there are some different regulatory requirements for

1 those two types of reactors, we looked at different
2 ways to partition. We ended up making more of a
3 partition regarding how integrated systems were. That
4 was a judgment call on our part. We still think it's
5 the right judgment call because the level of
6 integration does contribute to the complexity of the
7 system. And we'll explain some of that today as to
8 our rationale for how we constructed the BTP.

9 I would say the BTP also outlines a number
10 of different methodologies that a licensee could use
11 to address CCF, all of which are acceptable. That was
12 some of the feedback we heard from the ACRS
13 previously, is that it appeared that it was if/then,
14 that licensees would have to go sequentially through
15 the methodologies. That's not the case. Different
16 methodologies are equally acceptable.

17 So, we got a lot of comments. We made a
18 lot of changes to the BTP in response to those
19 comments. And I'm happy to turn it over to Wendell
20 Morton, who is going to explain the changes made to
21 the BTP in the context of how we responded to those
22 comments and concerns.

23 MEMBER BLEY: Eric, this is Dennis Bley.

24 MR. BENNER: Hi, Dennis.

25 MEMBER BLEY: May I ask you a question

1 about final comments and our status? We're going to
2 have a presentation, a brief one, from NEI later, and
3 are you going to address anything that they're going
4 to raise? Do you feel that you're pretty well-aligned
5 with other stakeholders on this now?

6 MR. BENNER: We've seen the NEI slides.
7 We've also gotten letters from several stakeholders.
8 We have looked at all that information and will
9 address some of that information in our presentation
10 today. We think some of this is, like I alluded to,
11 you know, the lens you look at this document is
12 through the lens of what you're trying to accomplish.

13 So, we think some of this is just us
14 better explaining our position, but we are considering
15 making some changes to the BTP to make some of these
16 positions clear. Some of this may be some changes to
17 the BTP. We haven't really concluded that's the case
18 yet. But, certainly, if we were going to do anything
19 beyond clarification to the BTP, we would reassess
20 whether we should have the Full Committee meeting next
21 month.

22 MEMBER BLEY: Okay.

23 MR. BENNER: If we just need to clarify --
24 and we're going to explain some of that today -- if
25 we're just going to clarify, we think we could make

1 some language changes to the BTP and still move
2 forward with a Full Committee meeting next month. If,
3 in parsing through all this stuff, we believe there's
4 any change to be made to the BTP, we would reconnect
5 with the Committee to discuss how best to handle that.

6 MEMBER BLEY: Okay. Thanks. And I just
7 saw the NEI slides and heard some of the public
8 comments we might be hearing later in the day, and
9 it's smelled like there wasn't quite as much alignment
10 as we had hoped. So, if you can address some of that
11 during the presentation before we hear from them, that
12 would be great.

13 MR. BENNER: Yes, and we'll touch on some
14 of those things as we go through the presentation.

15 CHAIR BROWN: Eric?

16 MR. BENNER: Yes?

17 CHAIR BROWN: This is Charlie.

18 Yes, you all commented. The November
19 version that we reviewed, you all did make pretty
20 extensive changes to that relative to the public
21 comments as well as the results of the Committee
22 meeting. I just wanted to echo Dennis' thought.
23 Recall that -- excuse me for a minute.

24 A full Committee meeting is not really
25 long enough if there's extensive, extensive changes,

1 based on what you all decide to do over the next
2 month. So, you ought to keep in mind, I think, that
3 if we need to have another Subcommittee meeting, if it
4 gets extensive, that we might talk about that as well
5 before we have a full Committee meeting. I don't want
6 to get -- we don't have as much time in a full
7 Committee meeting to go through details.

8 MR. BENNER: We agree completely.

9 CHAIR BROWN: Okay. I just wanted to make
10 sure we were on the same page. Thank you, Eric.

11 MR. BENNER: So, with that, I turn it over
12 to Wendell.

13 MR. MORTON: Thank you, Eric. Appreciate
14 that.

15 Once again, good morning, everyone. My
16 name is Wendell Morton. I'm the Team Lead for the
17 BTP 7-19 Revision project.

18 First, I want to thank my fellow team
19 members: Rossnyev Alvarado, David Rahn, Dawn
20 Matthews, Collette Davito (phonetic), as well as all
21 the other staff that contributed to this effort. And
22 I also want to thank industry for the input they
23 provided through the public comment period because we
24 think it will overall improve the content of the
25 document greatly.

1 This morning we'll be going through the
2 presentation and some of the changes that have taken
3 place, as we will the public comments. And this
4 draft, in particular, we'll be discussing did
5 incorporate the resolution of public comments and the
6 staff's position on those comments, as well as the
7 feedback we received from ACRS members during the
8 November 2019 Subcommittee meeting.

9 With that, please go to slide No. 2.

10 All right. So, here, for the agenda,
11 we're going to discuss some of the basic objectives we
12 have for this meeting as well as the summary of the
13 changes that we made overall in the document, some of
14 the key areas that we updated, as well as going over
15 the final status and the next steps for the project.

16 Please go to slide 3.

17 So, the objectives, similar to what we had
18 in November of 2019. It's to present key areas that
19 we updated in the BTP, Revision 8, both in response to
20 ACRS feedback we received and public comments.

21 In terms of Charlie's point to Eric a few
22 minutes ago, we did end up touching a lot of different
23 areas of the BTP in terms of our response to public
24 comments, but the basic structure and everything of
25 the BTP that you saw in the public version is still

1 largely very similar. We just added and refined a lot
2 of the content that was inside there. And you can see
3 that as we go through the presentation. And, of
4 course, we still want to obtain ACRS feedback on what
5 they've see in the current draft version of the BTP.
6 Right now, I'll just also note that the BTP itself is
7 still within concurrence in terms of the NRC.

8 And with that, please go to slide No. 4.

9 So, here we'll talk about the basic
10 summary of the changes with the BTP. And as I've just
11 said, there were a number of areas. In fact, most of
12 the document had some level of refinement due to the
13 various public comments received, from comments versus
14 the name, the actual title of the document, versus
15 comments to individual sections of the BTP. And as
16 you know, on bullet No. 2, a lot of the comments went
17 towards improving the readability, the technical
18 content and regulatory bases, and overall clarity of
19 the positions contained within.

20 Overall, in terms of public comments, we
21 received over 40 in all. Many of the comments came in
22 multiple parts as a multiple sublayer under the
23 initial comment with a number of proposed changes
24 attached therein. And we did also receive a few
25 comments from international stakeholders who were also

1 interested in providing feedback.

2 And as I think Member Bley and Member
3 Brown alluded to earlier, we are aware that we
4 received additional comments from stakeholders up to
5 this meeting. We understand there's potential
6 additional room for clarification. We understand that
7 and we will take that into account and consideration
8 as we complete the concurrence process. But we are
9 aware of the secondary comments we received post-
10 public comment period. So, I just wanted to note that
11 for the record as well.

12 So, if there's no questions on this slide,
13 we can go ahead and go to slide No. 5.

14 And basically, this summarizes the key
15 areas of the document, which you can pretty much tell
16 every area of the document was touched to some degree
17 by public comment. Some of this was as a result of
18 the staff recognizing there are potential refinements
19 to make as a result of public comments, but we
20 actually took the opportunity, based upon one comment,
21 to sort of expand upon what it was saying and, then,
22 take the opportunity to improve all these various
23 areas on the document. So, you can see that pretty
24 much many of areas of the document were refined or
25 improved as a result of public comment resolution.

1 And please go to slide No. 6.

2 So, one of the areas that we received in
3 terms of public comment feedback was the actual scope
4 of the BTP. Now this is an area where some public
5 comments were going in different directions. They
6 were stakeholders; they requested the scope of the BTP
7 to remain strictly focused on software and software-
8 based consideration when it comes to resolving CCF.
9 And there were other comments that looked forward to
10 and requested the staff expand the particular scope of
11 the BTP to include potential hardware latent defects
12 as part of the scope. And based upon our own internal
13 deliberation discussions and research, we did modify
14 the scope, as you see on the slide, to include
15 assessing the potential for CCF vulnerabilities and
16 consequences, both due to latent defects in hardware
17 or software.

18 Now I will note for the record that,
19 regardless of that particular consideration, either
20 latent defects in hardware or latent defects in the
21 software, ultimately, the response that you have from
22 receiving a CCF and the assessment you'll perform, per
23 the guidance within the BTP, remain the same. So,
24 this expansion is consistent actually what the staff
25 wrote way back in SECY-93-087, itself the precursor to

1 the SRM itself. We did mention the consideration for
2 hardware latent defects as being potentially
3 problematic for safety systems.

4 So, this is, more or less, making the
5 document more concise and, then, making the document
6 more consistent with other regulatory documents that
7 we have out there on the streets right, including
8 documents such as NEI-101 and the Risk Supplement
9 which mentioned these parts as well.

10 CHAIR BROWN: Wendell? Wendell?

11 MR. MORTON: Yes, sir?

12 CHAIR BROWN: I'm not quite sure how to
13 ask this question. I didn't ask it in the last
14 meeting because I didn't know how to ask it then,
15 either.

16 (Laughter.)

17 MR. MORTON: Okay.

18 CHAIR BROWN: You opened up, you start off
19 with the beginning of the whole BTP, and it talks
20 about latent defects.

21 MR. MORTON: Uh-hum.

22 CHAIR BROWN: But I didn't see, there was
23 no -- what do you all mean by a latent defect? I
24 understand it's latent -- (laughter) -- but how do you
25 -- that's why I didn't ask the question in the first

1 meeting.

2 MR. MORTON: Well, in terms of latent
3 defect, really, you can use the term "design defect".
4 We prefer using the term --

5 CHAIR BROWN: That's what I was thinking.

6 MR. MORTON: Yes.

7 CHAIR BROWN: But a design defect, there
8 could be -- I hate to say it this way -- there when
9 you talk about hardware, there was -- this is really
10 old. Okay?

11 MR. MORTON: Uh-hum, uh-hum.

12 CHAIR BROWN: Back in the old days of
13 integrated circuits and operational amplifiers, there
14 was, I think it was a 70-something and then, a 741
15 integrated circuit. They were both operational
16 amplifiers.

17 MR. MORTON: Uh-hum.

18 CHAIR BROWN: One of them -- nobody knew
19 it at the time; this was back in the late '70s -- when
20 you applied it, depending on how you did it, it would
21 lock up. An analog circuit would lock up in that
22 version. So, that was a hardware defect. It got
23 fixed, but nobody knew what it was.

24 So, you could have hardware latent
25 defects.

1 MR. MORTON: Uh-hum.

2 CHAIR BROWN: I call that a design defect
3 in the hardware. So, I think we're probably on the
4 same page. It's just that the term "latent" is very,
5 very broad, and I'm not sure anybody knows exactly how
6 that gets applied across the board.

7 I'll let you go on. I had to throw this
8 little rat into the thing.

9 MR. MORTON: No, thank you, Member Brown.
10 We appreciate that feedback.

11 So, from our standpoint, latent defects
12 are those kind of defects that have escaped detection,
13 human design or quality check processes themselves.

14 CHAIR BROWN: Okay. You didn't say that
15 explicitly.

16 MR. MORTON: Yes, but --

17 CHAIR BROWN: I don't remember you saying
18 it explicitly; let's put it that way.

19 MR. MORTON: Yes, that's our general
20 perspective on using the term "latent defect" versus
21 "design defect".

22 CHAIR BROWN: Well, you might say that in
23 your document, just so people will understand what
24 you're talking about.

25 MEMBER BLEY: This is Dennis.

1 I'm wanted to jump into this just a little
2 because this goes back to what we talked about 10-15
3 years ago. You don't have software failures. It
4 doesn't fail sitting there. The only way it gets you
5 in trouble, if there's something you haven't tested
6 that comes up buried inside it. So, those are latent
7 problems. Whether or not you call them "failures" or
8 not is irrelevant.

9 MR. MORTON: Yes, the terminology,
10 whenever we're talking about CCF, it's challenging to
11 find something that we all consistently agree on. So,
12 one of the goals of this revision is to finalize
13 terminology that we can all be on the same page when
14 it comes to addressing CCF. So, we definitely
15 understand that point.

16 CHAIR BROWN: Okay, you can go ahead,
17 Wendell.

18 MR. MORTON: All right.

19 CHAIR BROWN: Is that okay, Dennis? Are
20 you okay?

21 MEMBER BLEY: Yes, I'll speak up if I'm
22 not.

23 CHAIR BROWN: Okay. I figured as much.

24 (Laughter.)

25 MR. MORTON: Okay. Please go to slide No.

1 7.

2 So, in terms of the restructuring of the
3 BTP, this is an area of the document where we made
4 great use of the feedback ACRS gave us back in
5 November of 2019 in terms of there were a couple of
6 things from Rev. 7 that we brought back into the
7 document in terms of the specific conversation about
8 echelons of defense, in terms of the discussion about
9 spurious operations, and lastly, sort of the
10 consistency of the logic that we use in terms of, you
11 know, as Eric was referring to earlier, there are a
12 number of approaches to address CCF within the BTP and
13 it's not monolithic.

14 You can choose any particular approach the
15 licensee or applicant wants to. It's not a sequential
16 process. It's more of an "or" process where you can
17 actually pick and choose which particular path forward
18 you want to take, whether you want to do a
19 consequence-type analysis or you want to do testing
20 and things of that nature.

21 So, that's one of the big things we got
22 from restructuring the BTP, is a lot of the feedback
23 we made use of from mainly ACRS, and a lot of that was
24 incorporated into the document, as well as other
25 public comments to kind of lend itself along those

1 lines as well.

2 CHAIR BROWN: I would make one observation
3 that you all did start leading in with some preambles
4 to a number of the sections --

5 MR. MORTON: That's correct, yes.

6 CHAIR BROWN: -- where you discuss what
7 were you trying to accomplish before you went into all
8 the "ifs" and "whys".

9 MR. MORTON: Yes.

10 CHAIR BROWN: And I thought that was a
11 plus. I'm just giving you -- it was an obvious effort
12 to try to think that way, and I think that came out
13 better in a number of the sections. That's positive
14 feedback.

15 MR. MORTON: Yes, we appreciate that.
16 Because one of the things, when you get so kind of
17 deep into the weeds with the project, sometimes you
18 forget that you actually need to study where you're
19 trying to go before you go there.

20 CHAIR BROWN: That's right. That was the
21 purpose of the comment back in that meeting.

22 MR. MORTON: Yes. So, we definitely took
23 that to heart. Thank you.

24 So, if there's no other questions, we'll
25 go to slide No. 8, please.

1 Now this is an area of the BTP where we
2 got a lot of public feedback previously in our past
3 couple of meetings last year, as well as a few public
4 comments. And one of the things I wanted to note for
5 the graded approach is that, as you see on the slide,
6 that little asterisk says, "Not required to be
7 implemented as shown". Basically saying, a licensee
8 or applicant is clearly to implement a graded approach
9 at their discretion, so long as the graded approach is
10 at least described and documented within their
11 application, so that a reviewer can understand it.

12 This was just a sample framework, and we
13 wanted to reemphasize that point, too. So that a
14 licensee/applicant can choose to adopt this framework
15 exactly as written or they can modify it to their
16 particular purposes, or they can use another framework
17 entirely. For example, where you see an A1 category,
18 a licensee could choose to perform a D3 assessment
19 that covers all SSC categories at one time. We've
20 seen that in advanced reactor space. So, we just
21 wanted to reiterate that this is just a sample
22 approach and licensees are at this discretion to use
23 or not use portions of it at their discretion.

24 MEMBER MARCH-LEUBA: Wendell, this is
25 Jose.

1 MR. MORTON: Yes?

2 MEMBER MARCH-LEUBA: I remember asking you
3 the same question. So, I'm going to repeat it. Can
4 you me an example of the component that you
5 characterize as B1, one that is significant to safety,
6 but is not safety-related?

7 MR. MORTON: Right. And you'll see this
8 breakdown within the BTP supplement where we actually
9 have descriptions of the individual systems. And for
10 B1 systems, the important thing to keep in mind is
11 that that would be a system or component that's
12 capable of affecting reactivity, the power level of
13 the reactor, such that it could initiate an accident
14 sequence. So, obviously, that would include such non-
15 safety-related systems as the non-safety-related lock
16 control system that has an accident actually analyzing
17 the chapter for standard analysis, for example, or a
18 system such as a pressurizers. Feedwater has an
19 accident that it is an initiator of and it is analyzed
20 in safety, in the accident analysis. So, systems such
21 as that would be something that would be considered a
22 B1 SSC.

23 MEMBER MARCH-LEUBA: See, what I was
24 thinking, if the applicant or licensee took credits
25 for this component on their PRA analysis, that means

1 it contributes to the safety of the plant because they
2 get credit for it. Is that significant enough to be
3 B1 or would become B2? It's very qualitative or
4 subjective what you make B1 and B2.

5 MR. MORTON: Yes, the staff recognizes
6 that these are qualitative definitions that really
7 depend upon the licensing basis of an individual
8 license and the application itself. And there's going
9 to be systems which may fall in between these
10 categories. It's one of the reasons why we allow for
11 the potential use of PRA insights to inform the
12 categorization itself if the deterministic or
13 qualitative approach leaves you in a place where
14 you're not quite sure which way to go.

15 MEMBER MARCH-LEUBA: Yes, my problem is
16 defining "significant". And I know we're late and you
17 don't have to pay attention to what I'm saying, but I
18 would have liked more objective -- say, if removing
19 this equipment from the risk analysis, the PRA,
20 increases the damage to the plant by more than 10 to
21 the minus X, then it's significant. If it's less than
22 10 to the minus X, it's not significant. And that
23 would be a good application of risk-informed
24 regulation.

25 MR. MORTON: Uh-hum.

1 MEMBER MARCH-LEUBA: Well, yes, put in the
2 comment, I would have liked to see more objective
3 tests.

4 MR. MORTON: Well, just keep in mind that
5 this is an example framework. And actually what you
6 just stated is something that, within the guidance of
7 the BTP, I'd like to see us free to do that sort of an
8 approach, that you can form your categorization
9 through your PRA insights if a plant actually has that
10 particular framework already set up. It's one of the
11 considerations that some licensees may have a PRA
12 fully fleshed out and they're comfortable using those
13 numbers; some of them may not. So, that's part of
14 what the framework is; a licensee is free to use that
15 sort of information at their discretion.

16 MEMBER MARCH-LEUBA: All right. Thank
17 you. Yes, please move on.

18 MEMBER KIRCHNER: Wendell, this is Walt
19 Kirchner. If I could follow on to Jose?

20 MR. MORTON: Uh-hum.

21 MEMBER KIRCHNER: Systems that were in the
22 DRAP, would they fall under category B1?

23 MR. MORTON: I'm sorry, I didn't hear.
24 Can you explain that?

25 MEMBER KIRCHNER: A system is categorized

1 and is included in the DRAP. Would that be something
2 you would check for under B1?

3 MR. MORTON: I guess you'll have to
4 forgive me; I'm not specifically familiar with what
5 the DRAP is. I don't understand. Is that a report at
6 the sites or is that something -- if you could explain
7 what you mean by DRAP?

8 MEMBER KIRCHNER: No, it's the Design
9 Reliability Assurance Program.

10 MR. MORTON: Well, I would say I'm not
11 specifically familiar with that particular program.
12 We can check on it and get you some information back.
13 We'll respond to that.

14 MEMBER KIRCHNER: Okay. Thank you.

15 MR. MORTON: Okay.

16 MEMBER DIMITRIJEVIC: Hello?

17 MR. MORTON: Yes?

18 MEMBER DIMITRIJEVIC: Okay. This is Vesna
19 Dimitrijevic.

20 Well, I just want to say that your scheme
21 -- and this is where it's very similar, I mean it's
22 identical to 50.69 where there is a clear, defined
23 quantitative criteria to define what is safety
24 significant and what's non-safety significant. And
25 the same criteria apply for DRAP. So, you are

1 familiar with 50.69, the quantitative criteria for
2 safety significance, right?

3 MR. MORTON: Yes.

4 MEMBER DIMITRIJEVIC: So, I mean, they're
5 similar. So, the systems there, because Jose was
6 mentioning that, if they're removed from the risk
7 assessment, it will increase the risk by twice, which
8 contributed more than 5 percent to risk, considered
9 risk significant. So, the same criteria applies for
10 DRAP systems.

11 MR. MORTON: I see. Okay.

12 MEMBER DIMITRIJEVIC: And that's the
13 quantitative criteria I assume you would consider
14 similar to what you consider here because it's the
15 same scheme.

16 MR. BENNER: Yes, this is Eric Benner.

17 I think we could have a lot of discussion
18 on this. We actually did start by coupling this
19 somewhat to the categorization scheme in 50.69. There
20 was a lot of discussion about whether across-the-board
21 I&C systems their risk significance was quantified
22 adequately to use a system like that. And certainly
23 not all licensees have or will adopt 50.69.

24 So, certainly, someone who was ready to
25 use and wanted to use a more quantified methodology,

1 either under 50.69 or the DRAP, that would be great.
2 We certainly would entertain that. This is somewhat
3 fuzzier because it needs to both accommodate that and
4 it would need to accommodate those licensees who maybe
5 haven't advanced as far in the quantified area, but
6 would have risk insights that they legitimately would
7 want to, and we legitimately would, consider in
8 rendering which of these boxes a system would fit in.

9 MR. MORTON: Did that answer the member's
10 question?

11 (No response.)

12 CHAIR BROWN: Did we lose Vesna?

13 MR. MORTON: I can't hear her.

14 MEMBER DIMITRIJEVIC: No, I'm here, and I
15 said yes. I don't know. Did you hear me? Yes. I
16 mean, I can see why it would be an issue with using
17 this directly for I&C systems because of the different
18 considerations, yes. All right.

19 MR. MORTON: Okay. I'm sorry, Eric, go
20 ahead.

21 MR. BENNER: I was just thanking the
22 members. Because we struggled with that. We started
23 in a more quantitative place and had enough discussion
24 and got enough feedback that being strictly
25 quantitative was going to lessen the utility of this

1 approach, particularly for first adopters. We may get
2 to a point where, if we do more of these reviews, that
3 it might be more straightforward for other licensees
4 to use quantitative methods, but we're particularly
5 looking at the types of applications we would get over
6 the next five years, and we suspect that the risk
7 insights that would be brought into this would likely
8 be more qualitative.

9 CHAIR BROWN: Eric, are you there?

10 MR. BENNER: Yes, I'm here.

11 CHAIR BROWN: The picture you're showing
12 here, the slide you're showing here, was -- I'm trying
13 to find the same picture in the November version it
14 was, but I think that is the picture from the November
15 version of Rev. 8, is that correct?

16 MR. BENNER: Yes. It's the same picture,
17 but some of the particular language might be
18 different.

19 CHAIR BROWN: Yes, I'm looking at Table
20 2.1 right now, which is the equivalent, what you
21 replaced that picture with on page 16. And it has all
22 kinds of explanation for A1, B1, A2, B2, possibly even
23 addressing Jose's or other questions.

24 MR. BENNER: It partially does, and that
25 is one of the -- I'm going to take some of Wendell's

1 thunder here.

2 MR. MORTON: Go for it.

3 MR. BENNER: In the explanation in the
4 table, it has more description, I agree with that, and
5 that description is good. Those descriptions are
6 mainly deterministic in nature. What you're going to
7 hear in the NEI presentation is they believe, with
8 those descriptions, the use of risk insights isn't
9 coupled tightly enough to this table. The paragraph
10 essentially right after the table talks about the use
11 of risk insights. We are looking at ways to maybe
12 migrate that risk insight piece into the table to more
13 tightly couple that you could use or either
14 deterministic or risk insights in helping to make your
15 determination of which box a system would fit in. So,
16 that's one of the changes we're considering based on
17 some of the recent feedback we received on the BTP.

18 CHAIR BROWN: So, this table might look
19 different the next time? Is that what you're saying?

20 MR. BENNER: The table proper, I think all
21 the content is there, because, like I said, the
22 paragraph is right after the table. So, it would be
23 the same content. It would just be how much of that
24 we pack into the table proper versus being an
25 explanation of how to use the table.

1 CHAIR BROWN: Okay. Let me try to make
2 sure I'm clear of what you're saying. If I look at
3 the table, which I'm doing right now, the A1 thing has
4 a paragraph that says, "Equipment relied upon to
5 initiate," on and on and on. And then, it says, "or
6 failure could directly lead to accident conditions
7 that may cause unacceptable consequences if no other
8 actions are taken, or equipment required to have
9 diversity to the extent practical for the GDCs." And
10 under that, it says, "Application or amendment should
11 include a D3 assessment, as described in Section B3."
12 That's fairly extensive. Okay?

13 MR. BENNER: Yes, yes.

14 CHAIR BROWN: And that part, then, you
15 follow in naturally with the "below" thing where you
16 say, "The graded approach presented in the table is
17 consistent with SECY-18-0090." And you go on with the
18 rest of your discussion.

19 I had no problem, I don't have any problem
20 with the graded approach. So, I don't want you to
21 take my comment in that manner. But when you get to
22 the end of your discussion on the next page, which is
23 part of, I guess -- I forgotten which; I was going to
24 save this for later, but it's like B2.1 and it's past
25 the table and it's the last paragraph of B2.1.

1 And in that paragraph, it reads -- you
2 give an example -- "For example" -- this is on
3 combining systems -- "if a digital protection system
4 includes controllers and/or performing reactor trip
5 and ESF logic, as well as others, the final actuation
6 device through the equipment performs functions, then
7 all equipment must be categorized as A1." Well, I got
8 that. And therefore, you have to do a D3 assessment.

9 This leaves the impression, very clear
10 implication, that you can combine your reactor trip
11 systems commonly through a common set of controllers,
12 and as long as you do a D3 assessment, you can combine
13 RTS and ESFAS systems and everything's okay. That
14 kind of strikes me, I guess from a deterministic
15 standpoint I guess risk is nice, but I don't think,
16 personally, that I could ever walk around saying, to
17 agree that the reactor trip systems and ESFAS systems
18 and/or multiple divisions could be incorporated into
19 a single combined integrated system, one controller,
20 similar to what one project did when they put stuff up
21 in a network for doing some controls, and I can't name
22 the project.

23 It's just there's some inconsistency
24 there. That's all I'm saying.

25 MR. MORTON: Well, Charlie, the point of

1 that particular -- and I know that it's the paragraph
2 below the risk insights paragraph you're referring to.
3 You know in our advanced reactor reviews the
4 protection system function, which is our rapid trip
5 function and the ESFAS function, are combined into the
6 same system oftentimes.

7 CHAIR BROWN: I understand that. I've
8 read the Chapter 7 where it talks about that. And I
9 won't tell you what my reaction was because it's not
10 a good forum for that right now.

11 But, anyway, it's just that issue is, to
12 me, it's still an open issue, even if it's an advanced
13 reactor, how you can combine all that stuff into one.

14 So, anyway, you can go on. I just wanted
15 to make sure you understood at least one point I had.
16 Okay?

17 MR. MORTON: Okay.

18 CHAIR BROWN: Instead of decoupling it to
19 the end.

20 MEMBER BLEY: I'm sorry, Charlie.

21 CHAIR BROWN: Yes, go ahead.

22 MEMBER BLEY: I apologize, my sound went
23 squirrely a while back and I couldn't finish what I
24 was trying to say.

25 I'm going to say on two parts. If, in

1 fact, we hit a point where you can do a good risk
2 assessment on these kind of systems and be
3 quantitative, then if the risk turns out to be high,
4 which makes it safety significant, treating A1 and B1
5 differently makes no sense logically. If you're at
6 the point where we are now, where much of the digital
7 I&C has to be treated qualitatively, then the best you
8 can do is a qualitative assessment.

9 I think you've given lip service to what
10 you might see in the future, but if you can do it
11 quantitatively and do it well, I see no reason to
12 treat A1 and B1 differently. They both have the same
13 safety impact on the plant.

14 So, I'll just leave it at that. I don't
15 want to have a discussion about it.

16 And on the point Charlie was making, this
17 is kind of a question. It's not a PRA-related thing,
18 Charlie. If the D3 assessment is set up well enough,
19 then the kind of problems you're envisioning either
20 can be clearly shown not to exist in this system or
21 you can't do it that way. And I think that might be
22 where the staff is coming from. Maybe they can
23 comment on that.

24 MR. MORTON: Yes.

25 CHAIR BROWN: Yes, let me make one comment

1 relative to Dennis. I understand your point. When we
2 did 9607, and you looked at some of the examples
3 relative to the digital I&C side, you know, the
4 Section 436, they provided some examples where
5 functions that were kind of safety-related, but they
6 were able to combine them, but they weren't the
7 reactor trip or safeguard systems. And they were good
8 examples and they made sense.

9 So, I don't disagree with you from the
10 standpoint of a D3 assessment can let you do some
11 combining with certain functions. It's just that
12 it's, mentally, I have a hard time walking down that
13 path for the specific reactor trip and safeguards
14 actuation systems.

15 So, anyway, that's where I come from. I
16 don't disagree with you. There's a lot of other stuff
17 that can be put together, I think, and it would work
18 out just fine, as they showed in their examples. They
19 went through a fairly decent argument on some of
20 those. That's just my input.

21 MR. MORTON: And, Member Brown, thank you
22 very much.

23 And I've been involved in the Appendix D
24 work as well for those examples. That's one of the
25 challenges with the graded approach, is that we want

1 to reiterate, it's not required for a
2 licensee/applicant to implement a graded approach.
3 They can assess the diversity/defense-in-depth of the
4 proposed system at their discretion. But this is a
5 sample approach to help them with the categorization.

6 There are a lot of nuances with digital
7 technology and the potential to integrate A1 systems,
8 safety-related systems, or if you see in advanced
9 reactors, you will see integration potentially between
10 A1 and B1 categories as well. So, one of the things
11 we try to do is take a high-level approach to the
12 categorization scheme and giving licensees the
13 flexibility to approach it the way they see fit. And
14 part of that flexibility is using PRA insights, if
15 they are available to them, to do such. I just wanted
16 to reiterate that final point.

17 CHAIR BROWN: Yes, don't take me as being
18 against taking a graded approach to the design of some
19 of the systems. Okay? I'm not against that.

20 MR. MORTON: Understood. Thank you.

21 CHAIR BROWN: It's just that I stumbled in
22 a couple of specific examples. That's all.

23 Okay. Thanks.

24 MR. MORTON: Thank you.

25 So, we can move to slide No. 9.

1 This where we kind of touched on this
2 already, but just kind of quickly, that the use of
3 risk insights to inform the safety significant
4 determination, I think we've kind of talked about this
5 before. But we do want to reiterate that it's at the
6 discretion of the licensee/applicant to use risk
7 insights, if they have them available for the
8 particular systems that are in question for the
9 proposed modification or new build.

10 And we do believe the risk insights can be
11 a valuable input to an integrated decision making
12 process when you're choosing to categorize your system
13 if you choose to follow a graded approach.

14 So, if there's no other questions, please
15 go to slide No. 10.

16 And here, we basically describe the
17 overall D3 assessment. It's some of the changes.
18 We've made a number of refinements and some key
19 modifications here to the D3 assessment as a whole and
20 the various approaches you can take.

21 One of the things I want to point out to
22 you, the bullet No. 2, in which we say we clarify that
23 a D3 assessment is not monolithic. Sort of like what
24 we've been touching on already is that, whether you
25 adopt a graded approach or not, there's a lot of

1 different ways the staff presents in the BTP to
2 address CCF vulnerabilities. Deterministically or
3 through consequence analysis or design features of the
4 testing, there's a lot of different approaches and
5 we've approved a lot of different approaches to that,
6 where some licensees have done a D3 approach that
7 encompassed all systems within there, and then, others
8 have more of a piecemeal approach where they've used
9 different avenues to address CCF and potential
10 vulnerabilities.

11 And this is also a key piece of feedback
12 we got in ACRS from the November meeting as well. And
13 like I said, we had a number of public comments that
14 touched on various areas in Section 3 of the BTP,
15 which is the overall D3 assessment.

16 If there's no questions, we can go to
17 slide No. 11.

18 And here, we try to graphically
19 demonstrate that there's a lot of different paths to
20 success for addressing CCF vulnerabilities. In the
21 first bullet, you'll see some of the deterministic
22 approaches you can take using specific design
23 features: diversity, testing, or defensive measures,
24 which is another concept we introduced within the BTP.
25 And we have a slide that we'll touch on more details

1 later.

2 These are basically "OR gates". We want
3 to illustrate that you don't have to go through the
4 BTP in a linear, sequential approach. A licensee or
5 an applicant can take any one of these particular
6 options to demonstrate that they have effectively
7 addressed the potential for CCF in their system, and
8 including the last. You can also demonstrate you can
9 cope with the consequences of the CFF through analysis
10 only, if the licensee or applicant chooses to do so,
11 without implementing these other above aspects on this
12 slide.

13 And if there are no questions, we can go
14 to slide No. 12.

15 And here's where we talk about the design
16 features aspect of approaching the D3 assessment,
17 where we talk about diversity and testing as two
18 approaches you can use to address potential CCFs in a
19 proposed system.

20 We did get a number of public comments on
21 that, and especially with regard to the testing aspect
22 of it. We did largely accept some of the approaches
23 provided in IEEE 7-4.3.2-2016. It's not an overall
24 adoption, but we did largely adopt some of the
25 approaches they took when it came to the comprehensive

1 testing to correct related defects.

2 CHAIR BROWN: Wendell?

3 MR. MORTON: Yes, sir

4 CHAIR BROWN: I think I read this, but I
5 don't remember it on the testing, and then, I'll come
6 back to the first bullet.

7 MR. MORTON: Okay.

8 CHAIR BROWN: I seem to remember there was
9 a couple of lines in there that talked about you had
10 to test every path and every whatever. By the time I
11 finished reading the testing section to eliminate CFF,
12 as a designer and a vendor, I would have never have
13 proposed trying to ever test to do what you all said
14 you could do. It's just too hard. All right?

15 (Laughter.)

16 And you would always default back to, how
17 do I design a system with enough redundancy,
18 independence, and then, factor in the diversity
19 between divisions and stuff like that?

20 If you remember, I opened up the last
21 meeting with you didn't say anything at all about
22 architecture. You did add one word that said
23 "architecture" up on the first background, or
24 something. And then, after that, you ignored it in
25 this version.

1 But, in reality, the architecture of the
2 system is really your first line of defense from a
3 defense-in-depth and CCF protection. All the rest
4 comes in within that architecture to provide what I
5 would call the nuanced things, the small things that
6 you don't pick up with an architecture, like multiple
7 types of processors or different programming languages
8 or not using processors for the voting units; using
9 integrated digital logic, you know, integrated circuit
10 digital logic.

11 There's a lot of different ways to do that
12 within the system, but the architecture itself, the
13 independence, redundancy, and deterministic processing
14 as well as not letting the internet access to it,
15 gives you a tremendous ability to protect yourself
16 from CCF situations. Then, you only have to worry
17 about the nuances and pieces, piece parts, within the
18 components.

19 The testing is so hard. I mean, I tried.
20 It is really difficult. Just to give you an example,
21 when we first started developing this stuff for the
22 nuclear program, naval nuclear program, we literally
23 built the entire I&C suite plus the reactor plant
24 control panels and everything, the actual engineering
25 models. Put them in the lab. Set up the computers to

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1 totally model the plant in every way, shape, or form.
2 Used emulators to make it look like you were sending
3 real sensors, you know, real detector signals out.
4 And then, we went off to that testing originally and
5 it was brutal. I mean, it takes a year to even come
6 close. And even then, you know you haven't tested
7 every path.

8 And we didn't use interrupt-driven
9 systems. We had straight-through, deterministic
10 processing. You never stopped or interrupted a
11 processing sample time.

12 So, testing is very, very difficult. I
13 mean, with us, I think we've missed the boat by not
14 emphasizing the benefits of an architecture framework
15 as we've been defining it in all the projects we've
16 been reviewing. So, that's just my qualitative throw-
17 in on this. But the testing is pretty difficult, and
18 I hope you all recognize that. I'm surprised industry
19 didn't choke when they read the testing section.
20 Maybe they did. Did they?

21 (No response.)

22 Can you still hear me?

23 MR. MORTON: Hello? Can you hear me?

24 CHAIR BROWN: Could you hear me?

25 MR. MORTON: Yes. For some reason, my

1 volume kind of blanked out.

2 CHAIR BROWN: Oh, okay. All right.

3 MR. MORTON: Sorry about that.

4 CHAIR BROWN: I'm finished with my
5 soliloquy there.

6 Did the industry ever say anything about
7 the extensive nature of the testing that you seem to
8 identify?

9 MR. MORTON: Well, in point of fact,
10 during our public meetings on the BTP last year where
11 we encouraged industry input, one of their
12 recommendations was to adopt the framework from IEEE
13 7-4.3.2-2016, as public comment, essentially within
14 the public meeting. We actually got that feedback
15 from industry to approve a more defined and achievable
16 criteria for testing.

17 And we understand that it's a high
18 threshold, but we want it to be high because we want
19 to remove further consideration of CCF. And that was
20 one of industry's recommendations, which we looked
21 into and tweaked a little bit, but we did largely
22 adopt that part of 7-4.3.2-2016 as published.

23 But I also would keep in mind that the
24 testing itself is really geared towards more simple
25 systems or devices like priority modules, for example.

1 CHAIR BROWN: Like what? Say that again?

2 MR. MORTON: Like priority modules.

3 CHAIR BROWN: Oh, okay.

4 MR. MORTON: Now if a licensee or
5 applicant wants to do that sort of level of testing
6 for an entire system, the staff encourages them to do
7 so. We would welcome reviewing that sort of approach,
8 if they choose, and they can. But it's really more
9 targeted towards simpler systems with simpler devices
10 like priority modules.

11 CHAIR BROWN: How come IEEE 7-4.3.2 is not
12 mentioned in the actual testing text?

13 MR. MORTON: It's not a word-for-word
14 adoption of the text.

15 CHAIR BROWN: No, even the IEEE standard
16 is not mentioned anywhere as a guide, part of the
17 guidance.

18 MR. MORTON: I'll have to look into the
19 BTP to see if we --

20 CHAIR BROWN: Okay. That's all right.
21 That's a secondary thing. Go ahead.

22 MR. MORTON: Okay. But that's largely it
23 in terms of the testing aspect, because we did respond
24 to public comment feedback on the testing because,
25 previously, industry had similar concerns about the

1 usability of testing criteria to actually legitimately
2 assess CCF vulnerabilities. So, we responded to that.
3 We responded to that in kind. But we also have not
4 endorsed 7-4.3.2-2016, either, is one reason.

5 CHAIR BROWN: Okay. Thank you.

6 MR. MORTON: Okay. If there's no other
7 questions, we can move to slide 13, please.

8 And so, I referenced earlier on slide 11
9 about defensive measures, and here's where we did
10 receive specific public comments and public feedback
11 on the potential to include defensive measures. So,
12 defensive measures are a subset of design attributes
13 that can be credited to prevent, limit, or mitigate
14 the potential consequences of a CCF vulnerability
15 being triggered somehow.

16 Now this in concept has not specifically
17 been presented to staff for approval as of yet, but it
18 does allow for innovative design techniques to be
19 employed to address CCF, if, in fact, when they do get
20 submitted for review. And that's why we know that,
21 because it's a new concept that we're opening the door
22 for, because we understand and can appreciate the
23 potential for innovative approaches to address CCF
24 within the design, including architecture. We still
25 need it, though, to be NRC-approved and be credited

1 towards that effect.

2 And this was in response to a number of
3 public comments and feedback we received over the last
4 year or so while we were starting the revision to
5 BTP 7-19.

6 MEMBER KIRCHNER: Wendell?

7 MR. MORTON: Yes?

8 MEMBER KIRCHNER: This is Walt Kirchner
9 again.

10 MR. MORTON: Uh-hum.

11 MEMBER KIRCHNER: Could you give an
12 example of what you mean by innovative design
13 techniques? I'm still thinking what Charlie has
14 postulated. It's architecture. So, what do you mean
15 by innovative design techniques to address CCF?

16 MR. MORTON: Well, in terms of the
17 specifics on the defensive measures, it's still a
18 conceptual aspect to the BTP. But we have not
19 specifically seen or had submitted to us an entire set
20 of defensive measures that can be deployed.

21 And I think there might be a typo inside
22 the slide, the second bullet on the slide. It reads,
23 "innovative". I believe it should be "integrated
24 design techniques," not "innovative". So, I
25 apologize, but I believe we have a typo on that

1 particular slide, for bullet No. 2 on the slide.

2 CHAIR BROWN: Walt, are you there?

3 MEMBER KIRCHNER: Yes, Charlie.

4 CHAIR BROWN: I will try to give you a
5 little bit of a -- I'm not sure this is as complete as
6 what Wendell and staff and industry are talking about.
7 But your project actually did something kind of unique
8 relative to the use of two different types of -- not
9 just the use of two different types of FPGAs, Field-
10 Programmable Gate Arrays, and their divisions, but
11 they also chose one that was a volatile type FPGA
12 where it had to be reprogrammed. Every time the power
13 went off, it disappeared; the memory disappeared.
14 When it turned back on, it had to be reloaded. The
15 other one was non-volatile.

16 So, the programming is different on those
17 in the way they're -- and it's like a hard-wired
18 digital logic effectively. But it's a number of
19 different ways that kind of aggregate combinations of
20 different things that could give you a CCF.

21 I mean, I'm not advocating doing that.
22 I'm just saying that's what they did, and it gave us
23 enough comfort that we walked away from that
24 satisfied. And that was kind of innovative.

25 So, I throw that in just as a little bit

1 of an information piece to you.

2 MEMBER KIRCHNER: Thank you, Charlie.

3 MR. MORTON: Yes, because digital
4 technology moves at a very rapid pace, we wanted to at
5 least provide a doorway so that a licensee or
6 applicant can provide a new approach to addressing an
7 old issue that we haven't necessarily seen or
8 specifically have approved yet. So, we wanted to
9 provide the flexibility for a licensee to do that, and
10 that's the general reason for the inclusion of
11 defensive measures.

12 CHAIR BROWN: Yes, and I brought that up
13 only because the approach they took really does
14 provide -- not only do they have the independence and
15 redundancy, but they also have the internal variation
16 without complicating the overall design.

17 MR. MORTON: Right.

18 CHAIR BROWN: So, that's why I considered
19 it a pretty darn good approach.

20 All right. Go ahead. I'm sorry.

21 MR. MORTON: Oh, no problem.

22 If there's no other questions, then we can
23 go on to slide No. 14. If you can go back one more
24 slide? Thank you. Sorry about that.

25 So, also diverse means to mitigate CCFs.

1 So, this is where the staff clarified, due to the
2 number of public comments, the specific diverse means
3 you can use to actually address CCF, to provide the
4 safety function if the protection system loses the
5 ability to provide due to a CCF. And that means
6 manual operator actions or the crediting of a
7 preexisting system or the potential for a brand-new
8 system such as diverse actuations that could be
9 installed to provide that protective function in lieu
10 of a safety system that was disabled due to a Common
11 Cause Failure.

12 And a number of aspects inside here were
13 clarified in terms of references that we had to ATWS,
14 references that we had in terms of quality for the
15 equipment being credited, and things of that nature
16 that were all clarified and refined due to public
17 comments and feedback.

18 So, if there's no other questions on this
19 slide, we can go on to slide 15.

20 And here, we talk about another avenue
21 licensees have to address CCF with their proposed
22 systems. You can simply do an analysis that
23 demonstrates that you are effectively bounded from all
24 variations of a combination of different systems
25 and/or components failing to demonstrate that.

1 So, this is another thing we wanted to
2 clarify that was another type of path forward that a
3 licensee can take to address CCF as well, looking at
4 the event consequences, and usually, the plant can
5 cope with the consequence of a CCF.

6 And I'm hearing no questions on this
7 slide. So, we can move to slide 16.

8 And here is a new addition -- and we
9 talked about this in the Subcommittee meeting in
10 November -- but the new additions that we have to the
11 BTP, which is the qualitative assessment
12 applicability. And these are really for those non-A1
13 systems. You can address potential vulnerabilities to
14 CCF.

15 And as we sort of stated in the November
16 meeting, this leverages the information we have with
17 RIS 2002-22, Supplement 1, that for non-A1-type
18 systems, a qualitative look at the design actuates of
19 the system, the design quality built in, and the
20 operating experience that's available, taken in
21 aggregate, provide a sufficient means to say that you
22 can address the potential for CCF vulnerability to be
23 addressed. And that section was added to provide
24 flexibility upon the adoption of a graded approach.

25 CHAIR BROWN: Wendell, why wouldn't A2 be

1 in this, non-A2 be in this category? A2 is a safety
2 -- what? I've forgotten the category. What is it?
3 A2 is --

4 MR. MORTON: Safety support systems.

5 CHAIR BROWN: Yes. How do you phrase it,
6 though? Is it safety-related, but -- I have to go
7 back to look at your chart.

8 MR. MORTON: Let me go back to --

9 MEMBER BLEY: Not safety significant.

10 CHAIR BROWN: Thank you.

11 MR. MORTON: Not safety significant.
12 Thank you.

13 CHAIR BROWN: Safety-related, but not
14 safety significant.

15 MR. MORTON: Uh-hum.

16 CHAIR BROWN: Why wouldn't that category
17 be in this first bullet as well? I mean, it's safety-
18 related. Even though it's not safety significant, it
19 seemed to me you would still not want it to fall off
20 the log.

21 MR. MORTON: Well, we do include it within
22 this category. So, we say, in the first bullet, for
23 a non-A1 category system. So, that would be your B1,
24 A2, and B2 categories.

25 CHAIR BROWN: Oh, I'm sorry, I read it

1 wrong. I apologize.

2 MR. MORTON: Oh, no problem. That's what
3 we're here for.

4 CHAIR BROWN: Thank you.

5 MR. MORTON: No problem.

6 So, yes, for non-A1 categories --

7 CHAIR BROWN: Yes, I got it.

8 MR. MORTON: -- it's sufficient.

9 CHAIR BROWN: Forgive me, please.

10 MR. MORTON: So, any other questions on
11 this slide?

12 (No response.)

13 Okay. We can move on to slide 17.

14 So, spurious operation evaluation
15 guidance. We did receive a lot of feedback on this
16 particular section and its previous incarnation within
17 the publicly available portions of the BTP. We
18 received comments in terms of the regulatory basis,
19 and we received some comments on the flow, of course,
20 and how it was reading; and also, just on various
21 aspects of the spurious operation guidance itself.

22 So, when the staff looked at this section
23 going from Rev. 7, the Rev. 7 version of the BTP
24 didn't provide in our minds specific guidance that was
25 actionable by a licensee or applicant, even though we

1 know spurious operation is a credible outcome of a CCF
2 in the same way that a loss of design function is.

3 So, the effort for the spurious operation
4 guidance is actually to provide specific criteria to
5 review and specific criteria for accepting a potential
6 for a spurious operation, either not invalidating the
7 previous accident analysis results or verifying the
8 previous spurious operation assumptions have not been
9 affected by the proposed design.

10 And so, the effort in this, in that
11 particular section of the BTP, which is Section 5, was
12 to simply clarify these aspects and to focus on
13 spurious operations of those systems that are highly
14 integrated, in particular, those highly integrated
15 balance-of-plant systems. Because, as we noted, with
16 the graded approach, there are a number of balance-of-
17 plant systems that have the ability to directly or
18 indirectly affect reactivity. And integrating all
19 those systems onto a similar platform provides the
20 potential for making more difficult the analysis to
21 address spurious operations. So, that's the focus to
22 be placed on the spurious operation assessment.

23 In addition, clarifying the different
24 failure types of considerations in spurious operations
25 in terms of the latent defects in hardware or software

1 that could lead to multiple spurious operations,
2 different functions, are the primary concern that we
3 have in this section. And we clarified that. A lot
4 of that was due to the public comment feedback we had
5 in terms of, are you expecting us to look at spurious
6 operations for things within the design basis or are
7 we talking about spurious operations that are a result
8 of the beyond-design-basis-type functions like a
9 latent defect in hardware/software? So, we clarified
10 the discussion here, too, so that it was consistent
11 between operating plants and advanced reactors, that
12 they had the same guidance, and trying to draw that
13 fine line between them, but it still took a little
14 bit.

15 CHAIR BROWN: Okay. Wendell?

16 MR. MORTON: Uh-hum? Yes?

17 CHAIR BROWN: I do have a comment on this.
18 Back in November of 2011, when we reviewed Rev. 6 of
19 this, we made some comments, fairly extensive
20 comments, relative to spurious operations. And there
21 were some fairly significant revisions included as a
22 result of that. It was in Rev. 6, but, then, they
23 migrated into Rev. 7 as well, which was a trivial
24 Rev., by the way.

25 But Section 1.8, the last two paragraphs

1 of Section 1.8 in Rev. 7, and the whole paragraph of
2 Section 3.7 were incorporated to address the issues
3 that the Committee had back in that November report of
4 2011, November 14th. Those totally disappeared.
5 There's not a single piece of substance from those
6 that are in here now.

7 I would encourage you to go back and look
8 at that letter and look at those sections and
9 reevaluate their inclusion. They make some very good
10 points relative to spurious operations. And you all
11 proposed these words. It wasn't us. The EDO response
12 provided those revisions. So, I would encourage you
13 all to go back and look at that comment, and then, the
14 revisions that were made to satisfy that concern, and
15 at least try to address why it's not necessary to have
16 those anymore.

17 MR. MORTON: So, Member Brown, if I
18 understand your comment, it's that there were some
19 input, in the Rev. 6 to Rev. 7 transition there was
20 a --

21 CHAIR BROWN: No, no, no, no. We reviewed
22 Rev. 6.

23 MR. MORTON: Okay.

24 CHAIR BROWN: And we made a comment. And
25 the final version of Rev. 6 included these revisions.

1 MR. MORTON: Okay.

2 CHAIR BROWN: Okay? It was Rev. 6. But
3 I compared Rev. 7 to Rev. 6, and all you did was
4 change some labels. I mean, it was it updated some
5 Rev. levels and a different definition of this or
6 that. I did it paragraph and section-by-section and
7 they were virtually identical. So, I used Rev. 7 just
8 because that's the marketed version that we are
9 springing from right now.

10 MR. MORTON: Okay.

11 CHAIR BROWN: All those words were exactly
12 the same and it was incorporated in Rev. 6 initially,
13 and then, when you all finally redid Rev. 6 to do some
14 editing, administrative updates, they were retained in
15 that verbatim.

16 MR. MORTON: Okay.

17 CHAIR BROWN: So, I would just encourage
18 you to go back and look at the report from November
19 14th, 2011. We can get that to you, if you can't find
20 it. And then, look at the EDO response and the words
21 that were incorporated, and then, at least try to
22 explain to us why they are no longer relevant, why
23 they were deleted from Rev. 7 to these revisions.

24 MR. MORTON: Okay. Very good. If you
25 could, we would appreciate it, if you could provide us

1 the November 14th report.

2 CHAIR BROWN: Okay. Christina, are you
3 there?

4 MS. ANTONESCU: Yes, sir.

5 CHAIR BROWN: Okay. I think if we can get
6 that letter, we'll try to provide it to them.

7 MS. ANTONESCU: Sure. I will do that.

8 CHAIR BROWN: Okay. Thank you.

9 MR. MORTON: All right. Thank you,
10 Christina.

11 CHAIR BROWN: Go on, Wendell.

12 MR. MORTON: No, I said, thank you. We
13 would appreciate seeing that feedback.

14 Like I said, we're open to refining the
15 discussion within the spurious operation section. So,
16 if those paragraphs that you're referring to in
17 Sections 1.8 and 3.7 --

18 CHAIR BROWN: Yes, it's the last two
19 paragraphs of our Revision 7, 1.8, and the whole
20 paragraph 3.7 in Rev. 7. And they'd be perfect as a
21 preamble, as the lead-in paragraphs. That's what I
22 got out of reading those words, and then, looking at
23 what you all now have.

24 So, anyway, all right. I don't need to
25 mouse-milk that one anymore.

1 MR. MORTON: Okay. Thank you for that
2 feedback. We appreciate that.

3 So, were there any other questions on this
4 slide?

5 (No response.)

6 Hearing none, okay, can you move to slide
7 18, please?

8 And this slide basically just summarizes
9 point No. 4 or position 4 within in SRM-SECY-93-087.
10 There wasn't a lot of changes made. Actually, I don't
11 believe there were any changes made to this section,
12 but it's still there to reemphasize that point 4 has
13 a specific and different application than the other
14 points, than the other three positions within the
15 overall SRM in terms of the need to actually provide
16 system-level manual controls in the control room to
17 satisfy point 4. And this is just a summary of that
18 information that's in the BTP.

19 If there's no questions on this slide, we
20 can move to --

21 CHAIR BROWN: Oh, no, I have a question.

22 MR. MORTON: Oh, sure.

23 CHAIR BROWN: If you'll go back? Again,
24 back in the November 14th -- I'm just going to hit you
25 with the Rev. 7 again.

1 MR. MORTON: Okay.

2 CHAIR BROWN: Our letter in November 14th,
3 '11, again, addressed some issues relative to manual
4 actions and how they should be considered and some of
5 the issues relative to limited margin, time available,
6 time required, 30 minutes, this, that, and the other
7 thing. They're all in there, and again, I would
8 encourage you to go back and look at our letter, and
9 then, look at paragraphs 3 and 4. And I'll send you
10 this also, have Christina send this comment to you,
11 from Section 3.5, Rev. 7, should be incorporated into
12 Rev. 8 ahead of the acceptance criteria.

13 They provided a clarification and what do
14 we mean examples, which are valuable from a reviewer's
15 standpoint in trying to see -- and that's what this
16 Branch Technical Position is for. It's for the
17 reviewer as well to give them an idea of what is
18 meant.

19 And then, there was another item under the
20 acceptance criteria which provided information, and
21 you all incorporated, the EDO incorporated that back
22 in Rev. 6 also, which, then, moved on into Rev. 7.

23 So, anyway, it's the same approach that I
24 took with the spurious operation. I'll send that
25 information to you, the details of where they are.

1 And then, you all can answer that question as to why
2 they have been left out of this version. Is that
3 acceptable?

4 MR. MORTON: Yes, we will certainly take
5 a look, but I just want to reiterate that there is a
6 difference between the manual operator actions to
7 address point 4 and point 3 of the SRM. So, point 4
8 that we see on this slide --

9 CHAIR BROWN: This is point 4.

10 MR. MORTON: Yes.

11 CHAIR BROWN: This has to do with point 4.

12 MR. MORTON: Okay. This had to do with
13 point 4?

14 CHAIR BROWN: Yes.

15 MR. MORTON: Because point 4 is
16 specifically to address manual critical safety
17 functions.

18 CHAIR BROWN: That's what this is.

19 MR. MORTON: Okay.

20 CHAIR BROWN: This is not normal, run-of-
21 the-mill stuff.

22 MR. MORTON: Okay. And this is in the
23 same November 14th letter?

24 CHAIR BROWN: It's the same November 14th
25 letter, yes, and all these changes were made when we

1 reviewed your all's proposed Rev. 6. And then, they
2 were incorporated in the actual issued Rev. 6.

3 MR. MORTON: Okay.

4 CHAIR BROWN: And were in Rev. 7 as well.

5 MR. MORTON: Okay. We'll take a look.
6 Thank you.

7 CHAIR BROWN: Thank you.

8 MR. MORTON: If there's no further
9 questions, we can move to slide 19.

10 Here's another area of BTP and this is
11 actually the very last section of the BTP, which is
12 8.6, where we did receive a number of public comments
13 on -- to kind of summarize the direction of the public
14 comments, it is to essentially provide flexibility for
15 licensees or applicants to address vulnerabilities
16 that were not directly addressed through design
17 attributes or defensive measures, or other diverse
18 actions you can take to address the potential
19 diversity of vulnerabilities.

20 So, there was some proposed wording that
21 was provided to sort of update and modify this
22 section, and we did have a lot of internal
23 conversations about this because we wanted to make
24 sure that the enhanced guidance we did provide for
25 this section, although not necessarily extensive in

1 content, does not provide more flexibility for
2 licensees or applicants to address specific
3 vulnerabilities that weren't corrected through all the
4 various techniques that were described in Section 3
5 and 4 of the BTP.

6 And specifically, as you can see by the
7 second bullet, this really comes down to line breaks
8 and the potential to address them through actions that
9 aren't specifically about diverse means and
10 specifically about crediting leak detection systems
11 and then operator actions to address and identify
12 system leakage to prevent large line breaks.

13 So, as part of resolving public comments
14 along those lines, we did provide additional
15 flexibility for licensees to make it clear that the
16 staff does not prohibit using these particular items
17 which were addressing specific vulnerabilities, that
18 you do have the flexibility to present that, if a
19 licensee or applicant so chooses to do so; and that
20 those particular techniques will be reviewed on a
21 case-by-case basis.

22 So, really, what this modification comes
23 down to is just really providing more flexibility to
24 address those very low likelihood types of failures,
25 such as a CCF concurrent with a large pipe break.

1 CHAIR BROWN: Okay. You're going to hear
2 from me again.

3 MR. MORTON: Okay. Sounds good.

4 CHAIR BROWN: This is Section 8.5, and
5 then, you talk about 8.6, but where's 8.5? Was that
6 back there? No. When you updated, you lost 8.5
7 somewhere in Rev. 8.

8 And in Rev. 8, your all's proposed
9 revision 8.5 talked about identification of
10 alternative mitigation capabilities.

11 MR. MORTON: Yes, that's Section 8.5.

12 CHAIR BROWN: Yes. And there was a
13 section, it really got back, if you're going to credit
14 automatic or manual functions that are credited in the
15 plant's analysis, the accident analysis. Okay?

16 MR. MORTON: Uh-hum.

17 CHAIR BROWN: Or it's compensated by
18 another different automatic or different manual
19 function. You need to provide a basis. Then, you
20 went on and talked about when manual operation is
21 cited as a diverse means, we should demonstrate that
22 the HFE analysis demonstrates that that's okay.

23 MR. MORTON: Uh-hum.

24 CHAIR BROWN: If you go back to Rev. 7,
25 that equivalent information is provided in Section

1 4.6, Identification of Alternative Mitigation
2 Capabilities, just a different section number.

3 MR. MORTON: Uh-hum.

4 CHAIR BROWN: And the paragraph, the
5 second paragraph, which talks about when operator
6 action is cited as a diverse means, then it had some
7 more information in addition to referencing some HFE
8 stuff. That's all deleted. That was also a comment
9 that we made back in the 11/14/2011 letter, where you
10 all proposed specific language to go along with the
11 when operator action is cited, and that has
12 disappeared.

13 There's another paragraph. It's a note
14 that provided additional clarification or information
15 for the reviewers to do their assessments, and that
16 has disappeared for this more generic, don't tell the
17 reviewer anything type of information.

18 I did not have SRP Chapter 18 to see if
19 that information was actually in the SRP Chapter 18.
20 I was able to do that for some other stuff you deleted
21 because it was in 1.62 and ISG-04. So, I didn't
22 comment on those, the fact that they were deleted.
23 But this one I could not find. And so, I guess this
24 is another one I'd put on the table for, in whatever
25 mode we come back, whether it's a full Committee

1 meeting or another Subcommittee meeting, as needed,
2 that you address this, why this was deleted also.
3 This was another response to an Advisory Committee
4 recommendation back in the November 14th letter. I'll
5 provide that writeup to you as well through Christina.

6 MR. MORTON: Okay. So, if I understand,
7 you have a concern that there was some information in
8 our current Draft Rev. 8, Section 8.5, that's been
9 deleted from the Rev. 7 version of that section?

10 CHAIR BROWN: Yes. The equivalent
11 section, yes.

12 MR. MORTON: The equivalent section?

13 CHAIR BROWN: Yes. Yes, it's been
14 deleted. I just want to know what the explanation is.
15 I mean, if the equivalent information happens to be in
16 another document where they have to review it, I guess
17 I would do that. I don't think it is because we still
18 reference the same chapter of the SRP in the Rev. 7
19 version also.

20 MR. MORTON: Yes. Our understanding is
21 that that information you're referring to is now
22 residing in Chapter 18 of the SRP.

23 CHAIR BROWN: And it might be if it's been
24 revised --

25 MR. MORTON: Yes, yes.

1 CHAIR BROWN: -- but I haven't seen that.
2 All I need is to make sure is we haven't lost that;
3 that whatever we had in this in the old Section 4.6,
4 that we haven't lost the concern.

5 MR. MORTON: Yes, that was my agreement
6 into -- that Section SRP 18 was revised to include
7 that information, but it's also within our acceptance
8 criteria for the section as well. But we can still
9 take the action to look at the recommendation from the
10 November 14th letter.

11 CHAIR BROWN: Okay. You're going to
12 address this one as well, right?

13 MR. MORTON: We can still take that
14 action, but just kind of as a reference, I mean, that
15 information does reside in Chapter 18, which we
16 reference within Section 8.5 in the draft.

17 CHAIR BROWN: No, I recognize that. It's
18 just that the information -- I didn't have that. So,
19 that's all I wanted, to make sure that we haven't lost
20 the bubble.

21 MR. MORTON: Okay.

22 CHAIR BROWN: Okay? Thank you.

23 MR. MORTON: So, hearing no other
24 questions on this slide, we can move to slide No. 20.

25 MEMBER KIRCHNER: Wendell?

1 MR. MORTON: Yes, sir?

2 MEMBER KIRCHNER: Wendell, this is Walt
3 Kirchner again.

4 MR. MORTON: Yes?

5 MEMBER KIRCHNER: This middle bullet is
6 puzzling me. There's nothing wrong with it. It's
7 just I find it odd that it's here. I don't see the
8 connection with CCF per se. This is a tech spec kind
9 of issue.

10 If you have a leak detection system, then,
11 usually, there's a certain gallon per minute or hour,
12 or whatever, limit. And then, when you exceed that,
13 you shut down for the same reason that you give here
14 in the bullet. But it seems out of place to me. I'm
15 just struggling to see the connection with the rest of
16 the Branch Technical Position. Am I missing
17 something?

18 MR. MORTON: No. So, let me give you a
19 little more kind of feedback on this section itself.
20 As part of the D3 assessment process, you are
21 postulating a CCF concurrent with the events you have
22 in your accident analysis. So, there are some events
23 in accident analysis that are very low likelihood to
24 occur. And for those particular events, there was a
25 desire, through public comments, to have particularly

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1 more flexibility in order to address those particular
2 low likelihood events, if it was possible to do so
3 through something like your leak detection system or
4 manual operator actions.

5 So, it wasn't specifically something about
6 tech specs per se. It was really just as a matter of
7 addressing your overall CCF vulnerabilities, whether
8 additional flexibility to address that when you're
9 postulating CCF concurrent with the various events in
10 your accident analysis. It wasn't specifically about
11 tech specs per se or getting into a tech spec action,
12 if I understand your comment.

13 MEMBER KIRCHNER: No, I don't see anything
14 wrong with this. It's just that, to me, it's more
15 Chapter 15, tech specs, a design issue, rather than a
16 CCF vulnerability.

17 MR. MORTON: Understood. Understood. But
18 it really is primarily an aspect of looking at CCF
19 vulnerabilities, in particular, those particular
20 vulnerabilities with regard to very low likelihood
21 events like large line breaks.

22 I hope that answers your question.

23 MEMBER KIRCHNER: Okay. Go on.

24 MR. MORTON: Okay. If there are no other
25 comments, we can go to slide 20. Oh, you're already

1 there. Thank you.

2 Okay. This is just sort of an abbreviated
3 part of our schedule we've gotten into now. And as I
4 alluded to earlier, right now we're in the
5 final concurrence review for the BTP. As Charlie
6 stated, we actually have the first full Committee
7 meeting on the BTP scheduled, I believe you did say
8 July 9th. We just kept it open in case that
9 particular date changes, but we do have it slated for
10 July 9th of this year.

11 And we are still on schedule for the OMB
12 review and publication of the final BTP, Rev. 8, by
13 September of this year.

14 So, hearing no other questions on the
15 status, that pretty much brings us to the end of the
16 presentation. So, are there any other questions on
17 any of the content I presented from ACRS members?

18 CHAIR BROWN: Just a thought process;
19 that's all. If you come to the conclusion that we
20 will continue with the planned July meeting, full
21 Committee meeting, so that we can get a letter report
22 written, it would be useful for some of the questions
23 that I have asked, if that information could be just
24 provided to us ahead of it, as well as being addressed
25 in the meeting, just so that we see where you're

1 going; and any other questions other members have, if
2 there's any loose ends here.

3 MR. MORTON: Yes, in terms of the feedback
4 you've given us, I think we're going to take a look at
5 that after the meeting concludes and see what we can
6 respond to you. As soon as we get the information
7 from the November 14th letter, I think we can respond
8 to you. But you're looking for a response before the
9 July meeting, that's correct?

10 CHAIR BROWN: Yes, I don't want to hold up
11 -- you've got a lot of other public comments that
12 you've got to deal with. Okay? These are relatively
13 straightforward for the most part. They may be easily
14 answered; they may not be. But at least you can be
15 able to identify whether you want to do something or
16 not. There is an extensive number of some of the
17 other questions we noted that are still hanging
18 around.

19 MR. MORTON: That's correct, yes.

20 CHAIR BROWN: So, if we get them back in
21 advance -- it doesn't have to be two weeks in advance.
22 It can be you can poke me in the eye three days in
23 advance. Okay?

24 MEMBER REMPE: Charlie?

25 CHAIR BROWN: Yes?

1 MEMBER REMPE: This is Joy.

2 And along the lines of your comment and
3 Dennis' comment, I really strongly would like to
4 request that the responses be given to us at least a
5 week in advance.

6 CHAIR BROWN: Yeah, okay, if they can do
7 that before the full Committee meeting. Oh, you mean
8 the responses to the public comments or just the
9 responses to --

10 MEMBER REMPE: Any changes, responses to
11 your comments, and as Dennis had mentioned earlier,
12 there seems to be a lot of concerns by NEI and other
13 stakeholders. If there are going to be changes, I
14 would like to request that we see what those changes
15 are going to be at least a week in advance, not two or
16 three days in advance.

17 MR. MORTON: Okay.

18 CHAIR BROWN: Yes. Who am I talking to
19 now, Eric and Morton?

20 MR. MORTON: Yes.

21 CHAIR BROWN: Or Wendell rather?

22 (Laughter.)

23 MR. BENNER: Yes. You're talking to both
24 of us, and we will commit to somehow communicate
25 changes a week beforehand.

1 CHAIR BROWN: Okay. I would appreciate
2 that.

3 MR. BENNER: Yes.

4 CHAIR BROWN: We're dealing with another
5 issue right now. We're getting the stuff the day of
6 the meetings, and it's almost impossible --

7 MR. BENNER: Yes.

8 CHAIR BROWN: -- to try to do it. But
9 what we're trying to do is -- we know you guys are
10 under some pressure to get some of these things done,
11 and we're trying our best to try to accommodate that
12 and be rational in our responses.

13 MR. BENNER: And we appreciate that. So,
14 that's why we will make that commitment.

15 CHAIR BROWN: Okay. Thank you.

16 MR. BENNER: Yes, we think it's only fair
17 that the Committee have the opportunity to digest the
18 changes prior to the actual meeting.

19 CHAIR BROWN: Yes, and redlines/strikeouts
20 sometimes don't work very well. I get lost in the
21 red. But if we can just identify where the changes
22 were made, you know, in what sections and paragraphs,
23 then that would -- you know, I know how to read.

24 But I want to also thank Joy for bringing
25 that up. You're 100 percent correct.

1 MR. MORTON: Yes, like Eric said, yes, we
2 can commit to meeting that deadline for kind of
3 letting you know where we stand on your feedback.
4 Since we're still in the concurrence process, we have
5 the flexibility to do these kind of reconsiderations.
6 That includes the public comment feedback that we
7 receive after the public comment period from the
8 various stakeholders. Those are also things that
9 we're considering as we go through the concurrence
10 process as well.

11 CHAIR BROWN: Okay.

12 MR. MORTON: I just wanted to reiterate
13 that point.

14 CHAIR BROWN: Now if you all decide that
15 you can't get all this completed and all the public
16 stuff done before the July meeting, what are your
17 thought processes? We don't have a full Committee
18 meeting in August.

19 MR. MORTON: I may have to defer to my PM
20 on that particular question. We haven't gotten that
21 far in our thinking yet. We really focused on the
22 concurrence review and finalizing the document. Our
23 final issuance date is September. So, that's really
24 our next steps and focus at this point after the full
25 Committee meeting we have on July 9th.

1 CHAIR BROWN: Yes, that's why we were
2 trying to get it done, so you could meet that
3 September publishing date.

4 MR. MORTON: Yes.

5 CHAIR BROWN: All right. Well, Tekia can
6 coordinate with Christina on where you guys think
7 you're heading. Okay?

8 MR. MORTON: Okay.

9 MR. BENNER: Yeah, we understand. We
10 understand your schedule. We understand that, if we
11 change course, that has a schedule impact, and we'll
12 look at any course changes we're thinking of and
13 balance that with potential schedule impacts.

14 CHAIR BROWN: Okay.

15 All right. Matt, do you have any other
16 comments relative to schedule?

17 CHAIRMAN SUNSERI: No. No, it's fine,
18 whatever you all can work out. And I agree with
19 giving this Committee, the members, adequate time to
20 review.

21 CHAIR BROWN: Okay. All right. Thank
22 you.

23 Are we ready to convert over now to the
24 NEI presentation?

25 MS. ANTONESCU: Charlie, I think we should

1 take a break.

2 CHAIR BROWN: Thank you very much. Good
3 point. Why don't we go ahead and do that and take a
4 15-minute break? We will recess for 15 minutes and
5 come back here at 11:20. We're ahead of schedule.
6 So, why don't we make it 11:20, 18 minutes? Okay?

7 So, we are recessed until 11:20 by my
8 computer.

9 (Whereupon, the above-entitled matter went
10 off the record at 11:02 a.m. and resumed at 11:22
11 a.m.)

12 CHAIR BROWN: Okay. I'm going to do a
13 quick roll call to see if we got everybody back, if I
14 can find my list again.

15 Okay. Dennis, you're here? Dennis?

16 MEMBER BLEY: Yes, I'm here.

17 CHAIR BROWN: Okay. Matthew? Matt?

18 CHAIRMAN SUNSERI: Present.

19 CHAIR BROWN: Jose?

20 MEMBER MARCH-LEUBA: Yes.

21 CHAIR BROWN: Vesna?

22 MEMBER DIMITRIJEVIC: Yes.

23 CHAIR BROWN: Okay. Joy?

24 MEMBER REMPE: Present.

25 CHAIR BROWN: Ron?

1 MEMBER BALLINGER: Here. I was here all
2 morning, too.

3 CHAIR BROWN: Okay. Dave?

4 MEMBER PETTI: Here.

5 CHAIR BROWN: Okay. Myron?

6 MR. HECHT: Here.

7 CHAIR BROWN: Okay. All right.

8 MS. ANTONESCU: And Walt Kirchner.

9 CHAIR BROWN: Oh, sorry about that, Walt.
10 I've got to write you down.

11 Okay. The meeting will come back into
12 session, and we will proceed with NEI's presentation.

13 Steve, do you want to take it from here?

14 MR. VAUGHN: Yes. Thank you, Chairman
15 Brown. I appreciate that.

16 Again, I'm Steve Vaughn with the Nuclear
17 Energy Institute, and I'll kick off the NEI
18 discussion.

19 Again, appreciate you giving us an
20 opportunity to share our perspectives here and at
21 previous ACRS meetings. You know, we think these
22 panel discussions are integral to improving this
23 technical guidance. So, again, thank you.

24 We think the current Draft of Revision 8
25 to BTP 7-19 is a significant improvement to Rev. 7 and

1 we commend the staff in their efforts over the past
2 year and a half to clarify the guidance and by
3 providing two -- we see two -- significant
4 improvements, the first being the graded and risk-
5 informed approach to digital I&C categorization, which
6 will allow an assessment, whether it's a D3 or a
7 qualitative assessment, commensurate with the safety
8 significance. And then, two, the option to leverage
9 defensive measures in addition to the diversity and
10 testing approaches to appropriately address CCF. So,
11 we see those two as significant improvements to Rev.
12 8.

13 And over the next couple of weeks, maybe
14 a month, we do expect that Rev. 8 to BTP 7-19 will
15 provide both licensees and NRC reviewers with clear
16 guidance on how to appropriately address Common Cause
17 Failure in digital upgrades as utilities continue to
18 modernize their plants.

19 In addition to myself, I have Warren
20 Odess-Gillett. He works at Westinghouse, but he's
21 also a part-time loanee to NEI. He'll be discussing
22 slides 3, 4, and 5. And another one of our team
23 members, Mark Brezinski, representing Rolls-Royce, may
24 be joining. He had a conflict, but if he does join,
25 he may provide some amplifying information during

1 Warren's discussion.

2 MEMBER BLEY: Steve, this is Dennis Bley.

3 MR. VAUGHN: Yes?

4 MEMBER BLEY: We, and I guess the staff,
5 are just seeing these comments since you sent your
6 slides in. Are you sending written comments to the
7 staff and when do you expect they'll have them?

8 MR. VAUGHN: A good question, Chairman
9 Bley. We do plan to send additional comments like we
10 did with the previous ACRS meeting on Appendix D and
11 Reg Guide 1.187. We will send sort of a comment table
12 with redline/strikeout and some edits we will suggest.
13 And we'll do that in the next five working days. We
14 have that set up. We just, for this presentation, we
15 just kind of hit maybe the top three categories that
16 we wanted to provide feedback, but we will do that.

17 MEMBER BLEY: When you go through those,
18 if you would give some indication of the strength of
19 your comments, I'd appreciate it, because I wonder if
20 these are real showstoppers to you or things that you
21 think just need some minor clarifications.

22 MR. VAUGHN: Understood. Yeah, we'll
23 highlight that.

24 MEMBER BLEY: Okay.

25 MR. VAUGHN: So, moving on to slide 2.

1 All right.

2 During the NRC presentation there was a
3 lot of discussion on Table 2.1. This is the digital
4 I&C categorization. So, we can highlight some of the
5 differences.

6 One change we saw from the January Rev. 8
7 to the May Rev. 8 was the addition of this general
8 design criteria -- actually, criterion -- for the A1
9 and the B1 SSCs. And at first, one, it's very high
10 level, because it mentions diversity and the GDCs.
11 And from a practical standpoint, we struggled with
12 paragraph one to see how that ties in and of itself to
13 safety significance.

14 And then, two, it was just, since it is
15 not technical criteria, it was just hard to implement.
16 We kind of went through different examples and it
17 didn't add much value above and beyond the other
18 definitions or criterion that are in A1 and B1. So,
19 if this piece is needed, it would be good to
20 understand exactly what it's capturing beyond the
21 scope of the other criteria within the A1 and B1
22 definitions.

23 And then, the second main bullet here,
24 there was, again, previous discussion -- I think
25 Member March-Leuba mentioned it -- about the concept

1 of safety significance and those labels. If you look
2 at the table, just the table without looking at the
3 PRA risk insights paragraph, the term safety
4 significance can cause confusion, meaning that just
5 those criteria within those four different categories
6 don't provide any context to safety significance.
7 Now, if you do bring in the paragraph after the table
8 that talks about leveraging risk insights from plant-
9 specific PRAs, that can help provide context to what
10 is safety significant and not safety significant. But
11 the way it stands right now, NEI didn't think it
12 provided sufficient clarity.

13 And there was a conversation about what
14 are the thresholds for what's safety and not safety
15 significant. Eric Benner mentioned it. And we did
16 have discussions at previous public meetings: what
17 should those thresholds be? Now in the PRA community
18 there are important special thresholds that are used
19 in the maintenance role, 50.69. There's some tech
20 specs that are generally the same. Now we could use
21 those, and we thought about actually pointing to those
22 thresholds, but during the deliberations we just felt
23 that it might be best just to remain silent on what
24 those are and let a utility or a licensee during the
25 LAR process just to sort of use those and have a

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1 discussion at a presubmittal meeting.

2 Now, based on that, NEI, I think what
3 we're going to consider doing is taking a step back
4 and see if, hey, maybe there are thresholds we could
5 come up with leveraging stuff that's been done in the
6 past and see if we can tweak it into a digital I&C
7 context. So, we can take that and do it sort of as a
8 parallel effort, but we do understand that it would be
9 great to have clear, defined criteria of what is
10 safety and not safety significant in this table.

11 MEMBER MARCH-LEUBA: This is Jose.

12 In the past when we had this type of
13 problems, we resolved it by the staff providing a
14 number of examples where they tell you: let's have a
15 look at this problem. We believe this is safety
16 significant because, or we believe this is not safety
17 significant because. And if you have a number of
18 examples that will guide the industry to say, yeah, I
19 know which direction I have to go. Because, right
20 now, I agree with you, there is no clarity. And as a
21 regulator, which I lean towards a regulator, I know
22 the licensees are going to go the easier path and
23 nothing is going to be safety significant. So, that
24 would be one option, is to work out a number of
25 examples that gives us a way that the staff is

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1 thinking on this specific case.

2 MR. VAUGHN: Okay. Good comment.

3 Before I move on, any other comments or
4 questions on slide No. 2?

5 CHAIR BROWN: Yeah, I just have a question
6 for my colleagues here, Dennis and Vesna. I'm a
7 neophyte when it comes to PRAs and risk stuff. And
8 these terms of safety significant and not safety
9 significant have been used or have been referred to in
10 various aspects in a number of meetings. And I always
11 thought that there was some defining document or some
12 document, either PRA documents or whatever, that would
13 provide some insight onto those. Am I correct now,
14 based on listening to this, that there is not any real
15 definition of these?

16 MEMBER BLEY: In some cases there are,
17 Charlie. In other cases it's been more a matter of
18 common sense. If something has contributed a
19 substantial fraction of the risk, it's safety
20 significant, risk significant.

21 CHAIR BROWN: But there's not a breakpoint
22 that defines that when you're doing one of your PRAs?

23 MEMBER BLEY: No, not for every
24 application.

25 CHAIR BROWN: So, it's fuzzy?

1 MEMBER DIMITRIJEVIC: So Charlie, for
2 different applications, like for 50.69, for the
3 current generation of the plants, they're clearly
4 defined safety criteria from the PRA. However, those
5 are relative and it's a different discussion for the
6 new generation, where they're not clearly defined and
7 NuScale uses different criteria than one from 50.69,
8 for example.

9 Also, in 50.69, criteria used to select
10 the systems from PRA to inclusions in DRAP, they're
11 selected based just on this numerical criteria that is
12 a whole bunch of the previous of the question. They
13 ask qualitatively to make sure that this numerical
14 criteria didn't miss some system which is safety
15 significant, but it didn't meet these criterias.
16 Like, for example, can that system cause initial
17 DRAPs? Does this system support a safety significant
18 system, and so on and so on?

19 So, there are numerical criteria for the
20 current fleet and, in addition to, let's say, 10
21 additional questions which are qualitative questions.
22 Those criteria are not clear for the new generation
23 and the individual, depending on the risk.

24 CHAIR BROWN: So a reactor trip system
25 would be defined as safety significant because that's

1 an SSC and it's obvious? Is that --

2 MEMBER DIMITRIJEVIC: Yes. Yes.

3 CHAIR BROWN: But the feedwater --

4 MEMBER DIMITRIJEVIC: Yeah, I mean, that's
5 what would define the significant because the SSC
6 satisfied the numerical criteria that is contributing
7 significantly to risk, yes.

8 CHAIR BROWN: Well, that's kind of a
9 deterministic criteria in a way. But the feedwater
10 control system which has been used in examples, some
11 other stuff when we did the 9607 things, that is not
12 necessarily safety significant?

13 MEMBER BLEY: It depends on how much it
14 contributes to the risk, Charlie.

15 CHAIR BROWN: Okay. All right. I got it.

16 MEMBER BLEY: That system, if you turn it
17 around and say, what's happens if it and the
18 alternatives all fail, it's a bad result.

19 CHAIR BROWN: Yes.

20 MEMBER BLEY: So, it's safety significant.
21 The feedwater system depends on the scenario you're in
22 and a variety of things. In some plants it can be
23 very significant and in others not so much.

24 CHAIR BROWN: Okay. I mean, I would have
25 always thought that a safety significant item would be

1 such that, if it didn't perform properly, you would
2 end up with an accident scenario or potential damage
3 to the plant.

4 MEMBER BLEY: That's pretty close to the
5 way it works out when you do the PRA.

6 CHAIR BROWN: Okay.

7 MEMBER BLEY: Those are the things that
8 matter. But how much they matter is very much
9 dependent on the intricacies of how the plant's put
10 together and operates.

11 CHAIR BROWN: Steve, why does industry
12 think these cause confusion when they've been used as
13 frequently and interchangeably as they seem to have
14 been, at least over the 10 or 12 years I've been on
15 the Committee?

16 MR. VAUGHN: Yes, a great question. So,
17 what was provided in March was -- and Eric kind of
18 alluded to it in his discussion when Wendell was going
19 on to describe -- one comment we provided was to take
20 that PRA insights paragraph and somehow so it
21 optically it folds into the table. Because that PRA
22 insights paragraph is what provides the context of the
23 far left column that says, Safety Significant or Not
24 Safety Significant.

25 Those terms don't mean much to us unless

1 that PRA risk insights paragraph is folded into the
2 table so it's one integrated process. The way it
3 looked was, you have this table with deterministic
4 criteria, and then, there's another paragraph and
5 another paragraph that talks about PRA risk insights
6 and how those insights can be an input to an
7 integrated decision making process, which we fully
8 agree with. It shouldn't be risk-based. It shouldn't
9 be deterministic. It's a risk-informed process, but
10 it needs to be sort of wrapped up in one big package
11 as opposed to two, at least optically, disparate,
12 different approaches.

13 MEMBER BLEY: Steve, that makes me ask --
14 this is Dennis Bley again -- have you really looked at
15 the table that they have in the current version? It
16 has done a fair amount of that.

17 MR. VAUGHN: Yes, I agree that the table,
18 there were some really good changes made to A1 and B1,
19 especially the second, in A1 the second criteria was
20 tweaked based on one of our comments. But it's
21 actually I think the information's there, because the
22 paragraph, the PRA insights paragraph is there. So,
23 it's there to be used by a licensee that wants to
24 leverage their risk assessment PRA when they
25 categorize a digital I&C system.

1 But again, just optically, it would be
2 good to see that all in the same table. I know it's
3 not easy to do. We offered to just add that paragraph
4 as like a bottom row with an asterisk, which provides
5 the context to safety and not safety significant.
6 That was the comment we provided in March. That was
7 the easiest way we saw to do it. There might be a
8 more elegant, effective way to do it.

9 But we felt like it was sort of an
10 aftereffect. Like deterministic was the first step,
11 and then, oh, by the way, you can provide some risk
12 insights if you want, as opposed to -- really, there
13 are two things to consider here. Any plant can
14 consider both of them to do that and integrate it to
15 make an argument on why you think a system would be A2
16 instead of A1, or vice versa.

17 MEMBER BLEY: Let me be the devil's
18 advocate for just a minute. Something about your
19 comment bothers me, and it reminds me of when people
20 used to use the Swain human reliability handbook, and
21 they would just go use the tables or turn to some
22 other guidance and just look at a couple of examples
23 and use that as a replacement for all the words in the
24 guidance document.

25 You seem to be saying that's what they

1 ought to be able to do here and shouldn't have to read
2 the guidance. And that always strikes me as a way you
3 get into trouble. It makes me a little nervous about
4 how you would guide the industry in using these
5 guidance documents.

6 MR. VAUGHN: Oh, Chairman Bley, I must
7 have miscommunicated. I didn't indicate that at all.
8 So again, the PRA insights paragraph is there. And a
9 great example, Charlie, you gave, Chairman Brown,
10 about is feedwater safety significant or not? And
11 Member Bley's response was, you know, it depends.

12 So again, feedwater at a plant, look at
13 their PRA. It fails. And if using the risk
14 performance measure thresholds, the Maintenance Rule,
15 50.69, the tech specs, they show that it would not be
16 safety significant, then the licensee could use that
17 as an input to categorizing that system.

18 Again, the information is there. It's
19 just how it's packaged. And again, you're right,
20 people aren't going to just look at a table and forget
21 about the paragraph. They're going to read the entire
22 GD from page 1 to the end and not leave anything out.

23 MEMBER BLEY: Not just for you, but for
24 the staff, too, I didn't want to create the impression
25 that I don't think examples would be good. I would

1 agree with Jose's comment earlier that they are very
2 helpful. They can be overused or oversimplified, and
3 that's a problem.

4 But it's not always the staff who
5 generates those. Very often, well, in the document we
6 reviewed a week ago for 50.59 on digital I&C, the
7 industry put together quite a set of examples and
8 worked with the staff on those. So, they can come
9 from various places, but they are very helpful.

10 CHAIR BROWN: Well, Dennis, your comment
11 -- the table that's in the May version, as opposed to
12 the November version, actually, when I got to this,
13 because it was really sparse back in that one we
14 reviewed nine months ago --

15 MEMBER BLEY: It looked like the one on
16 the viewgraph.

17 CHAIR BROWN: Yes, but when I read this
18 one in the new version, the May version, I said, geez,
19 you know, now there seemed to be some guidance in
20 terms of how you would categorize these things. And
21 then, I thought back to the Section 4.3.6 examples,
22 which there were what, seven or eight, five or six,
23 seven examples, or something like that, and two or
24 three of them popped out where I could go look at this
25 table and say, yeah, now I can grab that example in

1 9607 and I can relate it and see that, hey, gee, these
2 apply. I can understand how they came to that
3 conclusion when you use these categorizations, these
4 choices, in terms of how you determine whether it is
5 or is not safety-related or not safety-related.

6 MEMBER BLEY: Yes, I agree with you.

7 CHAIR BROWN: The table was a good table.
8 So, it's the first context I've seen in my limited
9 experience with this risk stuff. So, I liked it and
10 I thought it was pretty easy to use.

11 That's why I asked you the question,
12 Steve. I couldn't understand why it would be
13 confusing with this. With the old table, I could
14 agree with you, no contest. With this one, there's
15 plenty of contest with the new one. So, I thought the
16 staff was on the right track when they revised it to
17 come up with this expanded Table 2.1 for these graded
18 or risk-informed approaches. So, that's my input
19 then.

20 Am I far off the mark, Dennis?

21 MEMBER BLEY: No, I agree with you, and
22 that's why I asked Steve. I don't know if NEI had a
23 chance to really get through this revised guidance
24 document thoroughly, but that table is dramatically
25 better.

1 MR. VAUGHN: Yes, I agree that the table
2 is definitely improved. But if you read -- again,
3 maybe examples would be a good thing to note here. I
4 mean, on the industry side, at our meetings we always
5 use examples to test the different bins, and we did
6 that.

7 And when you look at like the B1 table,
8 for example, there could be a lot of examples where
9 you would meet the criteria in B1, one of those three,
10 where you would say, okay, it's safety significant.
11 Then, you go to your PRA and you would say, well, no,
12 it's not.

13 So, effectively, the table in and of
14 itself, if you didn't have the PRA risk insights
15 paragraph -- let's say you didn't get to it yet; this
16 is the first time you're reading it -- the labels
17 safety and not safety significant in the table can be
18 a little bit misleading if you just look at the
19 criteria in the table itself for A1 and B1, and A2 and
20 B2, for that matter.

21 It could be something like, you know,
22 important to safety, which has a regulatory context or
23 safety impact. But once you say safety significance
24 or risk significance, people say, okay, well, what
25 would a PRA say? So, it was a contextual thing. A

1 lot of the feedback we got from our team, from the PRA
2 community, they struggled with that table. But,
3 again, we're trying to blend this deterministic
4 digital I&C context with some PRA context, and we're
5 trying to integrate it. And it's easier said than
6 done for sure.

7 But I guess the comment is, the table in
8 and of itself, the terms safety/not safety can be
9 misleading. But, again, once you get to that
10 paragraph and you read that, then you get the
11 understanding of, oh, now I know how the terms safety
12 significant and not safety significant can be applied,
13 because I have this PRA risk insights paragraph I can
14 leverage. But, without that, we thought it could
15 cause some confusion.

16 So, in our recommendation prior to March,
17 it was to take that paragraph and kind of build it
18 into the table.

19 CHAIR BROWN: Steve, you can't build
20 everything into the table. I mean, the table would
21 become cumbersome. I mean, the table -- this is my
22 perspective -- it seems to me you have to put them
23 both together. I mean the table provides an initial
24 thought process, and then, the paragraph that follows
25 says, okay, now here's some ifs, ands, or buts that

1 may alter what you came up with. But at least you
2 have a calibration starting with before you jump off.

3 I guess I just kind of don't understand
4 the confusion issue. I thought they worked well
5 together. Anyway, that's --

6 MEMBER BLEY: Yes, one more question, if
7 I could. This thing has been going on for a very long
8 time, and it's been going on as a cooperative effort
9 between NRC and the stakeholders from back in the
10 early 2000s at least, if not before. Have you guys
11 considered a set of industry examples that you might
12 provide to people after making sure they work with the
13 staff? You guys being NEI.

14 MR. VAUGHN: Yes, we've discussed them.
15 So, we could go back and gather those examples and
16 provide them and share them with the staff and have a
17 discussion.

18 MEMBER BLEY: It's something to think
19 about. We've done it in other cases. So, you know,
20 it might be something you want to consider.

21 MR. VAUGHN: Okay. Yes, that's a good
22 recommendation.

23 CHAIR BROWN: I agree with the examples.
24 Dennis has got a good point. I would not try to put
25 the examples in the table. I would leave the table,

1 and then, use your paragraph and some examples to
2 flesh out what the table is talking about. That's my
3 thought. I don't know whether Dennis would agree with
4 that or not. But, again, I'm not an expert in that
5 area. It's just examples work well. The old BTP had
6 a lot more examples than the new one does in some of
7 the other areas as well.

8 MEMBER BLEY: Yes, and whether they're in
9 the BTP or in some subsidiary document that the staff
10 would support, it really doesn't matter. I agree with
11 you, Charlie, all of that can't be in the table.

12 CHAIR BROWN: Exactly. All right. That's
13 all I've got to say.

14 MR. VAUGHN: I appreciate that feedback.

15 And if we don't have any questions on
16 slide 2, I'll move on to slide 3.

17 And at this point, I'll turn it over to
18 Warren Odess-Gillett to kick off slide 3.

19 Warren?

20 (No response.)

21 Are you there, Warren?

22 (No response.)

23 We can't hear you, Warren, if you're
24 talking.

25 MS. ANTONESCU: Steve, he probably didn't

1 expect to get on that early.

2 MR. VAUGHN: Yeah, I'm letting him know
3 right now that we can't hear him.

4 But I'll kick it off and I'm sure Warren
5 will maybe log back out, log back in.

6 Okay. So, slide 3, design defects, and
7 this was discussed during the NRC presentation as
8 well. A comment we provided in March was -- and I
9 think we discussed this at the ACRS meeting in
10 February, or, actually, it was a public meeting with
11 the staff -- in the front, it mentioned software and
12 software logic was the scope of BTP 7-19, but hardware
13 was sort of peppered in throughout. And it caused a
14 little bit of confusion. So, we recommended where it
15 mentions hardware, just take that out.

16 And then, in this new revision --

17 CHAIR BROWN: Steve, you need to flip the
18 slide; somebody does.

19 MR. ODESS-GILLETT: Steve, I'm back, by
20 the way.

21 MR. VAUGHN: Okay. You don't see Design
22 Defects: Software versus Hardware?

23 CHAIR BROWN: No, I got slide 2 is showing
24 on my computer.

25 MR. VAUGHN: I'm seeing slide 3.

1 CHAIR BROWN: I've got everything else.
2 I just don't have -- well, anyway, don't worry about
3 it. I've got them up on my other adjacent computer
4 here. I'll just open that up.

5 MR. VAUGHN: Okay. Thank you.

6 So, Warren, you're back on. I'll turn it
7 over to you.

8 MR. ODESS-GILLETT: Okay. Great.

9 I don't know how far you got on the
10 hardware versus software, but --

11 CHAIR BROWN: Start again.

12 MR. ODESS-GILLETT: Okay. All right. So,
13 let me begin then.

14 We've noticed that this draft adds
15 hardware CCF to the scope of the BTP. And on page 4,
16 it states that, failures to be considered as beyond-
17 design-basis CCF include latent hardware defects
18 leading to loss of function and spurious actuation.

19 Now it was always industry's perspective
20 that the CCF issue, in our point of view, is a digital
21 issue. In other words, it's where software and
22 hardware meet. The way this version of the draft is
23 written, a latent defect in hardware isolated from
24 software is now a beyond-design-basis event to be
25 analyzed.

1 And industry has been addressing hardware
2 CCF or latent hardware design defects for decades as
3 part of the equipment qualification program for
4 seismic events and other environmental hazards,
5 including electromagnetic interference in emissions.
6 So, it's not clear that industry, that there might be
7 some unintended consequences by isolating hardware
8 latent defects as part of this BTP for beyond-design-
9 basis CCF for consideration. It seems like now this
10 might have broader implications than the just digital
11 I&C. So, we are requesting that the BTP reflect CCF
12 as a digital implementation potential issue to be
13 addressed rather than something that's isolated just
14 in hardware.

15 Any questions?

16 MEMBER BLEY: Well, your basis sounds to
17 be that any hardware-induced Common Cause Failure is
18 already addressed elsewhere, is that right?

19 MR. ODESS-GILLETT: That's correct.
20 That's right.

21 MEMBER BLEY: Is it addressed to the same
22 depth that it would be here?

23 MR. ODESS-GILLETT: Excuse me. I had
24 technical difficulties there. Can you repeat that,
25 please?

1 MEMBER BLEY: Sure. In those other
2 places, such as EQ, is it addressed to the same kind
3 of analytical depth that it is here, which is not
4 really deep, but is very qualitative?

5 MR. ODESS-GILLETT: So, it's different.
6 It's addressed differently. So, when you talk about
7 how you would address, how you would -- let's say you
8 have your three criteria for addressing CCF, to
9 eliminate its consideration, right? Well, there's 100
10 percent testing. Well, how do you exactly do that?
11 Or not 100 percent testing, but extensive testing.
12 How do you do the criteria that's in the BTP for a
13 latent hardware CCF? And how would you add diversity
14 to eliminate a potential hardware latent defect?

15 All of this has really been addressed in
16 the area of equipment qualification to put in its
17 environment what latent hardware defects could be
18 exposed as a result of the equipment qualification
19 program. It's really, you know, this whole topic of
20 CCF didn't come into being until we started adding
21 software to our safety-related systems.

22 CHAIR BROWN: What do you mean by that?
23 We didn't consider Common Cause Failures back when we
24 had analog-only systems?

25 MR. ODESS-GILLETT: Well, you did, but you

1 didn't do a D3 analysis to assume that, for each
2 hardware latent defect, that you postulated that
3 hardware to fail and, then, you could still cope with
4 that accident.

5 CHAIR BROWN: Yes, but we did do FMEAs.

6 MR. ODESS-GILLETT: Well, sure, that's
7 part of the design process. You know, that's not a --

8 CHAIR BROWN: What if they're too subtle?

9 MR. ODESS-GILLETT: You mean it's
10 undetectable? It's not detected?

11 CHAIR BROWN: Yeah, I'll give you an
12 example. Okay? Now this is a relay, a contactor.
13 This is a real experience.

14 In the old days, relay contactors were
15 good for, I don't know, a thousand operations or
16 2,000. Then, a bunch of the manufacturers came out
17 where they were good for a million operations, GE and
18 a couple of the other ones. And they all tested
19 great.

20 Unfortunately, GE ended up manufacturing
21 the relays in Puerto Rico. And when they did the
22 laminations and treated them, and then they quenched
23 them, they happened to neglect cleaning the quenching
24 oil off of the laminations, and then, they compressed
25 and made their armatures out of those laminations.

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1 They went and issued them.

2 They worked fine for a while, but then, as
3 the plants' temperatures varied from normal
4 temperatures to higher temperatures during operation,
5 that oil seeped up onto the surface of the armatures,
6 the contactors. And all of a sudden, somebody went
7 and, say, initiated an action, say, drive the rods
8 out, and then they released the switch and the rods
9 kept going out.

10 That's a latent defect. Okay? And it
11 took us two years to find that. We actually
12 implemented a process. We knew what the cause was,
13 but we couldn't find out why it was occurring.
14 Because if you looked at all the process and all the
15 procedures, they said that it shouldn't have happened.

16 But somebody, when they made a huge batch
17 of these suckers, didn't bother to follow the process.
18 So, that's a latent hardware -- and I'm trying to
19 think about how would I find a latent hardware in a
20 microprocessor or an FPGA. I have a harder time doing
21 that.

22 But I go back, and maybe you'll remember
23 this. I don't know how old you are. I'm really old.
24 So, back in the early days of the integrated circuit
25 -- I brought this up earlier in the meeting,

1 integrated circuits. And I've forgotten what the most
2 common -- it was a Fairchild Operational Amplifier 704
3 or 3, or something. But there was a companion Op Am
4 called, I think it was a 741. One of those actually
5 had a characteristic based on its operation, and you
6 never knew -- we didn't even know it until it
7 happened. It is that Operational Amplifier would
8 lock. It just stopped working.

9 It was a design defect in the chip that
10 nobody picked up on because of the circumstances. It
11 got fixed, but it was a day late and dollar short for
12 those people who had designed their systems using that
13 741 Operational Amplifier, as opposed to the older
14 704, or whatever it was, 705. I've got them in my
15 drawer here.

16 (Laughter.)

17 So, that's another latent defect. So,
18 there are hardware defects that won't necessarily pop
19 out all the time during a testing or a qualification
20 program.

21 MR. ODESS-GILLET: Okay. I understand.
22 Are we stating that, without this Branch Technical
23 Position, we don't have the regulatory guidance to
24 address latent hardware defects?

25 CHAIR BROWN: I don't know. I don't know

1 what other stuff is out there. I know a few of the
2 ISGs and Reg Guides and IEEE standards, but I'm just
3 not that versed in all the things that go into those
4 programs.

5 MEMBER BLEY: After you guys are done, I'd
6 like to hear back from the staff because --

7 CHAIR BROWN: Yes, I'm finished. I'm
8 finished.

9 MEMBER BLEY: The staff this morning, they
10 claim that, if not clearly written down, these were
11 still issues they had always included in their review.
12 So, they don't see this as a major change. I think
13 that's what I heard them say.

14 CHAIR BROWN: I would amplify that. And
15 when I thought of Common Cause Failures, I always
16 thought, is this Branch Technical Position addressing
17 not just software, but hardware as well? That's just
18 because of my lack of long-term commercial experience.

19 So, let the staff answer again, I guess,
20 based on Dennis' response.

21 MR. MORTON: Sure. This is Wendell from
22 the NRC. I can respond. I will give you a quick
23 response to the member's question.

24 So, in terms of the staff's consideration
25 of CCF -- and I'll just read for you a quote from

1 SECY-93-087, which is the precursor to SRM. And we
2 stated back then, "The redundant trains the digital
3 I&C systems may share databases, software, and process
4 equipment and hardware. Therefore, a hardware design
5 error, a software design error, or a software program
6 error may result in Common Mode or Common Cause
7 Failure of redundant equipment."

8 Now the Commission's direction, through
9 the endorsement of the SRM to it, did not contradict
10 that statement. It's still a consideration we've had.
11 So, part of the clarification with this scope is to
12 ensure that the different types of potential
13 vulnerabilities to CCF were addressed, and part of
14 that was simply including hardware as a potential area
15 of concern.

16 But I will reiterate that the solutions
17 within the BTP, and the direction that the guides will
18 provide, are applicable to both. And that's the main
19 key, is the potential vulnerabilities and how you're
20 addressing them within your application and the
21 potential consequences of them.

22 MEMBER BLEY: Yes, I just wanted to --
23 thank you -- I just wanted to back up Charlie because
24 I think this Committee over the last 20 years has
25 pushed in that same area. It's always been an issue.

1 And now, there's subtleties to the issue we didn't
2 have before, but if you're considering it, you ought
3 to consider it across the board.

4 MR. ODESS-GILLETT: All right. So, if you
5 have a valve configuration for implementing an ESFAS
6 function, and you replace those valves, all four
7 valves. Let's say they're the same. Are you to then
8 address the CCF potentiality of those four valves that
9 are the same that are initiating, let's say, four
10 trains of an ESFAS function, and address that to see
11 if it will cope with other postulated accidents or
12 AOOs?

13 MR. MORTON: I'm assuming that's a
14 question for the staff?

15 MR. ODESS-GILLETT: For anybody. I'm just
16 trying to understand. Our understanding of the scope
17 of this was, when software met hardware. And now, it
18 seems that we now have to look at this from the
19 perspective if there is a hardware mod in a plant.

20 CHAIR BROWN: When was the first issue of
21 BTP 7-19, Rev. 0?

22 MR. ODESS-GILLETT: I think Rev. 4 is the
23 first one that's published, I think.

24 MR. MORTON: I think it's back in 1997.

25 MR. ODESS-GILLETT: Yes, I think it is

1 1997.

2 MR. MORTON: Yes.

3 CHAIR BROWN: Was it done strictly because
4 of software being introduced into systems?

5 MR. MORTON: I would have to go back and
6 verify that question, Member Brown.

7 CHAIR BROWN: I mean, I keep coming back
8 to I'm on Dennis' side. I mean, I thought about back
9 in the '70s and while I was designing new systems,
10 Common Cause, we thought about that. But where we had
11 concerns, we largely tried to resolve that with
12 redundant and independent -- for instance, I had to
13 design, I had responsibility for a new rod control
14 system for one of the brand-new, long-life cores that
15 was going to go into submarines and cruisers. And it
16 was a solid-state rod control system.

17 And instead of using relay logic, we were
18 going to use CMOS. Okay? Integrated circuits,
19 digital, you know, hard designed digital logic, not
20 software. And we had a major concern with those
21 components, and we ended up designing redundant,
22 parallel voting logic in order to move the rods and
23 the control circuits, largely because the experience
24 with solid state and noise back in those days -- CMOS
25 was one of the first more noise-resistant integrated

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1 circuits to come along, complementary metal oxide
2 semiconductors.

3 So, we actually had two channels of two-
4 out-of-three voting in order to pull the rods. We
5 didn't have any of that to drive them in, but we had
6 plenty of it to drive them out, just because
7 reactivity addition accidents in our plants were a
8 pretty significant accident that you had to deal with.

9 So, that's before software even got
10 started. We did that design, started back in 1968.

11 MEMBER BLEY: Well, it goes back even
12 further, Charlie, at least anecdotally. In the '50s,
13 a lot of the stuff done in aerospace was focused on
14 doing reliability calculations for equipment to be
15 sent up there. And I remember getting presentations
16 going to vendors, and they would say, well, the single
17 fail once in 10 to the 25th years. And you say, well,
18 yes, but it failed three times in the last four years.
19 So, well, those were acts of God.

20 (Laughter.)

21 And the supposed acts of God were really
22 Common Cause Failures. And starting in the early
23 '60s, a lot of people started focusing on them, and it
24 wasn't the age of software control yet. So, it's been
25 around a long time.

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1 Anyway, I think --

2 CHAIR BROWN: Dennis, Rich Stattel just
3 pointed out that Rev. 0 of 7-19 was issued in 1975.

4 MEMBER BLEY: There you go.

5 NEI can go ahead with their presentation.
6 We just wanted a little clarity between the two
7 arguments that are going on. Thanks.

8 MR. ODESS-GILLETT: All right. And I just
9 want to say that, if you look at Rev. 4 --

10 MR. HECHT: Excuse me. This is Myron
11 Hecht. I'm just wondering if I can get a
12 clarification.

13 MR. ODESS-GILLETT: Sure.

14 MR. HECHT: Earlier in the presentation
15 today, Wendell had said that latent defects were the
16 same as design defects. And I'm just wondering if the
17 intent of BTP 7-19 is to say that, if you have
18 problems in the hardware design language, such as VHDL
19 or Verilog or SystemC, that that should be treated in
20 the same way as software defects are treated. And I'm
21 not sure if it's talking about the same thing as we
22 were in Charlie's example of basically a process
23 defect in the relays. Perhaps if there were a design
24 defect, rather than a blatant defect, then it would be
25 clearer that we were talking about commonality between

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1 hardware and software.

2 CHAIR BROWN: I hadn't thought about it
3 that way. I think design defects, to me, are -- it's
4 not a hardware, it's not a component defect. It's a
5 design defect in terms of you don't implement what you
6 want to do to get the right result correctly. And
7 I've got examples of that as well that I call design
8 defects, where an interlock was overridden because of
9 the way it was executed off of a light going on, and
10 it should have been directly from the triggering thing
11 and going directly to the interlock, as opposed to
12 using an alarm circuit to trigger the interlock. And
13 that was a big design defect that we had to correct.

14 MR. HECHT: Isn't the difference between
15 a design defect and a manufacturing defect that the
16 failure is probably going to occur at the same time as
17 a design defect, simultaneously on multiple channels,
18 but not necessarily with some of the other
19 manufacturing defects? And that that would have been
20 the big issue in CCF, at least that BTP 7-19 is
21 addressing?

22 MEMBER BLEY: I can't really hear Myron.

23 CHAIR BROWN: Yes, Myron, you're breaking
24 up.

25 MR. HECHT: I guess I'll try to speak more

1 slowly and briefly.

2 Is it not true that design defects are
3 where you have simultaneous failures that cause the
4 CCF, and that other types of defects, such as
5 production, would not be causing the concern that
6 BTP 7-19 is addressing, even though they are also
7 latent defects?

8 CHAIR BROWN: Okay. I think I see what
9 you're saying, Myron. Let me restate it. Your
10 suggestion is, when we mean latent defects, do we mean
11 design defects as opposed to some integral things such
12 as a production defect, as I gave, or in the 741
13 example, which was literally a chip design defect at
14 the time? Some circumstance -- I've forgotten what it
15 was that triggered the lockup. Is that what you're
16 saying? It's really more of you design the circuit,
17 but if it's got a latent design defect, it doesn't
18 show up in your testing?

19 MR. HECHT: Right. And I thought that
20 that was the real issue in BTP 7-19. And that if the
21 word "design" were used in conjunction with "latent,"
22 it might clear up the confusion.

23 CHAIR BROWN: That's an interesting point
24 because the first question I had on this that I didn't
25 even bring up, in the title, it says, "Failure due to

1 latent defects". And my first question was, what is
2 a latent defect, which is not defined anywhere? So,
3 that's an interesting thought.

4 Dennis, do you have any thoughts on that?

5 MEMBER BLEY: Nothing I didn't say
6 earlier, no.

7 CHAIR BROWN: Okay.

8 MR. ODESS-GILLETT: Chairman Brown, I just
9 want to bring the attention to the members that the
10 title of Branch Technical Position 7-19 up through
11 Rev. 7 uses the term "computer-based instrumentation
12 and control system". So, it's always been industry's
13 understanding that the BTP was addressing the marriage
14 of hardware and software.

15 CHAIR BROWN: You're right, Rev. 7 did
16 say, "computer-based". That was in Rev. 7 and 6. But
17 this BTP was around back in 1975. So, did it say
18 "computer" back in those days as well?

19 MR. ODESS-GILLETT: Well, unfortunately,
20 on the NRC website, I can't go back before Rev. 4 to
21 see what --

22 CHAIR BROWN: Who's talking, by the way?

23 MR. ODESS-GILLETT: This is Warren. I'm
24 sorry.

25 CHAIR BROWN: Oh, okay. Thank you.

1 MR. ODESS-GILLET: Sure. So, going to
2 the website, I can't go before Rev. 4. Rev. 2, which
3 is a 1981 version, is not even a BTP, even though it
4 says it's Revision 2, and it has nothing to do with
5 Common Cause Failure. So, really, I think Revision 4
6 is the first release, and they called it HICB at the
7 time, HICB-19, to address, in our opinion,
8 SECY-93-087. And it was always about computer-based
9 instrumentation and control systems.

10 CHAIR BROWN: Staff, what do you want to
11 do? Do you want to continue arguing or discussing,
12 not arguing -- excuse me -- having rational
13 discussions with NEI on this blatant hardware thing
14 versus whatever?

15 (Laughter.)

16 Obviously, you'll win in the end.

17 (Laughter.)

18 MR. BENNER: Member Brown, this is Eric
19 Benner.

20 I don't think it's about winning or
21 losing.

22 CHAIR BROWN: No, I didn't mean it that
23 way, Eric.

24 MR. BENNER: I know you didn't, but I
25 wanted to just set that straight for the record.

1 CHAIR BROWN: Yes.

2 MR. BENNER: I think that this is one of
3 the challenges of trying to shorthand. I think we all
4 acknowledge that, like Member Bley said in the
5 beginning, that even though we call some of these
6 things defects, in the case of software, the software
7 does exactly what it was programmed to do. That just
8 may not be what you really want it or expect it to do.

9 So, I think the focus has been on
10 software. I think on these digital I&C systems we've
11 noted that there have been some hardware issues. I
12 think there is also the broader challenge of,
13 obviously, there could be latent design defects in any
14 piece of equipment in the plant. And we have systems
15 like the idea of equipment qualification and all of
16 the quality assurance requirements in Appendix B that
17 are part of the regulatory footprint that helps
18 convince us that the likelihood of such defects
19 existing is low enough that we don't have to make them
20 a regulatory concern.

21 I think there is some room in the BTP to
22 parse out this discussion instead of just trying to
23 rely on a term of latent defect versus design defect,
24 versus software versus hardware. I think we've packed
25 that in too tightly, and not that I want to make the

1 BTP longer because it's pretty long, but I think,
2 given both the initial comments Member Brown and
3 Member Bley gave at the beginning of this discussion,
4 as well as some of the dialog we've heard from other
5 stakeholders, both in the presentation here as well as
6 some of the letters we got, the staff is going to go
7 back and look at our description of this and see, is
8 there a better way to communicate this?

9 So, I don't think there's merit to
10 continuing to try to drag out the discussion here. We
11 have the action to look at it. And I think we've
12 heard some concerns that are being raised. I think we
13 can clarify this somewhat better. So, I think we just
14 need to see how effective we could do that, and then,
15 share that with both the Committee and the
16 stakeholders to see if what we say makes sense.

17 CHAIR BROWN: Could you do one thing for
18 me? This has been mentioned several times. The
19 software, we keep talking about software CCFs. And I
20 know I've made that comment the same as a couple were
21 made just now. Software does what it's programmed to
22 do. It's really software design defects. Is there a
23 way to try to get that thought process into this? I
24 don't remember that being, to make that
25 differentiation. I mean, software doesn't "fail fail"

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1 from a software standpoint. It's a design failure
2 because somebody tells it to do what it's not supposed
3 to do, or doesn't tell it what to do when it's
4 supposed to do it.

5 MR. BENNER: Yes, it's the design more, in
6 some ways, it's more a design requirements issue than
7 it is a --

8 CHAIR BROWN: Exactly. Is there a way to
9 try to get that? People keep throwing this thing
10 about software failing around like candy at a child's
11 party. It just gets so irritating.

12 MR. BENNER: Yes. No, and I think in this
13 whole idea of can we explain that more, yes, we'll
14 take a look at that.

15 CHAIR BROWN: Okay. Okay. I just wanted
16 to see if you could at least put that on the table
17 while you're doing this other stuff. Okay?

18 MR. BENNER: Yes, absolutely.

19 CHAIR BROWN: Okay. Thank you.

20 Steve, are you ready to go on?

21 MR. VAUGHN: Yes, I think we've beat this
22 dead horse.

23 (Laughter.)

24 CHAIR BROWN: Okay.

25 MR. VAUGHN: All right. So, if you

1 thought that was going to be easy, this one's going to
2 be even more challenging.

3 From the spurious operations or actuation
4 perspective, the Draft BTP, on page 30, Section 5,
5 provides an example in which only partial actuation of
6 an ECCS occurs, but with indication of a successful
7 actuation. That's an example the staff provides in
8 the BTP.

9 Now this example assumes that a partial
10 ECCS system actuation is caused by an internal digital
11 ESFAS CCF. But, you know, this example could occur
12 because a downstream ECCS SSC has malfunctioned. And
13 we know that addressing potential malfunctions of SSCs
14 downstream of the digital ESFAS is not within the
15 scope of this BTP. So, industry members have
16 requested that this example be clarified in that
17 regard.

18 CHAIR BROWN: You said it was on page 30?

19 MR. VAUGHN: Yes.

20 CHAIR BROWN: Okay. You all are going to
21 deal with that.

22 MR. VAUGHN: And then, the second bullet
23 there about from a licensing perspective, we noticed
24 also on that same page 30, at the top, that the SRP,
25 Section 7.7, is listed as the regulatory basis. And

1 it's our understanding SRPs are regulatory guidance.
2 We realize the SRP is referenced in Part 52, but we
3 look at it as it's there to state what version of the
4 SRP is in play for a submittal, rather than an SRP
5 being considered incorporated by reference regulation.
6 So, we would like to see that this SRP is not listed
7 under regulatory basis.

8 And, in fact, industry is struggling to
9 understand the regulatory basis for adding spurious
10 actuation to this BTP. This topic of spurious
11 actuation was introduced to the BTP in Revision 6 in
12 2012. Applicants and licensees have been addressing
13 spurious actuation from a design perspective and not
14 from perspectives like adding diversity.

15 So, techniques such as energized to
16 actuate and various styles of redundant logic have
17 been the design techniques for years to assure
18 spurious actuations won't occur. And even the safety
19 analysis of operating plants has also addressed
20 mitigating potential spurious actuations.

21 So, it's industry's position that the
22 purpose of this BTP is to provide the NRC reviewer
23 guidance on how to address SECY-93-087, and spurious
24 actuation really is a different animal and addressed
25 differently than a lack of function, as described in

1 the SECY, and differently from what this BTP tells you
2 to do for a D3 assessment from the point of view of
3 loss of function. And as a result, we think that this
4 topic should be in separate guidance rather than
5 adding it to the BTP along with how you're doing a D3
6 assessment to address loss of function.

7 CHAIR BROWN: This is Charlie again.

8 You said that first showed up in Revision
9 6?

10 MR. VAUGHN: Yes.

11 CHAIR BROWN: Which I think you all
12 participated in that revision back in -- because we
13 wrote a letter on Revision 6. We reviewed Revision 6;
14 the Committee did in November of 2011. And I don't
15 know whether Revision 6 -- I know there were some
16 changes to that made relative to the spurious
17 operation. I don't know whether there were other
18 words in there other than the proposed clarifications
19 that were noted by the Committee.

20 Dennis, do you remember anything?

21 MEMBER BLEY: No, I'd have to go back and
22 dig at that a little.

23 CHAIR BROWN: I remember John bringing up
24 spurious actuations in the meetings.

25 MEMBER BLEY: Kind of the reason it

1 probably came up is because of all the fire work that
2 had been done in the last seven or eight years before
3 that in which spurious actuations became a big deal.

4 CHAIR BROWN: Exactly.

5 MEMBER BLEY: So, the thinking probably
6 fell over to this side, but I'd have to go back and --

7 CHAIR BROWN: Yes, I think that was the
8 context of when some of those discussions came about
9 back then. You're right, there was a lot of the fire
10 stuff that was going on, and I guess John and you were
11 involved in that pretty heavily, if I remember
12 correctly.

13 MEMBER BLEY: Yes, John, not me, but yes.

14 CHAIR BROWN: Not you? Was it you or
15 John?

16 MEMBER BLEY: More John.

17 CHAIR BROWN: Oh, okay.

18 MEMBER BLEY: I was aware of it, but he
19 was heavily involved in it.

20 CHAIR BROWN: Yes. Okay.

21 I guess, Staff, I mean, you guys can go
22 discuss that one. I'll let you deal with the staff.
23 Okay? I understand your point. Because we did have
24 comments in our November 14th letter. One of those
25 was on the spurious operations section. It really

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1 referred to -- it was a response by the EDO to a
2 comment that we made in our letter that brought the
3 old Section 3.7 into play in Rev. 6.

4 But Section 1.8 had to do with failure to
5 actuate and spurious. That was not ours. That was a
6 new section. Section 1.8 was "The Potential Effects
7 of CCF: Failure to Actuation in Spurious Actuation".
8 I don't know whether that section was in an earlier
9 version of this BTP or not.

10 Eric, I think you guys are going to have
11 to go look at that and argue, and discuss with him
12 what you want to do with it.

13 MR. BENNER: Yes. I'll wait until my
14 closing remarks. I'm cataloging these issues, and
15 I'll wrap back around sort of as to what we're going
16 to do next.

17 CHAIR BROWN: Okay. No, it's just a
18 suggestion. I mean, you're all going to have to
19 resolve comments along here somewhere.

20 Okay. Steve?

21 Is that all, Eric? I'll let Steve go on?

22 MR. BENNER: Yes, for now.

23 CHAIR BROWN: Okay. Take it away, Steve.

24 MEMBER BLEY: Charlie?

25 CHAIR BROWN: Yes, Dennis?

1 MEMBER BLEY: Just for reference, going
2 back to our letter, Sections 1.8 and 3.7 of the BTP
3 did deal with spurious actuations. And I'd have to go
4 read that again to see just what was there. But it
5 was there.

6 CHAIR BROWN: Yes, 1.8 was there; 1.8 was
7 there, and we made a comment. And 1.8, the last
8 paragraph, the last two paragraphs of 1.8 were an EDO
9 response to one of our comments in our 11/14 letter.
10 The earlier part dealing with undesired trip or
11 actuation, but the title was still "Spurious
12 Actuation".

13 MEMBER BLEY: Yes, and they had it in both
14 1.8 and 3.7.

15 CHAIR BROWN: Right. And then, we added,
16 we spiffed-up 3.7 with John's comment. And then, they
17 came back with a change to 3.7. They did something
18 with it. They revised it a little bit to emphasize.

19 So, that's my remembrance. I'd have to go
20 back and look at the Rev. 6 proposed to us that we
21 reviewed to see what changes were made otherwise.
22 But, yes, you're correct. Thank you.

23 MEMBER BLEY: Staff agreed that we're
24 going to go back and look at this, anyway.

25 CHAIR BROWN: Yes. Okay. Steve?

1 MR. VAUGHN: Warren, go to the last slide.

2 MR. ODESS-GILLET: Yes. Okay. There we
3 go. Four miscellaneous items.

4 The first one is the testing section. I
5 believe this was talked about during the staff's
6 presentation. And industry actually appreciates the
7 BTP incorporating for the most part the language of
8 IEEE Standard 7-4.3.2-2016 for testing on page 21 in
9 Section 3.1.2.

10 That said, the language was changed from
11 the standard, and we know the staff intends to write
12 or revise Reg Guide 1.152. That will endorse IEEE
13 Standard 7-4.3.2-2016.

14 So, we want to avoid an error-likely
15 situation in which we have inconsistent test criteria
16 in two places, one in this BTP and one in the Reg
17 Guide. So, we would like to see one reference the
18 other, or vice versa, to avoid that error-likely
19 situation.

20 The second bullet, "Independent" and
21 "Diverse". So, this is in reference to Section B6,
22 which is the criteria for manual system-level
23 actuation indications for SECY-93-087, Position 4,
24 "Displays and Controls".

25 On page 33, there's a criteria D that

1 states that, "Displays and controls have to be
2 independent." Now independence can have several
3 forms, including functional independence and
4 electrical isolation, for instance. And many
5 applicants may meet this requirement by implementing
6 divisional safety-related manual controls that
7 initiate the safety function downstream of the digital
8 equipment that could be susceptible to a CCF.

9 And so, if an applicant uses this
10 approach, certainly electrical isolation wouldn't be
11 required, but certainly functional independence would
12 be required. So, NEI suggests that, when referring to
13 independence, that it's clarified that in the case of
14 a safety-related manual control credited to meet
15 Position 4, that it's expressed as functional
16 independence to avoid unnecessarily requiring other
17 forms of independence. Making this clarification in
18 several places related to Position 4, manual controls,
19 in the BTP would be helpful.

20 And then, the third one here is about
21 crediting existing systems. This is BTP 7-19, Section
22 3.2.1. On page 24, it states that existing ATWS
23 system being credited to cope with a postulated CCF
24 needs to be, quote, "responsive to the AOO or PA
25 sequences using independent sensors and actuators as

1 the proposed digital I&C system".

2 So, industry is concerned that this is not
3 consistent with the ATWS rule, specifically Item C in
4 10 CFR 50.62. There, it requires AMSAC diversity from
5 the sensor output to the final actuation device. So,
6 it's industry's understanding that separate sensors
7 and actuators are not required in order to meet the
8 ATWS rule. And so, this should be changed to be
9 consistent with that.

10 And the, finally, the last bullet, this is
11 on page 19 in Section B3.1.1. It states that, "The
12 staff reviewer should verify that the application
13 includes an analysis using the guidance of 6303 and
14 NUREG-7007 to demonstrate that the diversity is
15 adequate." And also, in the acceptance criteria on
16 page 20, on the next page, Item B, it requires the
17 applicant to demonstrate adequate diversity in
18 accordance with both 6303 and 7007.

19 And applicants have never had to in the
20 past, never been required to demonstrate adequate
21 diversity to both NUREGs. It's always been to
22 NUREG-6303 as a minimum, and then, sometimes
23 applicants will use 7007 to support their analysis
24 based on 6303, but it's never been a requirement in
25 the past that the applicant show compliance or

1 sufficient diversity in accordance with 7007. So, we
2 request that this be revised.

3 And I believe that's the last of our
4 comments. I'll turn it back over to Steve Vaughn.

5 MR. VAUGHN: All right. Thank you,
6 Warren.

7 We've doubled our time. So, I'll make
8 this quick. Again, we appreciate the opportunity to
9 share perspectives, have some great dialog, and we
10 look forward to continuing our engagement with the
11 staff to get this BTP 7-19 out on the street, so we
12 can use it. And we're happy to answer any other
13 questions that members have.

14 (No response.)

15 All right. Hearing none, Chairman Brown,
16 I'll turn it back to you.

17 CHAIR BROWN: Yes, thank you. I forgot to
18 unmute my mic.

19 Eric, I think a couple of your staff
20 members, Rich and Norbert, wanted to make a comment.
21 Is that okay with you?

22 MR. BENNER: Sure. I mean, we were trying
23 to coordinate the staff responses, but I'll let them
24 make some brief comments, if they would like to.

25 CHAIR BROWN: You can say no. They work

1 for you guys.

2 MR. BENNER: I know, but I don't -- I
3 would just ask them that, if they want to say
4 anything, to either make it brief, or if they wish to
5 coordinate with me, they can send the information to
6 me and Wendell.

7 CHAIR BROWN: Okay. Rich, do you want to
8 go first? Make it brief?

9 MR. STATTEL: Sure. Can you hear me?

10 CHAIR BROWN: Yes.

11 MR. STATTEL: Okay. I was on the team on
12 the previous revision. So, I just wanted to mention,
13 there was a lot of discussion about what transpired at
14 that time, and with regard to spurious actuation, the
15 language had already been there and we did revise it
16 significantly, based on the input we received from the
17 ACRS. And I just wanted to make that clear because I
18 think we were kind of going back and forth on what
19 actually had transpired.

20 CHAIR BROWN: Okay. So, spurious
21 actuations were already in Rev. 6?

22 MR. STATTEL: That's correct.

23 CHAIR BROWN: We made comments. It wasn't
24 like it was invented there?

25 MR. STATTEL: Right. The ACRS did not

1 interject the idea. It was already there. They just
2 asked us to consider revising it, and we did revise it
3 in response to your letter.

4 CHAIR BROWN: Okay. Thank you. I thought
5 that was the case, but I wasn't positive. Thank you,
6 Rich.

7 MR. STATTEL: Sure.

8 CHAIR BROWN: Norbert, did you want to
9 make a comment?

10 MR. CARTE: Yes. Just a quick correction
11 on the history of CCF. So, the way we did licensing
12 has changed over the years, but, in 1969, the agency
13 did ask the various vendors to examine their systems
14 for CCF. And there are four Topical Reports submitted
15 by each of the four vendors that did a numerical
16 analysis of CCF, of their protection systems. So,
17 those were done in the 1969-to-1971 timeframe.

18 CHAIR BROWN: Those were hardware
19 analyses, in other words?

20 MR. CARTE: Yes. And particularly, they
21 all relied on functional diversity as opposed to
22 equipment diversity.

23 CHAIR BROWN: Okay.

24 MR. CARTE: But different functions went
25 on different cards, but, yes, but they relied on

1 functional diversity, pressure and temperature and
2 neutron flux.

3 CHAIR BROWN: Okay. I vaguely remember
4 that.

5 MR. CARTE: And so now, (telephonic
6 interference) analysis assumptions --

7 CHAIR BROWN: You're breaking up, Norbert.
8 Norbert, you're breaking up.

9 MR. CARTE: Sorry. So, that AEC request
10 and the associated Topical Reports established the
11 underlying analysis for the basic system of
12 architecture that existed for a number of years. What
13 started to change is, in the mid- to late '70s,
14 digital systems were starting to be introduced into
15 the plant, into the proposals. And what that raised
16 was a concern about when they started combining
17 functions. So, the shared resources was a concern as
18 well as software CCF was a concern.

19 So, that's all articulated in
20 SECY-91-0292. The position was revisited, but in a
21 much abbreviated form in SECY-93-087. So, that
22 initial technical basis wasn't summarized there.

23 So, the intent was both hardware and
24 software. And the basic concern was you're changing
25 the architecture. What now becomes the appropriate

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1 criteria, given that you have a different
2 architecture? And I could say a lot more, but,
3 obviously, everyone wants me to keep this short.

4 CHAIR BROWN: Yes. Well, yes, we've got
5 some other comments we've got to deal with.

6 Okay. Thank you, Norbert.

7 All right. I've forgotten what order I go
8 in next. Do I do the members first? Matt, give me
9 help. Or do I do the public comments?

10 CHAIRMAN SUNSERI: The public first. You
11 can do the public first, Charlie, and then, members
12 will close it up.

13 CHAIR BROWN: Okay. Christina, can you
14 make sure that the public line is open?

15 OPERATOR: The public line is open.

16 CHAIR BROWN: Okay. Is anybody on the
17 public line that would like to make a comment relative
18 to the meeting?

19 MR. SCAROLA: Yes, this is Ken Scarola.
20 I'd like to make a comment.

21 CHAIR BROWN: Okay.

22 MR. SCAROLA: First of all, thanks for the
23 opportunity to make the comment. I appreciate that.

24 And I think this BTP is really coming
25 along. It has come a long way. But my first comment

1 is really an editorial nature comment about the BTP.

2 I find it extremely complicated for
3 subject material that is really not that complicated.
4 And I think the industry has been struggling with this
5 issue, as Norbert said, since 1969. It really came to
6 the forefront in the mid-'70s. We haven't really made
7 good progress resolving it. And I would encourage the
8 staff to find a way to simplify, summarize, bring more
9 clarity. They really need to work on this BTP to make
10 it more useful.

11 Let me give you some examples. And this
12 was really revealed to me as I'm reading through these
13 41 pages and I'm writing down my comments. And I find
14 that I'm writing the same comment over and over again
15 in multiple sections of the document. I'll give you
16 some examples.

17 There are sections that talk about the
18 consequences of CCF must be bounded by the existing
19 plant safety analysis. Well, I don't agree with that.
20 So, I wrote a comment. "These are beyond-design-basis
21 events. They don't need to be bounded by the existing
22 analysis." But that's not the point. The point is
23 that those same words with slight variation are
24 written eight different times in the document.

25 The second example, and we talked about

1 design defects in hardware and software. I'm in 100
2 percent agreement that we have to address design
3 defects. I am in complete opposition/disagreement to
4 the need to address implementation and fabrication
5 defects, which have now been introduced into the
6 document. Well, again, that's not the point. The
7 point is that we talk about implementation and
8 fabrication defects in various forms eight different
9 times in the document. Do we really need to talk
10 about it eight different times?

11 Another example is independence. This is
12 the one that Warren brought up. Well, independence
13 the way it's written in the document is very
14 ambiguous. I don't think that the staff means
15 IEEE 603 independence. I think they simply mean that
16 whatever mitigates the CCF can't be affected by the
17 same CCF. Well, those words of independence are
18 written six times in the document.

19 And I could go on and on and on. But, my
20 point is we need to simplify it. I would like to see
21 the BTP completely rewritten. I'm sure the staff
22 doesn't want to do that because they're under a
23 schedule; they'd like to get this out. So, I have
24 offered to the staff a summary table where they can
25 take their 41 pages and consolidate the key

1 requirements into a one-page table. And I would
2 strongly encourage them to consider this type of
3 approach. It doesn't have to be my table, of course,
4 because the staff has their own take on these things,
5 but a table like my table that could go a long way to
6 solving this complicity and reducing the complexity
7 problem.

8 That was my first comment. Do you want to
9 respond to that at all or should I just go to my
10 second comment?

11 MEMBER BLEY: No, but, Ken, this is Dennis
12 Bley. Can I ask, are you speaking as a member of the
13 public or do you have an affiliation now you would
14 like to tell us?

15 MR. SCAROLA: No, I'm speaking as a member
16 of my own company. I have a company where I do
17 consulting to various organizations in the industry.
18 So, no, at this point I'm speaking as a representative
19 of my own company.

20 MEMBER BLEY: Thank you.

21 CHAIR BROWN: We're not going to respond
22 to the comments during this. We don't have time for
23 that during this meeting.

24 MR. SCAROLA: Okay. The second comment --

25 CHAIR BROWN: They have been provided to

1 the staff.

2 MR. SCAROLA: Okay. So, my second comment
3 is technical, and this has to do with the staff's
4 acceptance criteria. The SRM for SECY-93-087 defines
5 CCFs due to a design defect in a safety system, or I
6 use the words in a system with a robust design
7 process. SRM is a safety system. But they define
8 these as beyond-design-basis events. But the staff
9 has defined different acceptance criteria for CCFs
10 concurrent with AOOs versus CCFs concurrent with
11 postulated accidents.

12 The acceptance criteria with an AOO is far
13 more conservative than for a PA. And this
14 conservatism makes no sense because the risk
15 assessment is dominated by the low likelihood of the
16 CCF itself, not by the event. And when you apply this
17 much more conservative acceptance criteria to AOOs, it
18 requires much more rigorous analysis to demonstrate
19 that you can defend that acceptance criteria, which,
20 by the way, is 10 percent of the offsite dose limit
21 compared to 100 percent of the offsite dose limit for
22 a PA.

23 Well, safety analysts can use their
24 qualitative judgment or their expert judgment and
25 easily make a case that they are not going to exceed

1 100 percent of the offsite dose limit for most events
2 with concurrent CCFs. But now, when you narrow down
3 the acceptance criteria and say it's only 10 percent,
4 now it forces safety analysts into quantitative
5 analysis. So, they have to use plant models and they
6 have to use computer codes. It's a much more
7 expensive and burdensome process that really is
8 unnecessary and results in a very large burden for the
9 utilities with no safety benefit. These are beyond-
10 design-basis events.

11 And now, let me take the case of spurious
12 operations with the same acceptance criteria because
13 this is even more of a problem. When we talk about
14 spurious operations, the staff has again, they have
15 applied the AOO acceptance criteria, which is 10
16 percent of offsite dose limits. Now the problem is,
17 in order to keep nuclear power competitive, we need to
18 move to digital standardization in a big way,
19 standardized digital platforms that are used all
20 around the plant. We need to use operator
21 workstations with soft control panels, so we can
22 simplify operations and, then, ultimately, reduce
23 operator staffing.

24 If we look at the potential for spurious
25 operation and use plantwide applications -- take an

1 operator workstation that controls everything in the
2 plant -- we can have extremely complicated spurious
3 operations. Well, demonstrating that those spurious
4 operations are bounded by the 100 percent offsite dose
5 limit is practical. We can do it. Demonstrating that
6 they're bounded by the 10 percent offsite dose limit
7 is impractical. It would take so many quantitative
8 analyses, computer codes, plant models; we would never
9 get to the end of the analyses.

10 So, I strongly recommend that, if we're
11 going to promote the use of digital systems and the
12 standardization throughout the plant of those digital
13 systems -- we can get our O&M costs down -- we need to
14 relax the acceptance criteria.

15 Those are my two primary comments. If I
16 have a few more minutes, I would like to address some
17 of the things that were stated by other people.

18 CHAIR BROWN: We're got other folks --

19 MR. SCAROLA: Could I have more time,
20 Charlie?

21 CHAIR BROWN: No, we've got other folks we
22 have to give an opportunity. We have a cutoff here of
23 one o'clock. So, I've got to let other people have
24 their opportunity to say anything, as well as the
25 members' roundtable.

1 MR. SCAROLA: Okay. I understand. Thanks
2 for the opportunity to speak.

3 CHAIR BROWN: Okay. Thank you, Ken.

4 Is there anybody else on the phone lines
5 that would like to make a comment?

6 (No response.)

7 Hearing none, Christina, you can get the
8 phone line closed.

9 And we'll go around the table. Well, we
10 don't have a table, but I guess we'll go around the
11 Skype. Let me call out the names, if I can find the
12 list.

13 Dennis, do you want to go first?

14 MEMBER BLEY: Sure. I don't have much to
15 say, just a couple of things. I would reiterate what
16 you said earlier about spurious actuations and manual
17 actions and the examples that kind of disappeared.

18 I would clarify our 2011 November letter
19 because I've gone back and refreshed a little bit
20 since we talked about it earlier. As the staff said,
21 they did have a section on spurious actuations.
22 However, they had a couple of assertions that were
23 pretty close to what NEI said today: that the effects
24 of spurious trips and actuations do not need to be
25 evaluated beyond what's set forth in the design-basis

1 evaluations, and that they are a lesser concern than
2 failures to trip or actuate.

3 And we had disagreed with an embedded
4 recommendation that the staff responded to. We didn't
5 think those statements were consistent with what we
6 had been finding from the fire analyses of what
7 spurious actuations can do and thought they should
8 revise the section, which they did later. But our
9 main focus was the D3 analyses should evaluate the
10 effects from spurious actuations that can place the
11 plant in a configuration that's not otherwise analyzed
12 or bounded because that could really make accidents
13 that are already analyzed much more difficult to
14 control. So, that did come from us and those sections
15 showed up as a result. But the original issue was
16 already there.

17 That's all. I think they've come a long
18 way, and with a few exceptions, they may come close.

19 I hadn't thought about the success
20 criteria issues Ken Scarola brought up. I need to
21 think about that some. I'm not sure where I sit on
22 that.

23 CHAIR BROWN: Okay. Thank you. Dennis,
24 could you do me a favor and run through the other
25 members? I have a distraction I have to deal with.

1 MEMBER BLEY: Yes. I don't have a list of
2 them in front of me. Just saying.

3 CHAIR BROWN: Okay.

4 MEMBER BLEY: I know the next one will be
5 Ron Ballinger.

6 MEMBER BALLINGER: This is Ron. I have no
7 further comment. Thank you.

8 MEMBER BLEY: I don't have a list.

9 CHAIR BROWN: Dennis, I'm still here.
10 Okay. My distraction disappeared here for a minute.

11 MEMBER BLEY: Okay. Go ahead.

12 CHAIR BROWN: Matt?

13 CHAIRMAN SUNSERI: Charlie, I just had a
14 couple of things to say.

15 I think, as I listened to the discussion,
16 I think both industry and the regulatory staff
17 fundamentally desire to have greater use of technology
18 deployed in these plants because of the safety
19 benefit. And they both seek to have more efficiency
20 in the licensing process, so that the technology can
21 be deployed faster.

22 I think the disagreement is in the devil
23 is in the details. And certainly, I think industry is
24 promoting clarity in the guide, such that regulatory
25 uncertainty through interpretation is reduced to the

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1 extent practical.

2 I think as both sides listen to each
3 other's arguments, they need to think about the big
4 picture, what their goals and objectives are, and work
5 towards those goals and objectives and not get so
6 bogged down in the nitty-gritty details, although,
7 where, albeit, the nitty-gritty details are necessary,
8 then that needs to be the case.

9 But I think at a high level I'm
10 encouraged, but there just seems to be still some
11 logjams. And I don't know if it's just people digging
12 in their heels on technical topics or what the really
13 backstory is on those things. But I think if
14 everybody just takes the high road and thinks about
15 the long-term objectives, that we might get past some
16 of these issues.

17 That's all I have. I would like to thank
18 both the staff and the NEI and the industry for their
19 comments and hard work on this topic. It's much
20 needed.

21 CHAIR BROWN: Thank you, Matt.

22 Jose?

23 MEMBER MARCH-LEUBA: Yes, I had to find
24 the mouse.

25 I want to second what Matt just said. I

1 mean, he gave the speech I was going to give you,
2 basically the same concept. So, no further comment.

3 CHAIR BROWN: Okay. Thank you, Jose.

4 Vesna?

5 MEMBER DIMITRIJEVIC: No further comments.

6 CHAIR BROWN: Joy?

7 MEMBER REMPE: Sure. I appreciated
8 everyone's presentation today. I think sometimes
9 deadlines are good because it makes everyone try to
10 work hard and get things done. But, on the other
11 hand, it sounds like there's still some things that
12 need to be addressed and rushing it too much and not
13 having a good product is not good. So, I hope that
14 folks can get there within time, but, on the other, I
15 hope that the product is a worthwhile product because
16 there's been so much time spent on this. And I hope
17 that makes sense on what I'm trying to get to, but
18 sometimes I think the staff is put under a lot of
19 pressure to meet milestones and there needs to be
20 sometimes some pushback in trying to get the project
21 correct.

22 Thank you.

23 CHAIR BROWN: All right. Ron, did I touch
24 you yet?

25 MEMBER BLEY: You did, Charlie.

1 MEMBER BALLINGER: Yes, you did. You did.

2 CHAIR BROWN: I thought I did. Okay.

3 Dave, you're next.

4 MEMBER PETTI: I have no additional
5 comments.

6 CHAIR BROWN: Okay. Myron, do you have
7 any additional comments?

8 MR. HECHT: Well, I just wanted to applaud
9 Mr. Benner's commitment to try to clarify what is
10 meant by a latent defect. And I do believe that the
11 primary issue is that hardware digital logic is being
12 designed with design languages that are very similar
13 to what software is and will reach that level of
14 complexity. And I believe that that should be the
15 focus of what the expansion of the scope to hardware
16 should include.

17 CHAIR BROWN: Okay. Thank you.

18 Hey, I want to thank the staff for a very
19 good presentation in covering and being able to
20 respond to a very wide range of comments.

21 Who's got their mic on? Okay. I guess
22 we're okay.

23 MEMBER KIRCHNER: Charlie, that was me,
24 Walt.

25 CHAIR BROWN: Oh, I forgot you. I'm

1 sorry.

2 MEMBER KIRCHNER: No, that's all right.
3 I wade into this conversation with certain risk.

4 I was just thinking back, though, to two
5 weeks ago and the Reg Guide 1.187 and the application
6 of Appendix D, where it was made quite clear we were
7 talking about digital I&C and its use in the 50.59
8 process.

9 I'm just thinking here I just presumed
10 that the Branch Technical Position was focused on
11 digital I&C, not, as the industry pointed out, you
12 know, hardware writ large, because there are other
13 regulatory systems in place that deal with those kind
14 of Common Cause Failures, say like in plumbing or
15 pumps, et cetera. So, just an observation that the
16 hardware here I thought was digital I&C, not hardware
17 writ large.

18 Thank you.

19 CHAIR BROWN: I think that's the case,
20 isn't it, Eric?

21 MR. BENNER: That is the case.

22 CHAIR BROWN: Okay. I think you're right,
23 Walt; it is not the other area. It's strictly digital
24 electronic hardware-type stuff. That's where the
25 focus --

1 MEMBER KIRCHNER: Right. That's what I
2 thought. And so, just making that obvious upfront
3 might have precluded some of the conversation or
4 confusion.

5 CHAIR BROWN: Okay. Anyway, again, I
6 would like to thank the staff for their
7 responsiveness.

8 MS. ANTONESCU: Charlie, can I interrupt?

9 CHAIR BROWN: Yes.

10 MS. ANTONESCU: Eric Benner would like to
11 make some closing remarks, I think.

12 CHAIR BROWN: Oh, that's fine. Yes. I'm
13 sorry, Eric. I didn't even think about that.

14 MR. BENNER: No problem. I was adhering
15 to your schedule. If I can, I'd like to.

16 CHAIR BROWN: Go ahead.

17 MR. BENNER: Okay. So, just I'll really
18 quickly try to go through some of the things we've
19 heard today from the members and the stakeholders.

20 Regarding the use of integrating risk
21 insights into the table, we are going to look at that.
22 We do believe it's all there. So, we're balancing
23 integrating it in the table versus making the table
24 too complex.

25 On the subject of examples, we acknowledge

1 that we could have more examples. We think some of
2 that will come out of some of the initial use of this
3 guidance document, and we can look at particularly how
4 to collect better and more examples in the future.

5 Regarding the hardware/software issue, I
6 think we could do a better job clarifying the focus,
7 and particularly, this idea if we use this shorthand
8 of latent defects that we thought people knew; we
9 think some clarification could be better there.

10 Regarding the discussion of spurious
11 operation, as was noted here, this has been in the Reg
12 Guide for a while. We've acknowledged that, without
13 some bounds on it, it could become a rabbit hole to
14 what the implications are. So, we tried to refocus
15 this version of the BTP to basically have it be sort
16 of two areas.

17 One is, if you already have assumptions in
18 your design basis about implications of spurious
19 operations, are you still within those bounds, or if
20 you're not within those bounds, that can be okay, too.
21 But have you looked at, particularly if there's high
22 integration of systems, have you looked at potential
23 consequences?

24 So, there was a lot of public feedback on
25 should that be a separate guidance document. I think

1 we're open to more dialog on that with stakeholders to
2 ensure that review is taking the right form. I think
3 we do still believe that some amount of discussion of
4 spurious operation is appropriate for this BTP.

5 Regarding Mr. Scarola's comments about are
6 we being too restrictive, we do note that the
7 consequence analysis is just one methodology that can
8 be used. And we will go back and scrub to reaffirm
9 that and to articulate what it means, because it is
10 not our intention that all current evaluations need to
11 be bounding. If they are bounding, that's great.
12 That's a simple test. But there is an allowance
13 particularly for AOOs, some amount of fuel damage,
14 given the design-basis nature. And that's sort of the
15 acknowledgment of using design-basis considerations
16 versus best estimate.

17 There was also mention made of
18 standardization being a desire. I think the staff
19 would agree that's a desire, but we don't have a
20 regulatory role in that. Certainly, there are
21 elements, like when we review and approve a Topical
22 Report for a digital platform, that platform being
23 leveraged later, that's one level of standardization.
24 Obviously, in the new reactor arena, we've approved
25 some standard designs.

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1 Sort of the challenge with the operating
2 fleet is they're going to do what they're going to do.
3 And to the extent a licensee standardizes across their
4 plants or the industry wishes to standardize, we
5 certainly support that. It makes our job more
6 straightforward. There's likely efficiencies. But
7 there's nothing we could do to mandate that. So, we
8 have to be at the ready to review whatever kind of
9 customized approaches licensees want to take.

10 And then, lastly, I just wanted to respond
11 to the comments by several of the members about sort
12 of the characterization of these issues.

13 Member Rempe's comment about rush to
14 judgment, we certainly don't want to rush to judgment,
15 right. We are going to look hard at this and see
16 whether this is a matter of clarification versus any
17 fundamental change.

18 Several of the other members did point out
19 that, you know, while the devil's in the details, the
20 devils are going to be in the details no matter what
21 we do. And I applaud that feedback because I continue
22 to say in this realm that there is no perfect guidance
23 documents and you don't really learn of its pitfalls
24 until you apply it. So, we do want to get the
25 language as right as it can be in this guidance

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1 document, but I think there still needs to be
2 communication even after that with potential
3 applicants to make sure there aren't miscommunications
4 or misinterpretations of the guidance.

5 So, I packed a lot into that last couple
6 of minutes, but I think those were all things that
7 needed to be said. I really appreciate the thoughtful
8 review of the Committee and the thoughtful feedback
9 provided by the stakeholders, because I think it's all
10 in the spirit of making this a better product to
11 better clarify and enable the adoption of digital
12 technologies in the nuclear power plants. And that's
13 what we're all striving to do.

14 And that's it for me.

15 CHAIR BROWN: Thank you very much, Eric.

16 Yes, I just want to go ahead and follow up
17 on that last, since I didn't call on you initially.
18 Sorry about that.

19 I thought it was a good presentation. We
20 covered a lot of stuff. A lot of issues came out to
21 be discussed.

22 One of the things that I did want to
23 emphasize from a staff to staff, your staff to ACRS
24 staff, is trying to get this, you know, as we can move
25 it along, so that we're cooperating.

1 Tekia and Christina have been trying to
2 make sure all the coordination got done. It's been
3 very, very difficult with all the late-breaking issues
4 going back and forth. And I want to thank both
5 Christina and Tekia for their cooperation between them
6 and the very cordial way they seem to communicate.
7 They were able to get this done very nicely, even with
8 all the rapid-breaking things that are coming forth.
9 I think that's important, between the staff and the
10 Committee to get our work done, to have that type of
11 good, close cooperation to requests. So, I just
12 wanted to thank you all for that as part of this
13 overall presentation and preparation.

14 So, with that, if there's no other --
15 before I ring off, if there's anybody else on the
16 Committee that would like to pop up and say anything?

17 (No response.)

18 I don't hear anything.

19 So, again, I would like to thank
20 particularly the staff as well as our ACRS staff for
21 all the efforts they've put in.

22 Okay. Thank you very much.

23 The meeting is adjourned.

24 (Whereupon, the above-entitled matter went
25 off the record at 1:06 p.m.)

Branch Technical Position 7-19 Draft Revision 8

Advisory Committee on Reactor Safeguards
Subcommittee Meeting
NRC Staff Presentation
June 2, 2020

Agenda

- Objectives
- Summary of Changes
- Key Areas Updated
- Status and Next Steps

Objectives

- Present key areas updated in draft BTP 7-19, Rev. 8 in response to ACRS feedback and public comments
- Obtain ACRS Subcommittee feedback on the draft BTP

Summary of Changes

- Each section of the BTP saw significant refinements due to the resolution of public comments
- Changes improved:
 - Readability
 - Technical content and regulatory bases
 - Overall clarity of positions contained therein
- The draft BTP and associated public comment resolution document are now in final concurrence



Key Areas Updated

- Scope of the BTP
- Restructuring of the BTP
- Graded Approach and Categorization Scheme
- Defense-in-Depth and Diversity (D3) Assessment
- Means to Eliminate CCF from Further Consideration
- Diverse Means to Mitigate CCF
- Evaluation of Event Consequences for Coping with CCF
- Qualitative Assessment Applicability
- Spurious Operation Evaluation Guidance
- Manual Action Means to Address Position 4 in SRM-SECY-93-087
- Justification for Not Correcting Specific Vulnerabilities

Scope of the BTP

- The scope of the BTP guidance applies to CCFs resulting from latent defects in hardware or software. The staff:
 - Distinguished between types of potential CCF vulnerabilities and which are in scope of the BTP
 - Single failures and single malfunctions (out of scope)
 - CCFs due to latent defects (in scope)
 - Clarified that the design and/or analytical solutions in this BTP are applicable for latent defects in hardware or software
 - Resolved several public comments regarding the scope of the BTP
 - Made conforming changes to reference latent defects with regards to CCF



Restructuring of the BTP

- Enhanced the background information to provide a framework for evaluation of CCF vulnerabilities
- Refined regulatory basis and references
- Consolidated technical guidance and corresponding acceptance criteria
- Improved 'Discussions' section in each area of the BTP

Graded Approach and Categorization Scheme

– Example Framework* in Draft BTP 7-19

	Safety-Related Equipment	Non-safety related Equipment
Safety Significant— Significant contributor to plant safety	A1 Perform D3 Assessment	B1 Perform Qualitative Assessment
Not Safety Significant— Not a significant contributor to plant safety	A2 Perform Qualitative Assessment	B2 May need to perform a Qualitative Assessment

***Not required to be implemented as shown**



Graded Approach - Use of Risk Insights

- Risk insights can be used to inform the safety-significance determination
 - Use of risk insights is at the discretion of the licensee or applicant
 - Risk insights is optional for implementation of a graded approach
- Use of risk insights can be an input to an integrated decision-making process for categorizing the proposed DI&C system

D3 Assessment

- Described assessment to identify possible CCF vulnerabilities due to latent defects in DI&C systems.
- Clarified that a D3 assessment is not monolithic
- Included guidance to verify adequacy of the defense-in-depth to protect the plant from the effects of these CCFs if they were to occur.
- Included guidance to evaluate effectiveness of any measures used to eliminate the CCF from further consideration, or to prevent, mitigate, or cope with such possible CCFs.

D3 Assessment (continued)

- Means to eliminate from consideration, or to prevent or mitigate the effects of postulated CCF in a digital system:
 - CCF vulnerability to latent defects can be eliminated from further consideration by use of these design attributes: diversity, testing, or NRC-approved defensive measures;
or
 - A diverse means can be used to perform the same or different function than the safety function disabled by the postulated CCF;
or
 - A combination of the above or a different proposed solution by the licensee/applicant
- Alternatively, cope with the CCF by evaluating if the consequences remain within acceptable limits

Means to Eliminate CCF from Further Consideration – Diversity and Testability

- Diversity within the DI&C system or component
 - Provided guidance to use diversity within each safety division or among redundant divisions to address CCF
 - Provided guidance to evaluate that sufficient diversity exists in the design so different portions of the system are not subject to the same CCF
- Testing to identify and correct latent defects
 - Revised guidance to be more aligned with testing criteria described in IEEE 7-4.3.2-2016

Means to Eliminate CCF from Further Consideration – Defensive Measures

- Defined as a subset of design attributes
- Added to conceptually allow for new and innovative design techniques to be employed to address CCF
- Clarified that it must be NRC-approved to be creditable



Diverse Means to Mitigate CCF

- Clarified guidance on the use of diverse means to perform the same or different function as the safety function:
 - The types of diverse means that can be credited
 - Guidance on the quality level for credited equipment
- Included guidance for the use of equipment outside the main control room for the performance of manual operator actions. Applies only for use of diverse means to address Position 3 in the SRM-SECY-93-087



Evaluation of Event Consequences for Coping with CCF

- Provides guidance to evaluate whether the facility can operate and remain within its safety limits:
 - When vulnerabilities to CCF are not addressed**OR**
 - When remaining (residual) CCF vulnerabilities exist
- Identified acceptance criteria to conclude that consequences of potential CCFs of a proposed system, or portions of a proposed system, remain acceptable

Qualitative Assessment Applicability

- Provides guidance for performing a qualitative assessment to evaluate potential CCFs and their effects in non-A1 category systems
- Identifies three factors used in the aggregate to demonstrate likelihood of failure (i.e. CCF) remains acceptable:
 - Design attributes
 - Design quality
 - Operating experience
- Clarifies the use of supplementing failure analysis information to support the qualitative assessment

Spurious Operation Evaluation Guidance

- Identified types of spurious operations:
 - From single failures and single malfunctions (design basis failures)
 - From CCFs due to latent defects (*beyond design basis and the focus of this BTP*)
- Updated guidance to focus on highly integrated systems
- Provided guidance for evaluating spurious operation assessment
- Identified acceptance criteria to conclude that:
 - Accident analysis results have not been invalidated

Or

 - Previous spurious operation assumptions have not been affected

Manual Action Means to Address Position 4 in SRM-SECY-93-087

- Clarified guidance on displays and manual controls to monitor, control and actuate critical safety functions from the main control room--necessary to address Position 4 of the SRM on SECY-93-087, Item 18
- Clarified that these displays and manual controls can be used as diverse means to address CCF only if they are not susceptible to the same CCF vulnerabilities

Justification for Not Correcting Specific Vulnerabilities

- Modified Section B.8.6 to highlight the possible use of alternative methods to not address specific CCF vulnerabilities
- Updated guidance to specifically refer to the potential for licensees or applicants to credit leak detection systems and manual operator actions to identify and address system leakage to prevent large line breaks from occurring
- Emphasized that justifications would be reviewed on a case-by-case basis only

Status and Next Steps

- Draft BTP 7-19, Rev. 8, is in final concurrence review
- ACRS Full Committee Meeting slated for July 2020
- OMB review and publication of final BTP 7-19, Rev. 8 by September 2020

Questions



Acronyms

ACRS	Advisory Committee on Reactor Safeguards
BTP	Branch Technical Position
CCF	Common Cause Failure
D3	Defense-in-Depth and Diversity
DI&C	Digital Instrumentation and Control
IEEE	Institute of Electrical and Electronics Engineers
GDC	General Design Criteria (Appendix A of 10 CFR Part 50)
OMB	Office of Management and Budget
RG	Regulatory Guidance
SECY	NRC Office of the Secretary to the Commission
SRM	Staff Requirements Memorandum

Background Information

SRM to SECY-93-087

1. The applicant shall assess the defense-in-depth and diversity of the proposed instrumentation and control system to demonstrate that vulnerabilities to common-mode failures have adequately been addressed.
2. In performing the assessment, the vendor or applicant shall analyze each postulated common-mode failure for each event that is evaluated in the accident analysis section of the safety analysis report (SAR) using best-estimate methods. The vendor or applicant shall demonstrate adequate diversity within the design for each of these events.
3. If a postulated common-mode failure could disable a safety function, then a diverse means with a documented basis that the diverse means is unlikely to be subject to the same common-mode failure, shall be required to perform either the same function or a different function. The diverse or different function may be performed by a nonsafety system if the system is of sufficient quality to perform the necessary function under the associated event conditions.
4. A set of displays and controls located in the main control room shall be provided for manual, system-level actuation of critical safety functions and monitoring of parameters that support the safety functions. The displays and controls shall be independent and diverse from the safety computer system identified in Items 1 and 3 above.

SECY-18-0090 – Five Guiding Principles

1. Applicants and licensees for Production and Utilization Facilities under 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities” or under 10 CFR Part 52, “Licensees, Certifications and Approvals for Nuclear Power Plants” should continue to assess and address CCFs due to software for DI&C systems and components.
2. A defense-in-depth and diversity analysis for reactor trip systems and engineered safety features should continue to be performed to demonstrate that vulnerabilities to a CCF have been identified and adequately addressed. In performing this analysis, the vendor, applicant, or licensee should analyze each postulated CCF for each event evaluated in the accident analysis section of the safety analysis report. This defense-in-depth and diversity analysis can be either a best estimate analysis or a design-basis analysis.
3. This analyses should also be commensurate with the safety significance of the system. An analysis may not be necessary for some low-significance I&C systems whose failure would not adversely affect a safety function or place a plant in a condition that cannot be reasonably mitigated.

Five Guiding Principles continued

4. If a postulated CCF could disable a safety function, then a diverse means, with a documented basis that the diverse means is unlikely to be subject to the same CCF, should perform either the same function or a different function. The diverse or different function may be performed by either a safety or a non-safety system if the system is of sufficient quality to perform the necessary function under the associated event conditions in a reliable manner. Use of either automatic or manual actuation within an acceptable time frame is an acceptable means of diverse actuation. If the defense-in-depth and diversity analysis demonstrates that a CCF, when evaluated in the accident analysis section of the safety analysis report, can be reasonably mitigated through other means (such as with current systems), a diverse means that performs the same or a different function may not be needed.
5. The level of technical justification needed to demonstrate that defensive measures (i.e., prevention and mitigation measures) are adequate to address potential CCFs should be commensurate with the safety significance of the DI&C system. For the systems of higher safety significance, any defensive measures credited need technical justification that demonstrates that an effective alternative to internal diversity and testability has been implemented.

NEI Perspective: Draft Revision 8 to BTP 7-19

ACRS DI&C Subcommittee
Meeting

June 2nd, 2020



DI&C Categorization (Table 2-1)

- General Design Criteria (GDC) for A1 and B1 SSCs
 - Equipment required to have diversity, to the extent practical, per the GDCs does not in and of itself infer safety significance
 - Technical criteria are more effective at distinguishing the four categories
- Labels of Safety Significance
 - Based on the structure of Section 2, the terms “Safety Significant” and “Not Safety Significant” can cause confusion
 - NEI prefers a graded and risk-informed approach, however the current structure does not provide sufficient clarity.

Design Defects: Software vs Hardware

- The introduction of hardware defects to BTP 7-19 is new and conceptually the scope is not well defined
 - Are the hardware latent defects described in BTP 7-19:
 - different than those defined in various industry standards?
 - a beyond design basis event? or considered a design basis event?
- Recommend limiting the scope of BTP 7-19 to only software latent design defects

Spurious Operations (Section 5)

- Design Perspective:
 - Partial spurious operations are not well defined and make it challenging to identify the scope of the analyses
- Licensing Perspective:
 - SRP Chapter 7.7 is not a regulatory requirement for the current operating fleet
 - It is not clear how SRM-SECY 93-087 describes the need to analyze for spurious operations caused by a latent software defect

Additional Items...

- Testing (Section 3.1.2)
 - Language does not completely align with IEEE 7-4.3.2 (2016) Subclause 5.16
- “Independent” and Diverse (various Sections)
 - Recommend a clarification to ensure the intent is functional independence; not independence as specified in IEEE Std 603-1991 Clause 5.6
- Crediting Existing Systems (Section 3.2.1) “using independent sensors and actuators”
 - The phrase “using independent sensors and actuators” is not consistent with 10 CFR 50.62(c)(1) through 10 CFR 50.62(c)(3)
- NUREG/CR-7007 (Section 3.1.1 Acceptance Criteria)
 - Could be interpreted as an expectation not a suggestion

Closing Remarks

- The NEI team appreciates the opportunity to share our perspective
- Looking forward to resolving the remaining regulatory and technical aspects of the guidance

Morning Meeting

63 people

The screenshot displays a Microsoft Teams meeting window titled "Conversation (63 Participants)". The interface includes a sidebar on the left for participants, a central presentation area, and a bottom taskbar.

Participants List:

- Presenters (10):**
 - Antonescu, Christina
 - Brown, Charles
 - Dashiell, Thomas
 - Govan, Tekia
 - Lui, Christiana
 - Nguyen, Quynh
 - Steve Vaughn Guest
 - Sunseri, Matthew
 - Wang, Weidong
 - Widmayer, Derek
- Attendees (53):**
 - 7073184109 Guest
 - Alvarado, Rossnyev
 - Arndt, Steven
 - Beaton, Robert
 - Benner, Eric
 - BILL ROSKO Guest
 - Burkhart, Larry
 - Carol Smidts Guest
 - Carte, Norbert
 - CLARK L SHELTON Guest
 - Compton, Makeeka
 - Court Reporter - Back... Guest

Presentation Slide:

Justification for Not Correcting Specific Vulnerabilities

- Modified Section B.8.6 to highlight the possible use of alternative methods to not address specific CCF vulnerabilities
- Updated guidance to specifically refer to the potential for licensees or applicants to credit leak detection systems and manual operator actions to identify and address system leakage to prevent large line breaks from occurring
- Emphasized that justifications would be reviewed on a case-by-case basis only

Slide number: 19

US EPA logo: United States Environmental Protection Agency, Protecting People and the Environment

Participant avatars: Morton, Wend...

Taskbar: Windows taskbar showing various application icons and system clock: 10:47 AM, 06/02/2020.

Conversation (63 Participants)

63 Participants

Request Control Actual Size

15:52

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19

U.S. Environmental Protection Agency
Protecting People and the Environment

Morton, Wendell

Participants:

- Compton, Makeeka
- Court Reporter - Back...
- Dave Petti Guest
- David Herrell Guest
- Dennis Bley Guest
- Desaulniers, David
- Dittman, Bernie
- Garcia, Ismael
- GENE KELLER Guest
- GOLUB, PA... - External Network
- Herb, Raymond L. Guest
- Kalathiveetil, Dawnmathews
- Kallan, Paul
- Kirchner, Walter
- March-Leuba, Jose
- Michael Waters - NRC Guest
- MICHAEL WIWEL Guest
- Montgomery, Shandeth
- Moore, Scott
- Morton, Wendell
- Myron Hecht Guest
- NEIL ARCHAMBO Guest
- Nourbakhsh, Hossein
- Paul Phelps - Dominio...
- Rahn, David

Conversation (63 Participants)

63 Participants

Request Control Actual Size

15:15

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19

U.S. Environmental Protection Agency
Protecting People and the Environment

Brown, Charles

Participants:

- Morton, Wendell
- Myron Hecht Guest
- NEIL ARCHAMBO Guest
- Nourbakhsh, Hossein
- Paul Phelps - Dominio...
- Rahn, David
- Rebstock, Paul
- Rempe, Joy
- RNT G Guest
- ROGERS S Guest
- Rogers, Ty D. (GE Pow...
- Ron Ballinger Guest
- Segarnick, Maxine
- Skov, Tammy
- Stattel, Richard
- Taneja, Dinesh
- Ted Quinn Guest
- Venkataraman, Booma
- Vesna Dimi Guest
- Warren Odess-Gillett Guest
- Weisman, Robert
- WIRELESS CALLER Guest
- WIRELESS CALLER Guest
- Wood, Ric... - External Network

