

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards

Docket Number: (n/a)

Location: teleconference

Date: Tuesday, November 1, 2022

Work Order No.: NRC-2149

Pages 1-98

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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700TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
(ACRS)

+ + + + +

TUESDAY

NOVEMBER 1, 2022

+ + + + +

The Advisory Committee met via
teleconference at 1:00 p.m., Joy L. Rempe, Chairman,
presiding.

COMMITTEE MEMBERS:

JOY L. REMPE, Chairman
WALTER L. KIRCHNER, Vice Chairman
DAVID A. PETTI, Member-at-Large
RONALD G. BALLINGER, Member
VICKI M. BIER, Member
CHARLES H. BROWN, JR., Member
VESNA B. DIMITRIJEVIC, Member
GREGORY H. HALNON, Member
JOSE A. MARCH-LEUBA, Member
MATTHEW W. SUNSERI, Member

1 ACRS CONSULTANT:

2 STEPHEN SCHULTZ

3

4 DESIGNATED FEDERAL OFFICIAL:

5 CHRISTINA ANTONESCU

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C-O-N-T-E-N-T-S

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P R O C E E D I N G S

(1:00 p.m.)

CHAIRMAN REMPE: Good afternoon. This meeting will now come to order. This is the first day of the 700th meeting of the Advisory Committee on reactive safeguards.

I'm Joy Rempe, Chairman of the ACRS. Other Members in attendance are Ron Ballinger, Charles Brown, Vesna Dimitrijevic, Greg Halnon, Walt Kirchner, Jose March-Leuba, Dave Petti, Matt Sunseri and I believe we're going to be joined soon by Vicki Bier.

I note we do have a quorum and today the Committee is meeting in person and virtually. The ACRS was established by the Atomic Energy Act and is governed by the Federal Advisory Committee Act.

The ACRS section of the U.S. NRC Public website provides information about the history of this Committee and documents such as our charter, bylaws, Federal Register Notices for meetings, letter reports and transcripts of all full and subcommittee meetings including all slides presented at the open meetings.

The Committee provides its advice on safety matters to the Commission through its publicly available letter reports. The Federal Register notice announcing this meeting was published on October 14th,

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1 2022.

2 This announcement provided a meeting
3 agenda as well as instructions for interested parties
4 to submit written documents or request opportunities
5 to address the Committee.

6 The Designated Federal Officer for today's
7 meeting is Ms. Christina Antonescu. A communications
8 channel has been opened to allow members of the public
9 to monitor the open portions of the meeting.

10 Members of the public may use an MS Teams
11 link to these slides and other discussion materials
12 during these open sessions. MS Teams link information
13 was placed in the Federal Register Notice and Agenda
14 on the ACR's public website.

15 We received no written comments or requests
16 to make oral statements from members of the public
17 regarding today's sessions. Periodically the meeting
18 will be open to accept comments from participants
19 listening to our meetings.

20 Written comments may be forwarded to Ms.
21 Christina Antonescu. During today's meeting, the
22 Committee will consider two topics. The SECY on
23 Potential Expansion of Current NRC Policy on Common
24 Cost Failures and Regulatory Guide 1.82, Rev 5, Water
25 Sources for Long-term Recirculation Cooling following

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1 a Loss-of-Coolant Accident.

2 A transcript of the open portions of the
3 meeting is being kept and it is requested the speakers
4 identify themselves and speak with sufficient clarity
5 and volume so they can be readily heard.

6 Additionally, participants should mute
7 themselves when not speaking. So at this time, I'd
8 like to ask other members if they have any opening
9 remarks.

10 PARTICIPANT: Thank you, Madame Chair.

11 MEMBER BIER: Joy, I have no opening
12 remarks, but I just wanted to let you know I'm in
13 attendance. I joined a couple of minutes late.

14 CHAIRMAN REMPE: Thank you, Vicki.
15 Member Kirchner, would you like to --

16 MEMBER KIRCHNER: Yes, thank you, Madame
17 Chair.

18 CHAIRMAN REMPE: Yes.

19 MEMBER KIRCHNER: So today is the 700th
20 meeting of the Advisory Committee on reactor
21 safeguards. And I thought it might be of use and
22 historical value to share some information with you.

23 In 1947, the U.S. Atomic Energy Commission
24 recognized the need for an independent technical group
25 to review and provide advice on reactor safety matters.

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1 And thus, a Reactor Safeguard Committee was formed
2 chaired by Dr. Edward Teller.

3 In 1950, the AEC established a second
4 committee called the Industrial Committee on Reactor
5 Location Problems which was chaired by C. Rogers
6 McCullough.

7 And it was charged with the responsibility
8 of advising on what we would today consider siding
9 issues including seismic and hydrological
10 characteristics of proposed sites.

11 In 1953, the Reactor Safeguard Committee
12 and the Industrial Committee on Reactor Location
13 Problems were combined by the AEC and the ACRS was
14 formally established.

15 There were 13 Members on that original
16 Committee. Mr. McCullough continued as the Chair, four
17 from academies, seven from industry, interestingly
18 enough, one from an insurance company and one from the
19 U.S. Weather Bureau.

20 And they were assisted by a secretary which
21 would be our Executive Director today. And in noting
22 this, I would like to look forward approximately five
23 years from today will be the 750th meeting and I'd like
24 to put a marker down.

25 I think it would be appropriate at that

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1 point under some new Chair to host a conference that
2 would mark ACRS contributions to reactors safety. And
3 hopefully they would invite past members as well to
4 attend.

5 And I would note such a conference was held
6 evidently in concert with the 500th meeting of this
7 Committee. With that, I thank you, Madame Chairman.

8 CHAIRMAN REMPE: Thank you for the
9 historical reminder of the history of this Committee.

10 Any other members have any other opening remarks?
11 So if not, I'd like to ask the Member Charles Brown
12 to lead us in our first topic for today's meeting.

13 MEMBER BROWN: Might be nice if I turned
14 my microphone on. Okay, this is just as, we're going
15 to run through fundamentally what we ran through during
16 the subcommittee meeting. It's whose, NRC, Samir, are
17 you going to be doing the presentation for this?

18 MR. BENNER: Samir will be leading the --

19 MR. BROWN: I can't hear you.

20 MR. BENNER: -- presentation, Member
21 Brown. This is Eric Benner, I'll do the kickoff from
22 our side.

23 MR. BROWN: We've got a -- yes, we can't
24 hear you right now. I guess we've got a technical
25 problem.

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1 CHAIRMAN REMPE: Oh, could you speak
2 again? Let's see, I've increased the volume and I hope
3 that helps.

4 MR. BENNER: Okay. One, two, --

5 MEMBER BROWN: No.

6 MR. BENNER: -- three, four.

7 CHAIRMAN REMPE: Can you also increase
8 your volume.

9 MR. BENNER: My microphone volume? I
10 will, yes.

11 MEMBER BROWN: Yes, you're very faint,
12 Eric.

13 CHAIRMAN REMPE: Yes, that helps. Other
14 people I can hear. And so it's just you, Eric.

15 MR. BENNER: Okay, is that any better?

16 CHAIRMAN REMPE: Maybe just get real close
17 to your mic and I think we'll manage.

18 MR. BENNER: Okay. I, my piece is fairly
19 short so I will speak loudly and then turn it over to
20 people who can better manipulate this equipment.
21 Again, so as Member Brown said, this will largely
22 replicate what we discussed at the subcommittee
23 meeting.

24 I will say in respect for the Committee's
25 time, we have abbreviated some of what I would call

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1 the background and have focused it more on the issues
2 that were raised at the subcommittee meeting both by
3 the subcommittee and in the industry presentation.

4 But we will, we certainly will go anywhere
5 in the discussion where the Committee wants to go.
6 We thank you for your time and with that, I will turn
7 it over to Samir.

8 MEMBER KIRCHNER: Yes, before we continue,
9 Charlie, can you just introduce the topic so it's on
10 the record and transcript?

11 MEMBER BROWN: Oh, okay. This is an
12 expansion of the SECY, get the right date, what's the
13 old one? '83, no, '93-087 on Common Cause Failure and
14 the SRM that the Commission provided providing their
15 additional comments and observations on.

16 And they will go through those as part of
17 this overall presentation point by point through the
18 SECY and the Commission's comments on it. Did I get
19 that correct, Samir?

20 MR. DARBALI: Yes.

21 MEMBER BROWN: Okay, and one observation
22 I would make and I don't, we didn't beat on this as
23 much as we maybe should have, but one of the key points
24 for, if I can find down and see where the right answer
25 is of this expansion of the policy is to address the

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1 diversity, allow risk assessments to address diversity
2 of the design in terms of multiple software, different
3 processors, whatever diversity sort of means that comes
4 into play.

5 While you're going through this and others
6 who are there, just one of the things I like to talk
7 about after you finish the presentation just explores,
8 when you talk about not providing any diverse automatic
9 actuation of safety functions, how do you envision that?

10 What is the thought process as opposed to
11 just the magic words of saying with the risk-informed
12 approach we would be addressing whether you would need
13 diverse automatic actuation of safety functions as has
14 been done for the last 30 years or more.

15 So just keep that in mind until we get to
16 the end. We go through the presentation and other than
17 that, I'll turn it over to you, Samir.

18 MR. DARBALI: Okay. Thank you, Member
19 Brown and thank you, Eric. Oh, alongside me presenting
20 this afternoon will be Steven Alferink and Norbert
21 Carte.

22 And our project managers for this project
23 are BP Jain and Michael Marshall. And we've also had
24 a diverse membership in our working group and a lot
25 of support from NRR and research staff.

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1 Here's the outline for our presentation
2 today. We'll go over the background and key messages
3 from our effort to expand the Digital I&C Common Cause
4 Failure Policy.

5 We'll cover the purpose of the proposed
6 expanded policy described in SECY 22-076. We'll
7 present the Staff's position on the questions the ACRS
8 Digital I&C subcommittee asked the Staff back in the
9 September meeting.

10 We'll go over the new points in SECY 22-076
11 and we'll finish by discussing the next steps. As we
12 know, nuclear power plants continue to install Digital
13 I&C technology which results in increased reliability
14 and safety benefits.

15 However, this use of digital technology
16 can also introduce digital common cause failures. The
17 current policy on Digital I&C CCFs is in Staff
18 Requirements Memorandum to SECY 93-087 which requires
19 a diverse means of a postulated common cause failure
20 could disable a safety function.

21 The diverse means may be an automatic or
22 an action or include manual actions. The Staff has
23 been expanding the use of risk Informed approach as
24 much as is allowed by these SRI.

25 However, the current policy does not allow

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1 for the use of risk informed approaches to determine
2 when a diverse means would not be required. Because
3 of this, the Staff developed SECY 22-076 to allow for
4 greater use of risk-informed approaches to address
5 Digital I&C CCFs for high safety significant systems.

6 The key messages from our presentation are
7 that the proposed expanded policy in SECY-22-076
8 encompasses the current points of SRM-SECY-93-087 and
9 expands the use of risk-informed approaches in Points
10 2 and 3.

11 When taken together, the four points
12 provide criteria for the assessment of diversity and
13 defense and depth against CCFs. Use of risk-informed
14 approaches will be consistent with the Safety Goal
15 Policy Statement, the PRA Policy Statement and
16 SRM-SECY-98-144.

17 The current policy will continue to remain
18 a valid option for applicants and licensees and Point
19 4 regarding dependent and diversity's place in manual
20 controls ensures the health and safety of the public.

21 And it is already risk informed as it
22 focuses only on those critical safety functions needed
23 to ensure the safety of the facility. The purpose of
24 the SECY is to request the Commission, expand the
25 current policy to allow the use of risk-informed

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1 approaches to demonstrate the appropriate level of
2 defense and depth including not providing any diverse
3 automatic actuation of safety functions.

4 This expanded policy would be applicable
5 to new or amended licenses and design approvals for
6 all nuclear power plants, power plant types under Parts
7 50 and 52.

8 The Staff sent the SECY to the Commission
9 in August of this year and we are currently waiting
10 for direction from the Commission on how to move
11 forward. I'm on slide 8 now.

12 The ACRS Digital I&C subcommittee provided
13 some question to the Staff during the September meeting.

14 The first question was if the revised policy would
15 be applicable to advanced reactors.

16 And the answer to this question is yes.
17 The policy would apply to advanced reactors, licensed
18 under Parts 50 and 52. When we get to the third question
19 below, we'll explain how reactor designs that may or
20 may not seem to fit within the policy would be addressed.

21 The second question was related to whether
22 those aspects of the current policy for which the Staff
23 did not request a change carry forward unaltered.

24 This question was focused on Point 4 and
25 the Commission's statement in SRM-SECY-93-087 that

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1 certain requirements in the original SECY were highly
2 prescriptive.

3 One of these requirements being that the
4 diversities placed a manner of controls had to be
5 hardwired. The ACR CRL subcommittee noted that the
6 SECY-22-076 was silent on this matter and wanted to
7 know if expanded policy maintain the Commission's
8 direction from the original SRM.

9 The answer to his question is yes, the Staff
10 intended to maintain the Commission's direction
11 regarding this matter.

12 MEMBER BROWN: I guess, this is Charlie,
13 I guess the point being is there is nothing that says
14 that in the 0076 as presently written. At least I
15 didn't find it. Is that correct?

16 MR. DARBALI: Correct. It is --

17 MEMBER BROWN: Okay.

18 MR. DARBALI: It is 22-076 did not mention
19 anything specifically from 93-087, then we're carrying
20 that forward.

21 MEMBER BROWN: Okay, go ahead.

22 MR. DARBALI: Okay. And the last question
23 was if different reactor types warrant consideration
24 of different critical safety functions. And the answer
25 is yes.

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1 The expanded policy is intended to be
2 technology neutral, but it does rely on the Staff's
3 licensing experience and assumptions about the design
4 of the facility such as the process of a main control
5 room.

6 We recognize that the critical safety
7 functions listed in the original SECY in SECY-22-076,
8 and in BTP-7-019, may not be the appropriate set for
9 all reactor designs.

10 But the expanded policy provides for the
11 use of existing regulatory tools like extensions and
12 alternatives that, if necessary, can be used to
13 accommodate designs with different critical safety
14 functions.

15 If the Staff encounters a reactor design
16 where the policy would not be applicable, the Staff
17 will engage the Commission as appropriate. Any
18 questions before I continue?

19 All right, here on Slide 9, it's a figure
20 that shows the proposed expanded policy that
21 encompasses the current position in SRM-SECY-93-087
22 with clarifications and provides for risk-informed
23 approaches in Points 2 and 3 to address Digital I&C
24 Common Cause Failures.

25 The current path shown on the left in green

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1 allows for the use of best estimate analysis and diverse
2 means to address a potential CCF. Whereas the
3 risk-informed path on the right allows for the use of
4 risk-informed approaches and other design techniques
5 or measures other than diversity to address a potential
6 CCF.

7 And I know we'll get these towards the end,
8 but we're talking about consideration of whether the
9 CCF can be properly prevented or mitigated. And in
10 the next slides, we'll show each of the four points
11 of the expanded policy.

12 This Slide shows Point 1 of SECY-22-076
13 which calls for a defense in diversity assessment of
14 the facility incorporating the proposed Digital I&C
15 system.

16 This assessment is to be, is to demonstrate
17 that vulnerabilities to Digital I&C CCFs have been
18 adequately identified and addressed. Point 1 does not
19 preclude the use of risk-informed approaches for the
20 D-3 assessment.

21 And the level of rigor of the assessment
22 is to be commensurate with the risk significance of
23 the Digital I&C system. The current guidance in branch
24 technical positions 7-019, Revision 8 supports a
25 greater approach in applying a level of rigor for the

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1 D3 assessment.

2 And we'll continue to refine this guidance
3 if needed. I will now turn it over to Steve Alferink
4 who will go over Points 2 and 3.

5 MR. ALFERINK: Thank you, sir. This is
6 Steven Alferink. As Samir said, I'll discuss Points
7 2 and 3 of the proposed policy. Point 2 contains the
8 requirements for evaluating postulated Digital I&C
9 CCFs.

10 As you can see on the slide, Point 2
11 consists of three paragraphs. The first paragraph
12 requires that Applicants analyze each postulated CCF
13 in the D3 assessment and it allows Applicants to use
14 either best estimate methods or a risk-informed
15 approach.

16 The second paragraph describes the
17 evaluation when using best estimate methods. This
18 paragraph meets the intent of the current Point 2 with
19 some minor wording changes.

20 This paragraph requires that Applicants
21 consider each event evaluated in the accident analysis
22 section of the Safety Analysis report when analyzing
23 each postulated CCF.

24 The third paragraph describes the
25 evaluation when using a risk-informed approach. This

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1 paragraph is in addition to the current Point 2. This
2 paragraph requires the Applicants evaluate the
3 risk-informed approach against the Commission's policy
4 and guidance of risk-informed decision making.

5 This paragraph also specifies that the
6 Staff will review Applications that use risk-informed
7 approaches or consistency with established policy and
8 guidance and risk-informed decision making.

9 In contrast to the evaluation using best
10 estimate methods, the Staff expects the Applicants
11 using a risk-informed approach will consider a broad
12 spectrum of initiating events not limited to only those
13 evaluated in the accident analysis section of the Safety
14 Analysis Report.

15 Next slide please. With respect to Point
16 2, the Staff's goal is that the acceptance criteria
17 for risk-informed approaches for Digital I&C CCFs will
18 be consistent with the NRC's broader practices and
19 guidance for risk-informed decision making and not
20 specific to Digital I&C.

21 As an example, the Staff intends to review
22 license amendment requests that use risk-informed
23 approaches for conformance to the guidance in Reg Guide
24 1.174. The Staff does not envision approaches that
25 are radical departures from existing practices. Next

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1 slide please.

2 MEMBER BROWN: Oh, don't go. Don't leave
3 yet. This is Charlie. How are you going to make a
4 decision that you're not going to accept their approach
5 using a risk-informed decision?

6 MR. ALFERINK: Well I --

7 MEMBER BROWN: You haven't laid out any
8 guidelines for that yet.

9 MR. ALFERINK: That's correct. We still
10 have to develop the implementing guidance. I would
11 say at this point, we're just envisioning that it will
12 not be a radical departure.

13 MEMBER BROWN: Where would you put this
14 implementing guidance? Radical departure and stuff
15 like that, those are critical words. And you mentioned
16 this in the last meeting.

17 MR. ALFERINK: I think the intent is we
18 would like to keep it within the current paradigm.
19 We're not intending to do something that's completely
20 different.

21 MEMBER BROWN: But well, if you don't have
22 a diverse, that's completely different. Isn't it?

23 MR. ALFERINK: I'm talking about the
24 regulatory process for evaluating it.

25 MEMBER BROWN: Okay, my question then is

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1 how do you determine whether you're going to accept
2 the risk-informed approach or not? That you don't have
3 any implementing guidance for?

4 MR. ALFERINK: That's correct. We still
5 have to develop the implementing guidance for that.

6 MEMBER BROWN: So you don't know how you're
7 going to say no?

8 MR. ALFERINK: At this point, the guidance
9 has not been developed so you're correct.

10 MEMBER BROWN: And if --

11 MR. DARBALI: And I believe what Steven
12 is saying is that risk-informed approaches have been
13 used in other disciplines outside of Digital I&C and
14 so we want to maintain consistency with those.

15 MEMBER BROWN: Okay, that's kind of
16 amorphous. All right, I'm making the point just so
17 that Members will, Committee Members will understand
18 that this is a, we have an objective to approach to
19 taking this approach.

20 We didn't say that obviously you're all
21 intending to try to go in that direction. The key issue
22 here is how do you know, how do you make a decision
23 to say no and because you're not saying, you're not
24 requiring them to do something?

25 Everything is now based on the

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1 risk-informed approach. Even Point 1 says has added
2 the word about risk-informed decision making even
3 though there were no real details for that. Two and
4 three were where the meat and potatoes were.

5 So okay that's just something that we need
6 to think about. Go ahead.

7 MR. ALFERINK: Okay so now we should be
8 on Slide 14. So now we'll discuss Point 3 as the
9 proposed policy. Point 3 contains the requirements
10 for addressing postulated Digital I&C CCFs.

11 When discussing Point 3 it is helpful to
12 keep in mind that the current policy requires a diverse
13 means to address postulated CCFs that can disable a
14 safety function.

15 Point 3 also consists of three paragraphs.

16 The first paragraph describes the outcome of the D3
17 assessment. This paragraph requires that applicants
18 demonstrate the adequacy of any design techniques,
19 prevention measures, or mitigation measures other than
20 diversity.

21 This paragraph also requires that the level
22 of technical justification for demonstrating the
23 adequacy of these measures or techniques other than
24 diversity be commensurate with the risk significance
25 of each postulated CCF.

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1 The second paragraph meets the intent of
2 the current Point 3. This paragraph specifies that
3 a diverse means is acceptable to address the postulated
4 CCF.

5 This paragraph also specifies that
6 automatic or manual actuation within an acceptable
7 timeframe is an acceptable means of diverse actuation.

8 I would note that BTP-7-019 Revision 8 provides the
9 Staff guidance for determining if automatic and manual
10 actuations can be performed within an acceptable
11 timeframe.

12 MEMBER BROWN: Okay, I've got a question.
13 Have you accepted other circumstances in the older
14 plans where automatic, where manual actuation is an
15 acceptable diverse actuation method, explicitly
16 accepted it?

17 MR. ALFERINK: I would defer to Samir or
18 Norbert on that one.

19 MR. CARTE: Norbert Carte, I&C. Even in
20 newer plants we've done that so on the digital upgrade
21 for Oconee, basically only two of the functions had
22 a diverse actuation systems high pressure, low pressure
23 safety injection.

24 The other functions were deemed to have
25 enough time to do it manually. Oconee actually

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1 believed they had enough time to do all but one. There
2 was a disagreement about that and we sort of forced
3 them to put in two rather than just one.

4 But they concluded they only need diverse
5 actuation for one. We concluded they needed it for
6 two and we, and they put in for two, but not all safety
7 functions.

8 MEMBER BROWN: What were the two again?

9 MR. ALFERINK: High pressure and low
10 pressure safety injection.

11 MEMBER BROWN: Okay, what about reactor
12 trip?

13 MR. CARTE: So they already have an ATWS
14 system or they already met the ATWS requirements so
15 we didn't impose anything additional for reactive trip.
16 And I see Dinesh has his hand up.

17 MR. TANEJA: Yes, Member Brown. The ABWR
18 design certification that we certified back in mid-90s,
19 the SECY-93-087's origination is really, you know,
20 connected to the review of that design cert application
21 from GE at that time.

22 And when we look at the certified design,
23 this concern was raised, the CCF concern and the
24 solution where we accepted was the worse manual
25 actuation of high pressure injection and low pressure

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1 injection and the analog display indications of level
2 reactor vessel level for initiating those two functions
3 manually as diverse means.

4 The reactor trip scram function was already
5 available in a manual scram. So those manual actions,
6 you know, as diverse means were what we accepted to
7 satisfy the CCF concern for the ABWR design.

8 And, you know, the SECY paper was really
9 written too in connection with our review of the ABWR
10 design cert application because it was all digital at
11 that time.

12 MEMBER BROWN: You mentioned the Oconee
13 application. You all approved that just as I arrived
14 in 2008 so early '09. We never reviewed that that I
15 know of. I'm not aware of the Committee reviewing that
16 design approach.

17 Go ahead, that one was a little puzzling
18 to me. It just appeared. When I first got here all
19 of a sudden it was approved. So that detail is lost
20 on us somewhat so the memory bank is pretty well drained
21 on that one. All right.

22 MEMBER HALNON: Charlie, I had a question.

23 MEMBER BROWN: Oh, go ahead, Greg.

24 MEMBER HALNON: Yes, this is Greg Halnon.

25 Just to kind of explore this manual a little bit

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1 further. To be acceptable, what is the pedigree behind
2 a manual actuation?

3 There's five parts to a manual actuation
4 when there's a failure detection diagnosis procedure
5 that procedure determination actions and then
6 verification the action taken is, was supposed.

7 So I guess the question is with the
8 training, the knowledge and abilities procedural
9 perspective, what are you looking for to make sure that
10 would be an acceptable --

11 MR. CARTE: Well --

12 MEMBER HALNON: -- means?

13 MR. CARTE: -- so first of all, 603 and
14 279 basically require that for every automatic
15 actuation there's a manual means to do it. Initiate
16 at the system or division level and that needs to be
17 safety related.

18 There are also associated requirements for
19 the display of information association with manual
20 actions. So in terms of equipment design, the I&C
21 review is to ensure the equipment has the capability.

22 The human factors folks review
23 implementation operator training and that sort of thing
24 and I'm less familiar with that.

25 MEMBER HALNON: Okay. All right, the

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1 reason I ask is acceptable timeframe is certainly part
2 of it. But there's also that first part which the
3 pre-emptive should be able to diagnose and detect and
4 determine what you're going to be doing both procedure
5 out, make sure you're doing it by procedure then verify.

6 So I was wondering if there was anything
7 in your thought process behind this allowing a manual
8 actuation beyond just the acceptable timeframe.

9 MR. CARTE: Well so, we generally use the
10 human factors people to evaluate operator responses
11 associated with the D3 analysis. So in terms of the
12 regulatory requirements and that says the means shall
13 be there, whether the, there's sufficient time to do
14 it, to meet the diversity in defense and depth analysis,
15 is a D3 criteria and generally we involve the human
16 factors people to do that review.

17 MEMBER HALNON: Okay. And that would
18 probably be expected to be a deep dive into the training
19 and the abilities of the operator and so forth, so forth.
20 Is that what you're saying?

21 MR. CARTE: Yes, I can't speak much to what
22 they do.

23 MEMBER HALNON: Okay.

24 MR. DARBALI: Yes, this is Samir. And I
25 believe that for the Oconee example, it was determined

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1 in the D3 assessment that those two functions would
2 not be performed in a timely manner. And thus, a
3 diverse actuation system was needed.

4 MEMBER HALNON: Okay. So that just shows
5 that there is a deeper dive somewhere else in the review
6 process.

7 MR. CARTE: Right and in Ocone, it wasn't
8 strictly analysis. They did do some tests with
9 operators in the simulator to support that they could
10 perform the actions.

11 MEMBER HALNON: Okay. That's what I was
12 looking for to see, you know, make sure we were just
13 outside of these words and to some other assessment
14 or inspection or whatever the case may be to ensure
15 that the human factors piece was still there. Thank
16 you. That's it.

17 MEMBER BROWN: I've got a note. Norbert,
18 you quoted 603, 19-091, about the requirements, but
19 if you look at the new rule making that's disappeared.
20 So that stuff is not in there explicitly anymore.
21 It's all off in guidance if it's there anywhere.

22 MR. CARTE: New rule, you mean Part --

23 MEMBER BROWN: Part 53.

24 MR. CARTE: Part 53. Okay, I'm less
25 familiar with Part 53 maybe someone can chime in if

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1 I'm wrong, but my understanding is mostly the difference
2 between Part 50, 52 and 53 is that there are different
3 processes and the technical criteria are predominantly
4 in Part 50.

5 So I'm not sure to how much extent Part
6 53 invokes Part 50 technical criteria. But that's the
7 --

8 MEMBER BROWN: It just --

9 MR. CARTE: -- my general idea.

10 MEMBER BROWN: -- it depends on which
11 framework you're in if I'm not mistaken. Dave, isn't
12 that correct? Or if the, you got the Part Frame B,
13 Frame A and Framework A and B? Framework A is, is that
14 the risk-informed one?

15 CHAIRMAN REMPE: No, it's --

16 MEMBER BROWN: And B is the more
17 traditional.

18 MR. CARTE: Well okay, the other part is.
19 One, this doesn't apply to 53 and two, 53 isn't done
20 so it's a little bit, three, I'm not involved in it
21 so I, it's a little hard to speculate on that.

22 MEMBER BROWN: Yes. One of the next
23 questions is when we talk about manual means, to me
24 manual means are very explicit. I turn a switch,
25 there's a wire going somewhere, operates a circuit

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1 breaker or relay starts a motor, closes a valve, does
2 whatever.

3 In other words, there is no intermediate
4 computer-based system like somebody's touching a touch
5 screen that's says close. And you're depending on
6 another computer system to then process that data and
7 then get it down in trip something else or the same
8 thing that would have been tripped otherwise.

9 It pretty much when you get to the new
10 technology approaches to doing that in terms of what
11 is an acceptable manual means? Does that mean totally
12 divorced from computers or software? Is that clear
13 anywhere or is that you're envisioning it, but it's
14 not stated?

15 MR. CARTE: I think there's some
16 flexibility there. And --

17 MEMBER BROWN: That's what I was afraid
18 of.

19 MR. CARTE: We have a Reg Guide 1.62 that
20 discusses that, but I believe that manual means could
21 use safety related display systems to implement the
22 manual actuation.

23 If you look at the current plant designs,
24 there's various levels of independence that the, that
25 a manual switches have. So I believe on combustion

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1 engineering designs the manual switches are just
2 equivalent to a bi-stable input to the voting logic,
3 but then it's relay voting.

4 So when you replace the relay voting system
5 with a digital system, you put your switches into that
6 digital system. That hasn't been decided yet because
7 no one has upgraded a combustion engineering protection
8 system yet.

9 Other facilities, the switches bypass some
10 of the voting logic and go directly to implementation
11 of the function. So it's a little bit design and
12 function specific how much independence the manual
13 switches have.

14 MEMBER BROWN: If I wanted to scram the
15 plant, I certainly wouldn't want to go through the
16 voting units. That doesn't make any sense. You ought
17 to go trip the scram breakers. Period.

18 Or if you wanted to start a pump, a fuel
19 pump if you need fuel systems or if you need some other
20 system, you ought to start the pump. It ought not be
21 voted on. Manual is manual.

22 You don't wait to see if you have two or
23 three or four of them in there. But that's subject
24 to another discussion. I'm just --

25 MR. CARTE: Well right. What gets into

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1 that discussion is how complicated the function you're
2 implementing. So when you're implementing a reactor
3 trip, in effect, you're just moving two breakers.

4 If you're trying to do containment
5 isolation or diesel load sequences, you've got this
6 shed the bus, load the bus and how much independent
7 logic you have associated with the manual push button
8 as opposed to the automatic system.

9 Or they just both provided an input to the
10 diesel load sequencer. And then that diesel load
11 sequencer does what it does. So part of that, it gets
12 complicated depending on the complexity of the
13 implementation function. That's part of the problem.

14 MEMBER BROWN: You know, that's a little
15 bit more back in the other parts of the plant would
16 typically we have focused on the reactor protection
17 side and the engineered safety actuation feature side.

18 Not necessarily diesel generator
19 sequencing. All right, so --

20 MR. CARTE: All right.

21 MEMBER BROWN: -- as much as going to be
22 even more amorphous now. All right. I guess anybody
23 else have any other questions or -- okay, go ahead.

24 MR. ALFERINK: Thank you. So I'll pick
25 up with the third paragraph. The third paragraph

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1 requires that a diverse means be provided if a
2 postulated CCF is risk significant and the D3 assessment
3 is unable to demonstrate that measures other than
4 diversity are adequate.

5 So this paragraph acts as a fallback
6 position. To summarize this Point 63, Point 3 allows
7 measures other than diverse means to be used with
8 appropriate justification.

9 If appropriate justification cannot be
10 provided, then diverse means must be used. Next slide
11 please. With respect to Point 3, the Staff has the
12 following expectations for a license member request.

13 First, the risk significance of postulated
14 CCFs will be determined by any increase in risk to the
15 facility using the traditional measures of increase
16 and core damage frequency or large early release
17 records.

18 Second, this increase in risk would be
19 determined using a quantitative bounding assessment.

20 Current experience is insufficient to establish
21 confidence and quantifying the probability of
22 occurrence of Digital I&C CCFs.

23 However, current experience may be
24 sufficient to establish bounding values that can be
25 used in a quantitative bounding assessment. The Staff

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1 expects the applicants may have flexibility in
2 selecting a bounding value.

3 The choice of a bounding value may vary
4 from system to system depending on the design and it
5 could be less than 1.0 with justification. The Staff
6 has confidence that a bounding assessment can account
7 for the uncertainties in quantifying the probability
8 of occurrence of Digital I&C CCFs. Because --

9 MEMBER BROWN: Just a second.

10 MR. DARBALI: -- of the lack of --

11 MEMBER BROWN: Go ahead. I'll ask after
12 you're finished.

13 MR. DARBALI: Thank you. Because of the
14 lack of confidence and quantifying the probability of
15 occurrence of Digital I&C CCFs, the Staff will not be
16 able to approve risk-informed quantitative approaches
17 based on reducing the probability of occurrence of
18 Digital I&C CCFs through design techniques or for high
19 safety significance SSEs.

20 MEMBER BROWN: All this, all this
21 commentary that you make about your ability to assess,
22 trying to phrase this correctly, that really requires
23 at the design stage if it's a new plant, new application,
24 or a replacement even for back fit that you have a pretty
25 detailed architecture structure from which to make

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1 these judgments.

2 Without that architecture, it's just
3 nothing that people say and what they're going to do
4 without one-line diagram showing the architecture and
5 why they can justify it seems to me somewhere you've
6 got to be expressing that.

7 I know right now it's been introduced in
8 7-019. It's also in the design and review design
9 specific review standards, the last two that have been
10 used. It's not in the SRP yet.

11 But it is in I think ISG-06, the licensing
12 approach that you do pre-licensing submittal. You
13 could argue that with the requirements you had before,
14 but once you go to the risk-informed approach, that
15 you need a more comprehensive architecture from which
16 to make these judgments as to whether they're approached
17 as okay or not. Am I misstating that or do you all
18 disagree?

19 MR. ALFERINK: I have a different way to
20 envision it from my perspective it would be a little
21 bit simpler approach. You don't need all the detail
22 drawings.

23 You just need to have an understanding for
24 what the system will do and how it can interact and
25 then choose a suitably large bounding value for your

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1 risk assessment.

2 MEMBER BROWN: I didn't say detailed
3 drawings, but an architecture can be shown on a single
4 sheet of paper as we have done in all the last three
5 or four design certifications we've run.

6 That's -- those have been detailed enough
7 that you could make that judgment or it would enable
8 you to make that judgment.

9 MR. DARBALI: Though we would still expect
10 to see that level of detailing the architecture. When
11 we may not get to see or an alternate review process
12 application is the software side.

13 MEMBER BROWN: I got that. The
14 architectural protection from the software side if you
15 do it right partially protects you anyway. All right,
16 you can go ahead.

17 MEMBER MARCH-LEUBA: No, no.

18 MR. DARBALI: Yes --

19 MEMBER MARCH-LEUBA: Hold it. I was just
20 going say how --

21 MEMBER BROWN: Please go ahead.

22 MEMBER MARCH-LEUBA: Just to entertain
23 you. Explain to me, I'm having problem understanding
24 this slide. You, you're saying that we have to evaluate
25 the risk to the facility.

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1 And typically risk to the facility is
2 determined as the CDF or the LERF or frequency of
3 something bad happening. And then on the last part
4 you say, but this time doesn't really believe the
5 probability of occurrence of CCF that you calculate
6 anyway.

7 So if we don't have any confidence on the
8 probability of this hidden factor, how do we have
9 confidence on the risk which is the product of that
10 and something?

11 MR. ALFERINK: The intent here is that we
12 will be able to pick a value that's large enough it
13 should encompass all the uncertainty. For example,
14 let's just pick a value, you know, 0.1 for the
15 probability of occurrence of the CCF.

16 I think everyone would likely agree that
17 would be a bounding number. Then we would not have
18 to go into the details to determine is it really 20
19 negative two, negative three, negative four.

20 If we agree that there's a suitably large
21 value then we can perform the risk assessment with that
22 and then not worry about the uncertainty in determining
23 the actual value.

24 MEMBER MARCH-LEUBA: So you can correlate
25 the increase in say callosity assuming a resolutely

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1 high probability of occurrence of the CCF and then you
2 don't --

3 MR. CARTE: Issue the -- I wouldn't use
4 the phrase ridiculously high probability of occurrence.

5 So I would --

6 MEMBER MARCH-LEUBA: You said this in
7 Point 1.

8 MR. CARTE: Well no --

9 MEMBER BROWN: Zero point one is
10 definitely --

11 MEMBER MARCH-LEUBA: A 10 percent chance
12 of, is a really critically high probability. I mean,
13 or you have a really bad design.

14 MR. CARTE: Well no, I was just looking
15 at a report out of the oil and gas industry yesterday,
16 today. And they were looking at CCFs of transmitters
17 and things like that.

18 And they came up with a range, their
19 estimate for realistic estimate of CCFs for their
20 redundant components was between .1 and .2. If .11
21 was the lowest CCF probability they had and Point 2
22 was the highest.

23 So their CCF range for 61-511, 61-508
24 compliant facilities was between .1. That was the
25 realistic estimate. It was between .1 and .2. Now

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1 that didn't include logic solvents.

2 That was just things like the damper, the
3 dampers we'll point to, but values, sensors, and things
4 like that. So between .1 and .2, was the basically
5 oil and gas industry standard for CCF.

6 Based on over 1,400 components analyzed
7 or failures analyzed.

8 MEMBER BROWN: This is a nuclear plant not
9 an oil and gas.

10 MR. CARTE: Right, but --

11 MEMBER BROWN: There's a big difference.

12 I mean you, we had one problem in the country. One
13 problem shut down the entire industry.

14 MR. CARTE: No, I get that, but we've also
15 just approved the commercial grade dedication process
16 where we use 61-508-03 certified components. So it's
17 the same components used in the oil and gas.

18 MEMBER BROWN: Yes, but if they're using
19 an architecture that's well defined, then you can
20 certainly get yourself better than .1.

21 MR. CARTE: Well, yes. Well okay --

22 MEMBER BROWN: That's my point.

23 MR. CARTE: So yes --

24 MEMBER BROWN: That's my point. Norbert,
25 that's my point. You keep nibbling this thing down

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1 to ridiculously low numbers when the focus on all of
2 these safety systems and what we've done at least try
3 to bring ourselves through them has been to make sure
4 we could see that I could mentally and just
5 qualitatively if nothing else, that there's a pretty
6 low probability without going through a math hurricane
7 of some kind.

8 So I'm just, you can't compare oil and gas
9 to a nuclear power plant. If an oil and gas plant say
10 has a catastrophic failure, you're not going to shut
11 down all the, you'll build more.

12 If you do that with a nuclear power plant,
13 you won't build any more. We've already done that '79
14 until now. What is that? Thirty, 42 years, 43 years?
15 The consequences are different even if you, even if
16 they're nebulous.

17 I mean, they were, the consequences were
18 virtually nothing. Then you look what happened. You
19 just got to be careful of the way you throw the
20 comparisons around. That's all I'm saying.

21 The rest of the Committee members can speak
22 out, tell me I'm off the wall, but that's my --

23 MEMBER MARCH-LEUBA: My gut feeling when
24 you tell me 10 percent almost go failure is reasonable
25 and expected. And it's not even covering an abundant

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1 case which is 11 percent. I said you'd better use
2 better components.

3 But going back to my original question
4 then, if I expected all the probability failure is 11
5 percent. What I'm bounding you should use at least
6 20, 25. And then --

7 MR. CARTE: Right, so --

8 MEMBER MARCH-LEUBA: What redundancy you
9 have? I mean, you, don't put two of them, just keep
10 only one. You're not getting anything in that empty
11 space.

12 MR. CARTE: Right. So basically we have
13 an established acceptance criteria yet, but they will
14 have, they would propose and justify a particular
15 bounding value.

16 But we expect it to be relatively large
17 rather than relatively small. It's kind of where we're
18 at today.

19 MEMBER MARCH-LEUBA: But it has to be
20 abundantly obvious to a reviewer familiar with the
21 subject that it is conservative.

22 MR. CARTE: Well --

23 MEMBER MARCH-LEUBA: It's easy when you
24 have thousands of components and you can look at the
25 statistics over the last ten years. We typically don't

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1 have that luxury. Okay, I just put it on the record.

2 I see a little logic failure here when we're going
3 through implementation.

4 MEMBER BROWN: And I would, let me amplify
5 Jose's comment a little bit because our comment on the
6 commercial dedication, we made the point that whatever
7 components you picked in our letter back which you all
8 responded to and that those parts have to be compatible
9 with being incorporated into the architectures we use
10 for the fire plants and you all did that.

11 You did, you converted a few words into
12 regulatory sausage making, but it came out reading okay
13 because you effectively say you have to have an, you
14 have to know what your system looks like and that it
15 will comply with our requirements before you can use
16 the commercially dedicated component.

17 That was a good write up. So anyway,
18 that's our thoughts. Joy, I interrupted you I think.

19 CHAIRMAN REMPE: It's okay. This is a
20 very trivial question that I should have brought up
21 during the subcommittee meeting. But it will, may be
22 help in the future for me to understand something.

23 Why do you have in the SECY six times high
24 safety significance SSEs instead of significant? Is
25 there some reason for this or is it just a typo that

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1 got repeated six times?

2 MR. DARBALI: I, we went through a lot of
3 wordsmithing and that is the term we agreed on.

4 CHAIRMAN REMPE: But what's the meaning?
5 Why do you say significance instead of significant
6 there? Why is that terminology important, that
7 distinction? Because it's really awkward and it gets
8 repeated in other places and I just am curious.

9 MR. DARBALI: I need to check what we said
10 in Branch Technical Position 7-019. Maybe we were
11 looking for consistency, but the intent was the same.

12 CHAIRMAN REMPE: Okay, so again, I can,
13 I get it will be repeated in the future here and I just,
14 it really is an awkward way of wording it and that's
15 why I'm asking that. Thank you.

16 MEMBER MARCH-LEUBA: But I thought you
17 were more concerned, I'm simply more concerned about
18 the modifier side whether you use significance or
19 significant.

20 CHAIRMAN REMPE: Well it doesn't make
21 sense to say significance to me.

22 MEMBER MARCH-LEUBA: Well what doesn't
23 make sense to me is high. High is in the eye of the
24 beholder. It's either a safety significant or it
25 isn't.

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1 CHAIRMAN REMPE: I agree with you on that
2 too, but again I've seen this high safety significant
3 at other places so that didn't (audio interference).
4 Anyway, go ahead.

5 MEMBER DIMITRIJEVIC: Well this is Vesna.
6 This is a better terminology. I mean this comes from
7 the, you know, 50.69 that you defined the recent numbers
8 actually which define I mean there is a risk measures.

9 And the values of these measure define is
10 this kind or loss if it is significant component so.
11 You know, you remember these four quadrants. You know
12 --

13 CHAIRMAN REMPE: But Vesna, I get what the
14 50.69, but that's the high and the low, but didn't they
15 use significant with a "t" instead of --

16 MEMBER DIMITRIJEVIC: Well they use the
17 significance so that's a different in that.

18 CHAIRMAN REMPE: Yes.

19 MEMBER DIMITRIJEVIC: But I mean that this
20 is not a value we hold that is clear criteria for these
21 measures that I mean what is the high significance based
22 on this contributing factor or factor vastly so.

23 MEMBER BROWN: There, I can help you out.
24 I just looked at BTP-7-019 and there's a section in
25 there that says acceptance of safety significance

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1 determinations, the following criteria applies.

2 High safety significance or safety related
3 SSEs are performed safety significant functions, work
4 on that one for a few minutes. SSCs in this category
5 have one or more of the following characteristics.

6 And then there are three bullets that
7 follow up. They're credited in the FSAR to perform
8 design functions that contribute significantly to plant
9 safety.

10 They're relied upon to initiate and
11 complete control actions essential to maintaining plant
12 perimeters within acceptable limits established for
13 a DBE or to maintain a plant in a safe state after it
14 reach safe shutdown or their failure to directly lead
15 to accident conditions that may have unacceptable
16 consequences exceeding site doses limits of the DBE.

17 So it is defined somewhere as to what a
18 high safety significance is in one of the BTPs. I'm
19 glad I looked it up. I had totally forgotten that.

20 CHAIRMAN REMPE: So basically we're
21 repeating some bad grammar from the PT meetings that
22 we've --

23 MEMBER BROWN: I, if this is Rev 8, this
24 was reviewed in 2021.

25 CHAIRMAN REMPE: Okay.

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1 MEMBER BROWN: And it was in the last
2 revision so we are compatriots in messing with something
3 that's vague.

4 MR. CARTE: Norbert Carte, I&C. There's
5 also another dimension about whether you're talking
6 about a binary perimeter or some sort of continuous
7 so if we say commensurate with safety significance,
8 that gives you, the flexibility to have a more graded
9 scale.

10 If it's safety significant or not it's a
11 binary scale. And to be risk informed, we sort of need
12 a graded scale, not just a binary scale or we want a
13 graded scale and that could also be part of what, when
14 any of those discussions, although I don't remember
15 them right now.

16 MEMBER BROWN: Well, I'll tell you some
17 more. Right after the high significance safety,
18 there's another B as lower safety significance then
19 they define safety related SSCs that is some other lower
20 safety.

21 And then there's a C which is lower, I just,
22 worst lowest safety significance so we've got high,
23 lower and lowest. They are defined at least in the
24 branch technical position whether those have meaning
25 for if not there is something, there is a basis for

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1 saying what those mean.

2 And there is a gradation. It's almost like
3 the graded approach type thought process based on what
4 Norbert just said. You can argue --

5 MEMBER DIMITRIJEVIC: So --

6 MEMBER BROWN: -- what the, where the
7 defining lines are between those is, could be
8 interesting. Go ahead, Vesna. I'm sorry.

9 MEMBER DIMITRIJEVIC: No, that's all
10 right. I just want to say, is the, how that's defined
11 it's not resistant which is actually risk-informed
12 content that you approaches as they exist, you know,
13 in that couldn't practices.

14 That's something new. I mean and
15 obviously this great a preductal with something new
16 and defined here so. I mean, you know, here the
17 presenters are true risk-informed content of approach
18 that those, you know, the risk-informed content that
19 the project as defined in Reg. Guide 1174.

20 Or you know, this inform ranking is
21 improving the 10-65-5069 at different than what Charlie
22 just said.

23 MEMBER BROWN: Any other questions or
24 comments? Samir? Take the spear out of your chest
25 and you can proceed.

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1 MR. DARBALI: Steven are you on, still on
2 Slide 15 or are you done?

3 MR. ALFERINK: I have finished Slide 15.
4 I was going to turn it back to you.

5 MR. DARBALI: Okay, thank you. We are now
6 on Slide 16 to talk about Point 4. So Point 4 of
7 SECY-22-076 maintains the intent from SRM SECY-93-07
8 regarding the need for independent and diverse manual
9 control room displays and controls for the plant's
10 critical safety functions.

11 These diverse displays and controls may
12 be credited to meet Point 3 and that was part of the
13 discussion before on the manual controls. Point 4 is
14 essential in the Staff's ability to conclude with
15 reasonable assurance that a proposed Digital I&C design
16 does not adversely affect an operator's ability to
17 manually control critical safety functions.

18 The Staff's position is that Digital I&C
19 systems should not be able to take control of the
20 facility away from the operator under all plant
21 conditions whether they be anticipated or unanticipated
22 plant conditions.

23 Point 4 is consistent with the application
24 of existing regulatory requirements for the
25 independence that are incorporated into the regulation.

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1 Point 4 already incorporates an explicit
2 element of risk informing as it is only applicable to
3 critical safety functions and does not require the
4 diverse displays and manual controls to be safety grade
5 or hard wired.

6 MEMBER BROWN: What's GDC 22 again? I
7 forgot. Does anybody remember?

8 MEMBER MARCH-LEUBA: You're very far away
9 from the microphone. It's hard to hear?

10 MEMBER BROWN: Oh, what's GDC 22?

11 MR. DARBALI: Remember you got that on top
12 of your head right now?

13 MR. CARTE: Yes, reliability and
14 testability I think.

15 MEMBER BROWN: And --

16 MR. CARTE: It has that statement about
17 design technique such as diversity so you'd be used
18 to the extent practical.

19 MEMBER BROWN: Okay.

20 MR. CARTE: To prevent loss of tech
21 disfunction. That's the last sentence of the --

22 MEMBER BROWN: Okay, 50.55a(h) has got
23 603-1991 in it. Right?

24 MR. CARTE: Yes.

25 MEMBER BROWN: If I remember correctly.

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1 That's the architecture is in the principles of design,
2 et cetera. Okay, all right. Thank you.

3 MR. DARBALI: And now on Slide 18, so this
4 graphic is intended to depict the risk-informed scope
5 of Point 4 which is shown in the green shaded area.
6 As you can see, Point 4 is only applicable to those
7 critical safety functions performed by the digital
8 system.

9 Point 4 is not applicable to all of the
10 critical safety functions performed by the system, only
11 those that are those critical safety functions
12 performed by the system and it's all, Point 4 is also
13 not applicable to critical safety functions that are
14 not performed by the Digital I&C system.

15 In other words, critical safety functions
16 aren't performed by various systems in the plants where
17 only focusing on the scope of the modification. Again,
18 we recognize that the critical safety functions listed
19 in the SECY and BTP-719 may not be the appropriate set
20 for all reactor designs.

21 And the SECY does provide for the use of
22 existing regulatory tools like extensions and
23 alternatives to accommodate the signs with different
24 critical safety functions, any of the Staff unconscious
25 or reactor design where the policy would not be

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1 applicable, the Staff would engage the Commission as
2 appropriate.

3 MEMBER MARCH-LEUBA: This is Jose, can you
4 give me an example so I can think of it of a safety
5 function where it will be good in your mind of the
6 digital system locks the operator and lesson lender
7 breakthrough in at all which is what No. 34 is. Right?

8 I mean, is a classic idea of you flying
9 a plane and the auto pilot is fighting you, your
10 joystick. Pulling up his point. Give me a safety
11 function with locking my joystick would be reasonable.

12 MR. DARBALI: And we can't think of one.

13 MEMBER MARCH-LEUBA: Me neither.

14 MR. DARBALI: Right, so and maybe that left
15 side of the box that says plant safety, you know, let
16 me --

17 MR. MARCH-LEUBA: It should, the left side
18 of the box should be an empty set.

19 MR. DARBALI: Right.

20 MR. MARCH-LEUBA: Even if no set.

21 MR. DARBALI: Right. A safety system is
22 going to have various levels, it's going to perform
23 a lot of functions and some are considered critical
24 safety functions.

25 Those are the ones like you said, you don't

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1 want your pilot to not have control of the plane. So
2 those are the ones that we are focusing on. If the
3 safety system performs other functions that because
4 they can be mitigated in some other way or they have
5 some, there are some preventive measures or the risk
6 of that function is not considered risk significant
7 than they would fall outside of those critical safety
8 functions.

9 MEMBER MARCH-LEUBA: Yes, let me give you
10 an example to focus many, if I'm driving one of these
11 modern cars and a cab breaks in front of me very
12 suddenly, that should release the brakes for me which
13 is good.

14 I mean it's a, the whole system takes
15 control of my action, but if I want to brake more, I
16 can. I can and then the moment you touch the brake,
17 the safety function disconnects itself and then you
18 can release the brake.

19 You just have to skid into -- anyway, I
20 think I said enough. I don't see the point of having
21 this caveat. I would, I don't see it would be applied
22 anywhere.

23 MR. DARBALI: Which caveat specifically?

24 MEMBER MARCH-LEUBA: The plant safety
25 functions not counting where the control system can

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1 take control from the operator and won't allow the
2 operator override it.

3 MR. DARBALI: But is that a comment
4 specific to the language in Point 4?

5 MEMBER MARCH-LEUBA: No, it's a comment
6 on your slide.

7 MR. DARBALI: Okay, understood. It may
8 not have been clear. Okay. Now on Slide 19. So Point
9 4 has not been an amphetamine to modern digital control
10 room designs.

11 For example, all recently approved designs
12 meet this Point 4 including the new scale control room
13 design and the AP-1000 control room design used at both
14 units 3 and 4.

15 Licensees that want to use risk information
16 to reduce the requirements for manual controls can
17 request an exception or an alternative and the Staff
18 would inform the Commission before approving or denying
19 such exceptions and alternative.

20 The Staff has had several meetings with
21 stakeholders to better understand their perspectives
22 and believes that industry's concerns can be adequately
23 addressed in implementing guidance.

24 MEMBER BROWN: What does that mean? Go
25 so high tech that it would blow your brains out? Touch

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1 screens, all kinds of good stuff like that, eliminate
2 all the switches, nothing but glass and -- it seems
3 to me you got to be careful about how principles might
4 be bypassed when we go these paths. That's all. It's
5 the --

6 MR. DARBALI: Understood. And that's why
7 we, you know, that's the value we see in Point 4.

8 MEMBER BROWN: Let me ask you one other
9 associated question then. We've got Reg Guide 1.152
10 is coming in for a review by the subcommittee on the
11 17th of November.

12 And that's been extensively revised, but
13 it seems to me that is another one of the main players
14 relative to how you address what's being allowed by
15 the second.

16 Is that, I'm just about to start on that
17 so I do know it's been revised extensively along with
18 the ATP-7-19. Somehow this has got to be integrated
19 with the stuff we've got out there right now.

20 And it's a little bit difficult to see.
21 Are we going to have to revise 7-19 and ISG-6?

22 MR. DARBALI: So --

23 MEMBER BROWN: And then that design
24 specific review standards, et cetera, et cetera, et
25 cetera to be in compliance or to respect or to reflect

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1 what's in this SECY?

2 MR. DARBALI: Right, so ISP-06 and the
3 design specific review standards point to currently
4 they point to SRM-SECY-93-087.

5 MEMBER BROWN: Yes.

6 MR. DARBALI: And so at least for ISO-06
7 its final resting place should be part, formalized as
8 part of the SRP so it eventually will not be an ISG
9 so and as we are performing a licensing reviews, we
10 are gathering lessons learned.

11 So eventually the contents of ISG-06 will
12 be updated and whatever comes out of the Commission
13 on this SECY and the implementing guidance would be
14 reflected in our licensing review guidance. Does that
15 --

16 MEMBER BROWN: Any other questions on this
17 slide?

18 MEMBER KIRCHNER: Yes, Charlie, this Walt.

19 MEMBER BROWN: Go ahead, Walt.

20 MEMBER KIRCHNER: Could you give us some
21 examples of what industry concerns might be? Are you
22 talking about new advanced non-LWR designs where the
23 BTP critical safety functions might be somewhat
24 different or what's the industry concern that we --

25 MR. DARBALI: So from our stakeholder

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1 engagements, we've received feedback from the industry.

2 On the critical safety functions, I don't believe that
3 is a major aspect of Point 4.

4 I believe what industry is trying to say
5 is that if you're not crediting the manual actions in
6 Point 3, then you shouldn't be looking at Point 4.
7 What we've tried to explain is that Points 1 through
8 3 are intended to address the CCF.

9 How does the facility cope with the CCF.

10 So Point 1 and 2 you do your D3 Assessment. In Point
11 3, you identify ways of addressing that postulated CCF.

12 Point 4 has a different safety concern
13 which is to allow the operators to be able to perform
14 the manual actions. And that's why it requires the
15 displacing controls and many of the controls to be
16 diverse from your system so that your CCF doesn't take
17 out, your CCF doesn't take out both your system and
18 your manual controls for those critical safety
19 functions.

20 I believe industry's argument is that the
21 quality of new digital systems is very high and the
22 reliability is very high where you would not consider,
23 you would not even consider that CCF and you would not
24 need to have the need for the operator to have manual
25 controls.

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1 Also, I believe the future that some in
2 industry are envisioning is a, what we call a glass
3 control room. Everything is a flat panel display run
4 by the same software and so that would not need Point
5 4.

6 And so we think that you can have a control
7 room made out of flat panel displays, but you're going
8 to have to run those manual (audio interference) diverse
9 software for those controls or whether they be
10 hardwired.

11 But they have to be, our position is they
12 have to be diverse from your safety system.

13 MEMBER KIRCHNER: Okay, that's good.
14 What you're saying, it doesn't leap out of the language
15 to me.

16 MR. DARBALI: Okay.

17 MEMBER KIRCHNER: I'm very encouraged by
18 what you just said, but I can imagine certainly with
19 some of the new advanced designs, their thinking is
20 probably that scenario you just played out where it's
21 entirely glass.

22 It would be important to, it goes back to
23 Charlie's point about architecture. Make it very clear
24 that you can go that route, but you would actually have
25 two different systems in the control room and they

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1 wouldn't share any comments off of their site to achieve
2 those critical safety functions. And --

3 MEMBER HALNON: This is Greg Halnon.

4 MEMBER KIRCHNER: -- and that would be --

5 MEMBER HALNON: You wouldn't necessarily
6 be in the control room if you had adequate time to get
7 to a remote location and actuate them. Correct?

8 MEMBER KIRCHNER: Well yes, that's
9 probably predates Digital I&C. That's my --

10 MEMBER HALNON: Well --

11 MEMBER KIRCHNER: --experience where you
12 had a, yes, a separate analog system for the shutdown
13 function.

14 MEMBER HALNON: Well I'm just saying you
15 had to actuate a pump, you can go locally and turn the
16 pump on if you had adequate time to meet that we talked
17 about earlier as far as manual actuation.

18 Also, there's some requirements prior
19 protection that have diverse ability to operate outside
20 the control room as well. So there's some synergies
21 there that will probably be built on.

22 MEMBER KIRCHNER: My point, Charlie is
23 that what was just said by the Staff makes eminent good
24 sense, but it doesn't leap out of the language to me.

25 But --

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1 MEMBER BROWN: It's varied.

2 MEMBER KIRCHNER: -- because, yes.

3 MEMBER BROWN: The whole thing when you're
4 running down that path, they have to have the ability
5 to say no. And that's --

6 MEMBER KIRCHNER: Yes.

7 MEMBER BROWN: -- my biggest concern for
8 all of this when you introduce this risk-informed
9 approach to how you, you know, diverse and nondiverse
10 or whatever.

11 You now, you have to prove the opposite.
12 They can come in and say this is what we want to do
13 and it's so good that we'll never have a problem. And
14 then you have to prove the negative for the Staff to,
15 I mean you could apply that to the entire application
16 of risk-informed approaches or the entire parts of the
17 plant which they're already going and doing.

18 So now this is one of the logical extensions
19 that they're nibbling down to the grass roots and now
20 it's down to the instrumentation control systems where
21 people are turning switches and doing various things
22 like that as opposed to the more of the other.

23 I'm still trying to figure out how risk
24 informed the operation of an amplifier. You know, it
25 either it trips or it doesn't trip. You know, if it's

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1 a vice saver.

2 It, you risk inform the parts, but you don't
3 buy such good parts and make them out of cruddy parts.

4 It's an interest conundrum to have to deal with.

5 I think as a Committee, this is just an
6 opinion that it would be difficult for us to walk through
7 seeing something that didn't have adequate manual
8 backup regardless of the circumstances under which it
9 was being said to be needed.

10 That's just kind of a hard spot and from
11 personal experience, I can, and very personal
12 experience. If it hadn't been for manual backup, it
13 would have been some severe consequences.

14 MEMBER HALNON: This is Greg. A question
15 again back I guess, Samir. You mentioned that the
16 digital systems are hard quality and, you know, the
17 industry's saying that the uncommon causes shouldn't
18 even have to be considered.

19 Doesn't that get flushed out in the D3
20 assessment early on to where you wouldn't have to
21 consider them if the quality and frequency and, you
22 know, probability of these things having a common cause
23 failure is so far out there we don't have to worry about
24 it?

25 MR. DARBALI: Yes, I think that's part of

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1 what Steven was talking about. But again, the point
2 of Points 1, 2 and 3 is exactly that. How do you cope
3 with the loss of the safety function because of a CCF
4 whereas the intent of Point 4 is you want to ensure
5 that your operator has the ability to perform those
6 manual actions and so that, and that a CCF doesn't take
7 out those, that ability.

8 It's more about maintaining that function.
9 We're not at a point yet where we feel comfortable
10 saying, yes, you can say that your CCF is unlikely so
11 you don't need to do any diversity for your digital
12 system and also you don't need to do anything to ensure
13 operators have the means to perform manual actions.

14 MEMBER HALNON: Okay. Do you see us ever
15 getting there? I mean, how do we credit the better
16 quality of electronics and digital systems? It had,
17 if it doesn't matter, then you have to consider every
18 CCF possible. But what is the risk-informed pieces?

19 MR. DARBALI: Well again, the
20 risk-informed piece is for, again, for your Point 3
21 which includes critical safety functions and
22 non-critical safety functions.

23 That's where you get the advantage of the
24 risk-informed approaches. And you know, even for
25 critical safety functions licensees can determine how

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1 they want to meet Point 3.

2 But for those critical safety functions,
3 Point 4 needs to ensure that those diverse, that those
4 controls and displays are independent and diverse.
5 So I agree, you know, when you think about it, you know,
6 where do you get that benefit?

7 It's more likely on those functions
8 performed on the system that are not critical safety
9 functions.

10 MEMBER HALNON: Okay, thanks.

11 MR. BENNER: Even more, those functions,
12 you can use the risk information to not need adapts
13 diverse actuation systems.

14 MR. DARBALI: Right.

15 MR. BENNER: So you know there are elements
16 of where the risk informing plays out, but I think it
17 does go back to for these functions deemed to be the
18 most critical safety functions the Staff's current
19 position is that a CCF shouldn't lock the ability of
20 the manual -- of the operators to take manual control
21 of those actions.

22 Now for a single failure. Right? The
23 code, the standards do require, you know, the manual
24 capability. But that manual capability that can't be,
25 shouldn't be able to be taken out by a single failure.

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1 But it could be taken out by a common cause
2 failure and that's why the, you know, the policy and
3 the standards were in concert with one another.

4 MR. DARBALI: Thank you, Eric.

5 MEMBER BROWN: The complications with CCFs
6 software is wide range. This software that's been
7 software based systems that we've seen has lots and
8 lots and lots and lots of the compliance code for one.

9 I mean you're talking hundreds of thousands
10 of lines of code. And they are interrupt driven and
11 the interrupts are there to do things that the vendor
12 that designs the software he's trying to accomplish
13 to approve something is okay or not okay as it goes
14 through.

15 If you're trying to execute a safety
16 function and it all of a sudden gets interrupted, that's
17 a problem. If the interrupt doesn't come back ask them.

18 If it doesn't, you know, go back to where it was, that's
19 a problem.

20 And it gets very, very complicated to prove
21 that without having, you try to compensate for that
22 by, you know, typically due to corrupt data of some
23 kind that stops and wants to stop something.

24 You have a synchronous performance so that
25 none of the channels are operating in the same sync.

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1 You have different detectors for everything so it's
2 the same data that might be corrupt doesn't get to all
3 of them because it's just sensors never ever read the
4 same thing for all of them.

5 There is a lot of ways you can try to justify
6 that, but you can't prove any of it. But there's just,
7 they're feel goods that makes your stomach not turn
8 over.

9 Non-interrupt driven systems are more
10 predictable. That's where you process everything in
11 a straight line. You never deviate and then you come
12 back and start over again with a new set of data.

13 That's for each process, for each channel.

14 These systems we've seen are not like that. The FPGA
15 ones are a little bit closer. They're like an analog
16 computer. You reprogram it and it's there.

17 You can have it individual keys fail
18 inside, but it's unlikely to have it fail in the other
19 one. And I would buy in on that. I don't know whether
20 I'm right or wrong, but I would buy in on that. That's,
21 we've accepted that.

22 So there's a lot of stuff that goes into
23 trying to figure out what is a CCF in a computer-based
24 system. So that's my speech for this part. Never pass
25 up an opportunity.

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1 MR. CARTE: Norbert Carte, I&C. So
2 there's something very interesting in your speech,
3 Charlie. So what we're really talking about is --

4 MEMBER BROWN: You going to tell me I'm
5 wrong?

6 MR. CARTE: No. I'm going to tell you
7 you're right. What we're really taking about is
8 reliability of the I&C system. And a lot of these
9 peripheral discussions have been about the adequacy
10 of the control room design.

11 So these criteria aren't really a back door
12 or control room design requirements. And they're not
13 necessary and sufficient for control room design. What
14 we're really aiming for is the reliability of the I&C
15 equipment and for the points you mentioned it's in some
16 cases it may be possible to show that your manual
17 controls don't need to be independent or diverse.

18 But in reality, it's more efficient and
19 effective to have simple independent diverse manual
20 controls. Although we allow this policy allows some
21 flexibility, but this is more about equipment
22 reliability.

23 The equipment being able to perform a
24 safety function when needed rather than on appropriate
25 criteria for a control room design. Because obviously

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1 this isn't enough for a control room design.

2 And you have to think balance what the
3 non-safety system does and what the safety system does
4 and it's a control systems design problem, control room
5 design problem not an I&C equipment design problem.

6 We just want to make sure the equipment
7 is reliable and that's what Point 4 is about. And it's
8 not about the control room design.

9 MEMBER BROWN: Yes, Norbert, but also the
10 architecture and the backup manuals all contribute to
11 that reliability. That's a fundamental piece of that
12 control room design for liability.

13 That's in my mind. Any other comments from
14 the Members? You want to go on to the next slide
15 whichever one that is, 20?

16 MR. DARBALI: Yes, so Slide 20 are the key
17 messages that we presented back on Slide 6 so I won't
18 repeat them here. And Slide 21 is our next steps.
19 If the Commission approves the recommended expanded
20 policy our next steps are to update the existing
21 implementation guidance.

22 BTP-7-019 is one of the guidance documents
23 we're considering for updating. And also to continue
24 to engage stakeholders and the public to seek comments
25 on our implementation.

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1 MEMBER BROWN: Why not 1.52 and 1.62, I
2 think it's, did I get that other number right? I've
3 forgotten what 62 is.

4 MR. CARTE: Yes, it's 1.152 and 1.62.

5 MEMBER BROWN: Yes, those are the
6 computer, kind of the computer based Reg Guides.

7 MR. CARTE: 1.62 is the manual controls
8 Reg Guide.

9 MEMBER BROWN: Yes, okay, got it. All
10 right, thank you. And 1.152 is the general application
11 of computer systems.

12 MR. CARTE: It's design criteria to
13 augment and supplement 603.

14 MEMBER BROWN: Yes. Which we're going to
15 work on some more. Okay, so if you go forward with
16 1.152 and with this current revision you're working
17 on, you're going to have to do that again if this thing
18 gets accepted by the Commission. Is that correct?
19 So you're going to do it twice?

20 MR. DARBALI: Well --

21 MEMBER BROWN: I'm asking you, my question
22 is why are you doing 1.152 before you know where this
23 Commission's going to do, what they're going to do with
24 this.

25 MR. NGUYEN: Yes, Charlie. This is Khoi

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1 Nguyen. I'm the one who prepared Reg Guide 1.052 which
2 is the deterministic guidance.

3 MEMBER BROWN: Yes.

4 MR. NGUYEN: And it's for common cause
5 failure we clarify the endorsement with the reference
6 to BTP-7-19. So I don't think 1.52 necessary to revise
7 to reflect the new SECY paper, but BTP-7-19 should be.

8 MEMBER BROWN: Yes, I noticed that. I
9 took a quick look at it and I noticed it was, some
10 references. There were some other good stuff in it.
11 There was some other not so good stuff in it. But
12 we'll deal with that on the 17th.

13 MR. NGUYEN: Thank you.

14 MEMBER BROWN: All right. Any other
15 comments from the Committee Members?

16 MR. DARBALI: That's our presentation so
17 thank you for the comments and are open to answer any
18 other questions.

19 MEMBER BROWN: No more questions, Joy,
20 I'll turn it back over to you.

21 CHAIRMAN REMPE: I think we need to ask
22 if any members of the public --

23 MEMBER BROWN: Oh.

24 CHAIRMAN REMPE: -- would like to make a
25 comment.

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1 MEMBER BROWN: Well that's a good point.

2 Thank you. We finished our part of the meeting. Is
3 there anybody, members of the public who would like
4 to make some comments on this presentation?

5 MR. DARBALI: I see Alan --

6 CHAIRMAN REMPE: I see a hand -- whoever's
7 got their hand up, you're welcome to unmute themselves
8 and speak. Alan Campbell.

9 MR. CAMPBELL: Hi, good afternoon this is
10 Alan Campbell with NEI. So I'll keep my comments brief
11 here. But NEI would like to thank the NRC for hearing
12 the industry needs to allow risk insights to be applied
13 to Digital I&C design and the licensing activities as
14 it's been applied in other technical areas.

15 We truly appreciate the engagement and the
16 urgency in which the NRC Staff has responded. NEI and
17 our members believe that Points 1 through 3 provide
18 the policy Staff change needed to allow risk insights
19 to be considered.

20 And we're looking forward to future
21 implementation guidance that further clarifies the
22 application of these principles. We also believe that
23 Point 4 remains overly prescriptive both in the scope
24 and location requirements.

25 We fully agree with the Staff that manual

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1 actions credited with responding to a CCF concurrent
2 with a design basis event should not be subject to the
3 same CCF.

4 However, to maintain the principle of
5 simplicity and design, the scope of those manual actions
6 should be driven by plant or application specific
7 analysis not prescriptive policy requirements.

8 We believe the results of the CCF coping
9 and D3 analyses provide reasonable assurance of
10 adequate protection while responding to this beyond
11 design basis event.

12 Additionally, existing human factors
13 engineering approaches described in SRP Chapter 18
14 Appendix Alpha to that SRP Chapter and the associated
15 New Regs provide adequate guidance for specific
16 features including the location requirements for these
17 credited manual actions.

18 So again, thank you to both the NRC Staff
19 and the ACRS full Committee and we ask that the ACRS
20 full Committee consider these requirements while
21 deliberating your action. Thank you.

22 CHAIRMAN REMPE: Thank you.

23 MEMBER BROWN: Is there anybody else that
24 would like to make a comment? Excuse me. Is there
25 anybody else on that would like to make a comment?

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1 Hearing no response, back to you, Joy, now.

2 CHAIRMAN REMPE: Thank you.

3 MEMBER BROWN: Thank you for reminding me.

4 CHAIRMAN REMPE: No problem. Okay, I know
5 you have a letter that you'd like to read in and so
6 at this point, I'd like the Court Reporter, I'd like
7 to go off the record and invite the Court Reporter to
8 return at 3:45 p.m. East Coast Time and then, thank
9 you.

10 (Whereupon, the above-entitled matter
11 went off the record at 2:26 p.m. and resumed at
12 3:45 p.m.)

13 CHAIRMAN REMPE: Okay, it's 3:45 p.m. and
14 we're back in session. And at this time, I'd like to
15 ask (audio interference).

16 MEMBER MARCH-LEUBA: Thank you, Ms.
17 Chairman. We're going to be talking about Reg Guide
18 1.82 which deals with sources of water for SECS and
19 other safety functions after LOCAs.

20 And at this point, I'd like to give the
21 floor to the Staff. I believe Jim, you're going to
22 make a presentation, an introduction?

23 MR. STRECKEL: Yes. Can you hear us okay?

24 MEMBER MARCH-LEUBA: Yes, we can.

25 MR. STRECKEL: Okay, good. Yes, I'll just

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1 do a real brief introduction and turn it over to the
2 technical staff to do the body of the presentation.
3 So let me introduce myself. My name is Jim Steckel.

4 I'm a Program Manager in the office of
5 Research, Division of Engineering and our branch does
6 all of the work or of the PM work, the project management
7 work on the regulatory guide system.

8 I'm also here with Ahsan Salman, he's the
9 Senior Nuclear Engineer in NRR Division of Safety
10 Systems. He'll be talking later on Appendix B of this
11 Reg Guide Revision and also Steve Smith, Senior Plant
12 Systems Engineer.

13 He is also in NRR's Division of Safety
14 Systems. Today we'll present in summary fashion the
15 main changes to Rev 5 of Reg Guide 1.82. These updates
16 will be discussed by the Technical leads and will
17 include the following: a) GSI-191, this issue
18 constitutes the main body of the Reg Guide and Appendix
19 A.

20 And included in this will be Reg Guide 1.82
21 Rev 5 status with respect to GSI-191 and some brief
22 points about FLEX equipment strategies and defense in
23 depth.

24 In Item B, a discussion will be presented
25 on the use of Containment Accident Pressure, CAP, in

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1 determining the net positive suction head margin for
2 ECCS pumps and containment heat removal pumps.

3 This is the main purpose for Appendix B.

4 I would now like to allow the presentation to continue
5 by Steve Smith.

6 MR. SMITH: All right, thanks, Jim. We're
7 going to go ahead and we'll turn our camera off now
8 that you've gotten a chance to get a look at us and
9 we will start presenting our slides. We have picked
10 the right ones. Yes.

11 MR. STECKEL: Yes, you did.

12 MR. SMITH: Okay, so this is just our title
13 slide. I'm going to move along to Slide 2 which just,
14 it tells the major change that we made to the Reg Guide.

15 With respect to GSI-191, what we did was
16 we added -- the biggest change that we added in vessel
17 guidance and some other references that had been
18 developed since the last revision.

19 The other major change to the Reg Guide
20 is the addition of Appendix B for the use of CAP and
21 NPSH calculations and I believe that ACRS is familiar
22 with both of these topics.

23 They've been around for quite a while.
24 I'm going to move along to Slide 3. And this slide
25 lists the major changes made in Rev 5 that are related

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1 to GSI-191.

2 If you have questions on any of these, just
3 stop, I'm not going to go through them. We went through
4 them in more detail in the subcommittee meeting. Let
5 me know if you have questions on these or --

6 MEMBER MARCH-LEUBA: Yes, this is Jose
7 just for the record. All you're doing, we have an echo.

8 MR. SMITH: Mine's off.

9 (Audio interference.)

10 MEMBER MARCH-LEUBA: How do you want to
11 do this?

12 CHAIRMAN REMPE: Let's try again. I don't
13 hear an echo. Can you hear us?

14 MEMBER MARCH-LEUBA: We muted everybody
15 so you have to mute yourself.

16 MALE PARTICIPANT: Yes, we can hear you.

17 DR. SCHULTZ: I can hear you now on the
18 line.

19 MEMBER MARCH-LEUBA: Okay, sorry about
20 that. Technical difficulties. So the question is,
21 the updates to the Guide are all there. Are they all
22 consistent with the GSI-191 resolution of the issue
23 that we have reviewed it for? Just for the record.

24 MR. SMITH: Yes, they're all consistent
25 with what has been reviewed. Oh, I'm sorry. Yes, this

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1 is Steve Smith again with the Staff and yes, all the
2 changes we made to the Reg Guide in Rev 5 are consistent
3 with what we have presented to the ACRS in the past.

4 MEMBER MARCH-LEUBA: Thank you. Keep
5 going.

6 MR. SMITH: Okay, sorry about that. All
7 right, so I'm going to move on to Slide 4. And this
8 is the status of the Reg Guide with respect to DSI-191.

9 We don't anticipate any significant
10 changes to the Reg Guide in the future for GSI-191 issue
11 where things can come up that are not to assume, but
12 at this point, we believe that Rev 5 is and that some
13 of the information that is in Rev 5 is a complete
14 guidance document for this topic.

15 Now we still have the tendency of R50.46(c)
16 Rulemaking which is currently with the Commission which
17 could have us add or remove some risk informed guidance
18 that is currently referenced in this.

19 It will either be finalized or maybe it
20 will be removed. We're not really sure. We're waiting
21 for the Commission to tell us what they want to do with
22 the 50.46C rule.

23 Slide 5 has a lot more information on it
24 just because this is a little bit more complicated.
25 I don't want to spend -- even though there's a lot of

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1 worries here, I don't want to spend a lot of time on
2 this slide so because it's not related directly to the
3 revision.

4 But if you're interested or have got some
5 interest in the FLEX equipment and its ability to
6 provide defense and depth. So this slide talks a little
7 bit about the defense and depth that may be available
8 from FLEX.

9 And these for the issues that we're talking
10 about today which would be a loss of MPSH margin either
11 due to a CAP issue or due to a strainer clogging issue.

12 The one thing to note is the FLEX strategies
13 were not developed or reviewed by the NRC for response
14 populated accidents like the ones that we are talking
15 about when we talk about drainer clogging or CAP.

16 They were developed for basically wide,
17 large scale, you know, natural disaster type things
18 so there's some differences between those type of events
19 and what we are actually talking about in the pro-temp
20 gap and these cooling issues.

21 So there are some differences between BWR
22 and PWR FLEX equipment the way it's installed. PWRs
23 have high volume direct RCS injection points that are
24 either they're configured, they're not hooked up, but
25 they can be readily connected to the pumps and can pump

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1 directly into the RCS.

2 PWR only had low volume direct RCS
3 injection and basically those are to make up either
4 for a shutdown condition or if you had a say a RCP seal
5 leak or something like that. That's what those are
6 designed for the PWRs.

7 Now the PWRs may be able to reconfigure
8 the high volume steam generator pump will eject to the
9 RTS, but that's not something that's been pre-planned
10 and pre-thought out.

11 It appears that the PWR FLEX strategies
12 are more even applied than PWRs for these scenarios.

13 The PWRs would take longer for I guess a high-volume
14 concept up to the RTS if they could do it at all.

15 So that's the bottom line on the potential
16 defense and depth that's been provided by the FLEX
17 equipment. I'll just pause there and see if there's
18 any questions that are on that slide.

19 MEMBER MARCH-LEUBA: This is Jose. Yes.

20 Just a comment that I'm the one that asked you to
21 include this slide on the presentation. Because since
22 there are Reg Guide 182 deals with availability of water
23 sources during this extended event, obviously FLEX is
24 one of those water resources.

25 And it's good to know that BWRs will

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1 probably improve to the significantly and PWRs that
2 have been there with it or without it so. Thank you
3 for presenting that.

4 MR. SMITH: Yes, I agree. I agree that
5 what you said sounds correct to me. Okay. Then
6 starting with the next slide, Ahsan is going to discuss
7 the use of CAP for the MPSA margin calculations. Go
8 ahead.

9 MR. SALMAN: Okay, thank you. This is
10 Ahsan Salman. I'm a Senior Nuclear Engineer in the
11 Nuclear Performance Systems Branch and the Regional
12 Safety Systems.

13 I'll talk about the use of containment
14 accident pressure in determining the NPS stretch of
15 the containment here to move pumps and the ECCS pumps.
16 There's this slide shows some background on the use
17 of CAP.

18 This issue was highlighted about 15 years
19 ago when NRC received EP applications from Browns Ferry
20 and then from Monticello. Both were using CAP in their
21 NPSH analysis.

22 At that time, the only published guidance
23 was Reg Guide 1.1 which stated that CAP should not be
24 used for NPS as how are some licensees were using CAP
25 and NRC had approved its use.

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1 The EPR reviews of the Browns Ferry and
2 the Monticello were discontinued and put on hold. The
3 Staff prepared a white paper documenting its position
4 to ACRS.

5 Also, the BWR Owners Group submitted a
6 topical report providing a standard approach for
7 requesting user CAP. In return ACRS provided
8 recommendations in a letter to EDO.

9 And the main one of them which were accepted
10 also are mentioned in here, the licensee should use
11 guidance in Reg Guide 1.82 so that's why the Reg Guide
12 1.1 was merged into Reg Guide 1.82.

13 And then operator actions to control CAPs
14 should be reliable. Risks should be small. Support
15 Staff for the SERS meant of problem with NPSHa the,
16 variable NPSH less than NPSHr.

17 And then the SERS agreed with the owners
18 group, BWR owners group tested the statistical
19 calculations to calculate margin. And the last one
20 which was also included in this Reg Guide was the margin
21 between the available NPSH.

22 And the required NPSH should consider
23 uncertainty in that the required NPSH. So then the
24 Staff SECY paper was issued. In this SECY paper there
25 was a Staff position for the use of CAP deterministic

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1 analysis is used.

2 And the recommendation from ACRS was to
3 use deterministic analysis and a plant specific PRA,
4 but when it went to the Commission, the vote for the
5 Commission was an Option 1 which was to just use a
6 deterministic analysis, conservative analysis and
7 include all those SER recommendations that I just
8 listed.

9 MEMBER MARCH-LEUBA: This is Jose. Let
10 me summarize what you said in my own words. And you
11 tell me if it's correct.

12 MR. SALMAN: Okay.

13 MEMBER MARCH-LEUBA: In lesson C the wants
14 to determine whether there is an ECCS pumps have
15 sufficient operating margin, let's call it MPSH.

16 MR. SALMAN: Yes.

17 MEMBER MARCH-LEUBA: Will perform a
18 dynamic calculation of the locker or what their event
19 will concern with.

20 MR. SALMAN: Yes.

21 MEMBER MARCH-LEUBA: And as a function of
22 time after the accident, you will calculate the
23 pressures of the containment is at --

24 MR. SALMAN: Okay.

25 MEMBER MARCH-LEUBA: -- foregoing the

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1 accident as it's supposed to develop or if you set those
2 minutes, hours after the accident.

3 MR. SALMAN: Yes.

4 MEMBER MARCH-LEUBA: And it will impose
5 conservative bounding numbers for the assumptions which
6 are described in Appendix B of the Regulatory Guide
7 --

8 MR. SALMAN: Yes.

9 MEMBER MARCH-LEUBA: -- so that when we
10 are at the end calculate what is the pressures high
11 containment as function of time with a ten minute that
12 pressure is higher than that required to have the pumps
13 operating.

14 MR. SALMAN: Right.

15 MEMBER MARCH-LEUBA: Is that correct?

16 MR. SALMAN: That is correct. And also,
17 calculate the suppression pool of the sump water
18 temperature conservative analysis for that so that the
19 NPSH available is conservatively calculated based on
20 the available, based on the temperature of the pool
21 --

22 MEMBER MARCH-LEUBA: All right.

23 MR. SALMAN: -- because one of the terms
24 in NPSH and negative term, the NPSH is the vapor pressure
25 at the pool temperature.

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1 MEMBER MARCH-LEUBA: Yes, and for my point
2 of view, ACRS' main concern and which we still have
3 differences, is that they should be plant specific risk
4 analysis performed that this containment operation has
5 been performed every percent reality.

6 I mean, you have to add additional failures
7 like somebody alliance about in the incorrect position
8 or containment had leakages before you had the accident
9 and therefore you cannot hold the pressure.

10 MR. SALMAN: Yes.

11 MEMBER MARCH-LEUBA: Our Members
12 agreement with the Staff, ASRC' agreement with the Staff
13 was that this is likely to be very plant specific
14 dependent and it would be wise to have a plant specific
15 risk analysis.

16 MR. SALMAN: Exactly. Yes, that was only
17 difference the, all the deterministic analysis
18 calculation methods were incorporated in this Reg
19 Guide.

20 And the only difference was the PRA that
21 when a licensee whose CAP for an EPU or some other
22 purpose they should present a plant specific PRA for
23 that.

24 MEMEBER MARCH-LEUBA: Yes, and the ACRS
25 position also was that and which you have accepted and

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1 implemented into the Reg Guide is that a licensee should
2 look first for how are changes that we give you the
3 NPSH margin before taking credit for CAP.

4 MR. SALMAN: Yes, the changes that I have
5 listed here, one of the major changes is the NPSH
6 required should consider the uncertainty because the
7 required NPSH is calculated or is determined by testing
8 at the plant vendor and the pump vendor I mean.

9 And the differences between the test
10 conditions and the plant conditions there should be
11 an uncertainty so that is, that makes a required MPS
12 at higher than the 3 percent --

13 MEMBER MARCH-LEUBA: Right.

14 MR. SALMAN: -- factory estimate so --

15 MEMBER MARCH-LEUBA: Yes.

16 MR. SALMAN: -- that is another margin
17 uncertainty considered in this Reg Guide.

18 MEMBER MARCH-LEUBA: Yes, but my point is
19 that some of the EPU applicants that wanted to use CAP
20 credit ended up making some minor reasonable
21 modifications to the plant.

22 Some did heaters changer, some did
23 alignment of pumps, so that after those modifications,
24 they did not require a CAP. So what --

25 MR. SALMAN: That -- what I think the Reg

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1 Guides says is the Staff will either reviews a CAP
2 application should consider that there are no
3 reasonable, the licensee has performed a sufficient
4 scope analysis that no original modifications can be
5 implemented.

6 MR. SALMAN: Yes, yes. The one, this is
7 one of the summary that if the plant, first of all,
8 the plant should consider modification. If the
9 modification is impractical, then they can apply
10 reusing this amount, this much amount of a CAP. And
11 that is included in the Guidance and the --

12 MEMBER MARCH-LEUBA: Excellent.

13 MR. SALMAN: And the last slide of this
14 presentation, there's a summary and that includes that,
15 but the plants, the EPU that were discontinued at that
16 time were Monticello and Browns Ferry.

17 And both of them they were using CAP but
18 without all these requirements that are now in the Reg
19 Guide. So finally it ended up that one of the plants
20 I remember was Peach Bottom.

21 They did hardware modifications, plant
22 modification by using two heat exchangers to reduce
23 the pool temperature, the suppression pool temperature
24 and so that there was no CAP used.

25 And another plant Browns Ferry first

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1 obligation which was I think 2005 they were using CAP,
2 but then afterwards, the applications submitted in 2015
3 they did not use CAP, but they approved the performance
4 of the heat exchangers so that the pool temperature
5 goes down and the vapor pressure is suppressed.

6 MEMBER MARCH-LEUBA: Okay, thank you.
7 You can continue.

8 MR. SALMAN: Okay. So I go to slide, next
9 slide which this is stating what is the margin. The
10 margin is calculated by the available NPSH minus the
11 effective NPSH which the effective NPSH is the 3 percent
12 that is a test done by the hydraulic institute standard
13 and that includes uncertainties.

14 So that is one of the major changes before
15 this Reg Guide was issued. And for special events for
16 the BWR which is a space station blackout or Appendix
17 R or the aqueous events, the Reg Guard allows the user
18 the 3 percent which is without the uncertainties and
19 use realistic inputs for the calculation of containment
20 accident pressure in the pool temperature.

21 Another point here is the negative NPSH
22 margin is acceptable if tests demonstrate that proper
23 performance safety function and that is, that were
24 highlighted in the previous meeting, what are the
25 different requirements for a negative NPSH. And if

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1 you want to go, I have to open my slide before.

2 MEMBER MARCH-LEUBA: No, no. We can look
3 at a transcript of the SUCO meeting unless a member
4 wants to ask about it.

5 MR. SALMAN: Yes, yes. We, I have to open
6 the other. So anyway, the Monte Carlo analysis was
7 recommended in the BWR owners group report to calculate
8 the margin.

9 In the conservative analysis, the
10 deterministic analysis, it will only say that heavy
11 are doing terminist analysis, which is conservative,
12 but the question from ACRS was always so what is the
13 margin?

14 So in order to determine margin in the
15 conservative analysis, this Monte Carlo 95-95
16 calculations was recommended by the ACRS also and it
17 is included in the, in this Reg Guide that any plant
18 who is using CAP above the vapor pressure should
19 determine what is the margin, what, how much is, what
20 is a conservatism in the deterministic analysis?

21 Another item is if the CAP up to the vapor
22 pressure, the pool temperature can be used without Monte
23 Carlo analysis. So that is most BWRs, there is some
24 temperature is higher, much higher than the
25 atmospheric.

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1 Then so those plants, they can use CAP up
2 to the vapor pressure of the pool temperature without
3 any Monte Carlo analysis. And if it is more than that
4 vapor pressure the whole temperature, then the Monte
5 Carlo analysis and another item in this is the plant
6 should monitor a pre-existing leak during normal
7 operation.

8 This was done also by Monticello. Yes,
9 they agreed or in the EPO application and the Staff
10 SER it was Staff required them to monitor a pre-existing
11 leak in the containment during operation.

12 MEMBER HALNON: So this is Greg. One
13 quick question back on the safety side. The test, does
14 it demonstrate promptly performed safety function?
15 This kind of brings me back to a mission time type
16 discussion that seems to be in circular motion in the
17 industry.

18 Is it, is the guidance clear enough that
19 we're not going to run into that problem of arguing
20 about what the mission time will be for these tests
21 that have to demonstrate a safety function for a
22 degraded system?

23 MR. SALMAN: Are you, I'm sorry, are you
24 talking about a negative margin when the --

25 MEMBER HALNON: Yes.

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1 MR. SALMON: When the -- yes, there are
2 requirements. Let me read what are the requirements.

3 I have the subcommittee presentation here. And those
4 requirements are important. Yes, the slide in this
5 previous presentation with respect to the margin
6 section --

7 MEMBER MARCH-LEUBA: Yes, on this issue
8 while you look for it, if a slide is --

9 MR. SALMAN: Okay, use of CAP --

10 MEMBER MARCH-LEUBA: -- presented in the
11 meeting, it is part of the record. Right?

12 (Simultaneous speaking.)

13 (Audio interference.)

14 MEMBER MARCH-LEUBA: Okay?

15 MR. SALMAN: Yes, that is, we have a report
16 and safety, does the pump has a negative margin and
17 the red light says it is acceptable if the tests are
18 done to demonstrate the actual pump or a similar pump,
19 will perform at for a limited time duration less than
20 hundred hours.

21 Actual pump or similar model pump is
22 tested, tested at the same speed as at the plant site
23 and tested at actual predicted available NPSH and the
24 test duration is for the time you're in this NPSH margin
25 is negative.

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1 And the flow and discharge help should be
2 greater than that required for the safety analysis.

3 MEMBER MARCH-LEUBA: This is Jose, the
4 mission time is that of or the result of the calculation,
5 the continuing calculation that we perform to determine
6 that CAP was needed.

7 So the time where the MPSH is violated is
8 calculated, there is no argument about it.

9 MEMBER HALNON: Okay so the test durations
10 for the period for negative margin is that test
11 continued and because the pump is now a degraded state
12 because of the potential capitation in your
13 interpretation and during the tie?

14 MEMBER MARCH-LEUBA: The pool temperature
15 finally cool down and now you recover NPSH.

16 MEMBER HALNON: Okay.

17 MEMBER MARCH-LEUBA: And I suppose it
18 demonstrates that the pump didn't break up that much.

19 MEMBER HALNON: That's a generalized
20 statement when you just said it had to be plant specific
21 so.

22 MEMBER MARCH-LEUBA: No, it has to be.
23 This completion is plant specific.

24 MEMBER HALNON: Okay. I just wanted to
25 make sure we weren't going to get into a circular

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1 discussion about mission time. It looks like you've
2 got that covered so I'm okay with --

3 MR. SALMAN: Okay, so containment leakage,
4 that's another item in this slide which the licensee
5 should demonstrate loss of containment, integrity and
6 loss of containment isolation cannot occur and monitor
7 leakage during operation.

8 And quantifying of the NPSH margin for the
9 DBA LOCA the calculation should use considerable
10 debonding inputs and to demonstrate margin, they can
11 use real estate and Monte Carlo analysis to determine
12 the conservatism.

13 And require NPSH should include uncertain.

14 So that's for DBA LOCA, but for special events, the
15 NPSHr may use without uncertainty. The next slide is
16 a guidance summary which I talk most of these points
17 and already talk, but if you want to go through it again,
18 I'm willing to, I'll be willing to.

19 CHAIRMAN REMPE: This is Joy and I do have
20 a question and I apologize, I had communication issues
21 during the subcommittee meeting and I tried to hone
22 in on this, but basically on the loss of containment,
23 integrity venting for example shouldn't occur during
24 CAP use.

25 And if I look at the guidance on Page 83

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1 out of 88, it does talk about the fact you shouldn't
2 allow them to be venting and using CAP at the same time.

3 But I'm thinking again about what happened
4 after Fukushima and so if an applicant comes in with
5 an LAR and they are trying to say, okay, we can use
6 CAP and they try and justify it. Are you guys going
7 to try and implement this guidance?

8 Are you going to say, let us see your severe
9 accident management guidance so we know that you're
10 going to check and see that you don't need CAP before
11 you go to early venting?

12 Because I mean, that's I would want to see
13 that if I were checking into it and how will the
14 regulators know how to check? Because the severe
15 accident guidance isn't really required to review, you
16 know, to be submitted as part of this. I mean, how
17 are you going to implement this?

18 MR. SALMAN: Well when a licensee submits
19 an application for the use of CAP, that application
20 should be consistent. The analysis for the usage of
21 CAP should be consistent with the procedure they're
22 using for the DBA LOCA.

23 And that's how this guidance is written.

24 This does not consider any severe accident procedure
25 in this Reg Guide.

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1 CHAIRMAN REMPE: Okay, but then during a
2 real event, where they have a long-term station blackout
3 and maybe they tried to use CAP during that event and
4 things went south, shouldn't somebody be checking to
5 make sure that during the severe accident that they
6 basically don't need the CAP anymore to run the pumps
7 before they vent?

8 And, I mean, how will that interface be
9 taken care of is what I'm asking? And it seems like
10 somebody ought to be checking that.

11 MEMBER KIRCHNER: By definition, if the
12 pumps function -- I shouldn't answer for the Staff.
13 My logic would be the following: if you're in design
14 basis accident space after 15, you do the dynamic
15 analysis to ensure you have sufficient and net positive
16 substantive head on those cooling pumps.

17 If they function, then you shouldn't have
18 a severe accident. If you lose CAP and you lose the
19 functioning of the pumps, then you're in trouble
20 obviously and your gone beyond the design basis
21 accident.

22 So I think the Staff guidance is, revolves
23 around a design basis event, not a severe accident.

24 CHAIRMAN REMPE: So --

25 MEMBER KIRCHNER: Once you get into severe

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1 accident space then the correct --

2 CHAIRMAN REMPE: So let's think of --

3 MEMBER KIRCHNER: -- both of those other
4 things, but for purposes of analyzing design basis
5 accidents, the presumption is in my mind that if you
6 have sufficient capacity and net positive suction CAD
7 for the pumps, then you're going to deliver the ECCS
8 cooling and containment cooling necessary to prevent
9 the severe accident.

10 CHAIRMAN REMPE: So --

11 MEMBER KIRCHNER: So you haven't moved on
12 to Chapter 19 yet.

13 CHAIRMAN REMPE: Okay, so during
14 Fukushima, --

15 MEMBER KIRCHNER: Well that's --

16 CHAIRMAN REMPE: -- for example, they
17 didn't know how high the water was in the core. They
18 didn't know it was a severe accident. And when I tried
19 to bring this up and I had communication issues during
20 the subcommittee meeting, Dennis tried to hone in on
21 it by saying the operators don't have a little gauge
22 in the control room saying I'm in a design basis event
23 versus --

24 MEMBER KIRCHNER: Okay.

25 CHAIRMAN REMPE: -- a severe accident.

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1 And so if I were wanting to be very --

2 (Simultaneous speaking.)

3 CHAIRMAN REMPE: You'd hope so.

4 MEMBER KIRCHNER: -- in trouble.

5 CHAIRMAN REMPE: Yes, but I mean basically
6 there were some, an intended venting due to expansion
7 of the seals on the PCV and things so again temperatures
8 and pressures are dictating when people start to think
9 about we need to start doing early venting because they
10 don't want to have a problem.

11 But I, what I'm back to is if I wanted to
12 be thorough, I might say, this means I need to think
13 about what's in the severe accident management guidance
14 to make sure that this will not occur.

15 And that was actually in one of our letters
16 about GSI-191. In the past we said, well no, I'm trying
17 to remember. Maybe it was one of the post-Fukushima
18 letters I guess.

19 They said, you know, this seems okay, but
20 we need to think, it was in one of our prior letters
21 where we said, think about, maybe it was the Monticello
22 letter when we approved their EPU that we said, you
23 know, you may need to think about this --

24 MEMBER MARCH-LEUBA: I was going to --

25 CHAIRMAN REMPE: -- what can happen in

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1 severe accidents. And I can pull up that letter. But
2 that's why I think it's important to kind of, and I
3 know it's in your draft letter to think about this.

4 MEMBER MARCH-LEUBA: Yes. I was going to
5 give you a hint, a preview that the letter makes that
6 accommodation.

7 CHAIRMAN REMPE: Yes, it's --

8 MEMBER MARCH-LEUBA: And I think it's wise
9 to do.

10 CHAIRMAN REMPE: Yes, it --

11 MEMBER MARCH-LEUBA: And the Staff should
12 look at it during the review, but as one more checkmark
13 to do, nothing showstopper.

14 CHAIRMAN REMPE: Because they don't
15 usually look at the severe accident management guidance
16 and that type of thing.

17 MEMBER MARCH-LEUBA: Yes.

18 CHAIRMAN REMPE: Okay, but anyway, I just
19 think I've homed in on my point of what I was trying
20 to make and I had some communication issues the last
21 subcommittee meeting.

22 MR. SALMAN: One of the requirements in
23 this Reg Guide is the loss of containment integrity.
24 And but then in parenthesis it says venting should
25 not occur during CAP.

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1 So if a licensee is presenting an analysis
2 for the use of CAP and they have this venting in the
3 analysis and then they are asking to use CAP, then the
4 analysis should cover that.

5 CHAIRMAN REMPE: So again, I'm looking at
6 your guidance on Page 83 where you have that section
7 and it's focused on design basis events. And --

8 MR. SALMAN: Right.

9 CHAIRMAN REMPE: -- what I'm saying is that
10 the world isn't so cut and dried and so I think that
11 means going into the severe accident --

12 MR. SALMAN: Right.

13 CHAIRMAN REMPE: It's a process too.

14 MR. SALMAN: So if you've got --

15 CHAIRMAN REMPE: Sometimes people don't
16 have a fine or they tend to segregate this and they
17 think only one way because that's what they're supposed
18 to think on that topic.

19 MR. SALMAN: So the CAP analysis that they
20 present to us if it includes venting, then the analysis
21 should consider that venting and then calculation of
22 CAP and the pressure and the containment.

23 CHAIRMAN REMPE: Okay, but then I think
24 also that it would behoove the Staff to think about
25 severe accident guidance or make the applicant

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1 demonstrate that this won't cause problems in severe
2 accidents is all --

3 MR. SALMAN: Okay.

4 CHAIRMAN REMPE: -- I'm trying to say.

5 MR. SALMAN: Yes, the procedure should be
6 then consistent with analysis.

7 CHAIRMAN REMPE: And see --

8 MEMBER MARCH-LEUBA: That is an excellent
9 phrase. You should frame it and put it in your wall.
10 I believe you finish your presentation, Ahsan?

11 MR. SALMAN: Yes, that is all. If there
12 is any question on the guidance summary which I
13 mentioned before all these points, please let me know
14 so we can answer the questions.

15 MEMBER MARCH-LEUBA: Members, you have any
16 more questions for the Staff? Hearing none, any
17 members of the public that would like to make a comment?
18 Unmute yourself and do so right now.

19 We don't have any comments from the
20 members. Chair, you are --

21 CHAIRMAN REMPE: Okay.

22 MEMBER MARCH-LEUBA: -- it's your
23 microphone.

24 CHAIRMAN REMPE: Okay. Thank you very
25 much. Thanks to the Staff. At this point, it's not

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1 been going that long so how about we just take a few
2 minutes until Sandra can come back and bring up your
3 letter and let's not have an official break or you want
4 to have a ten-minute break?

5 MEMBER MARCH-LEUBA: I don't need it.

6 CHAIRMAN REMPE: Okay, so as soon as we
7 can, we'll resume with letter writing and then --

8 MEMBER MARCH-LEUBA: Yes, and then --

9 CHAIRMAN REMPE: -- stay tuned all of you.

10 MEMBER MARCH-LEUBA: -- we're off the
11 record and what time?

12 CHAIRMAN REMPE: Oh, yes. Thank you very
13 much. I'd like to also ask to go off the record and
14 ask the Court Reporter to come back tomorrow morning
15 at 8:30 a.m. Okay? Whether it's you or someone else
16 from your organization. Okay. Yes, thank you very
17 much.

18 (Whereupon, the above-entitled matter
19 went off the record at 4:20 p.m.)
20
21
22
23
24
25

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Reg Guide 1.82, Revision 5

Advisory Committee on Reactor Safeguards

November 1, 2022

Ahsan Salman

Steve Smith

RG 1.82 Changes in Rev. 5

- GSI-191 (Main body of RG and Appendix A)
 - Updated to include new information on the effects of debris on long-term core cooling
 - Major change was to add information and references regarding the in-vessel effects of debris
- Use of CAP (Appendix B)
 - Added new Appendix B - guidance on the use of CAP in determination of NPSH margins
 - RG 1.1 states only containment pressure prior to LOCA should be used in NPSH calcs
 - RG 1.1 withdrawn (4/2015); new CAP guidance is now included in RG 1.82, Rev 5.

GSI-191 Related Changes

- In-Vessel Guidance Updates
- Penetration Testing Guidance
- Improved Clarity and Detail
- Updated Knowledge Base Report
- BWR Evaluation of Lessons Learned
- Updated Jet Testing
- Test Debris Preparation Guidance
- Risk-Informed Resolution – Draft RG 1.229

RG 1.82 Status With Respect to GSI-191

- Revision 5 to RG 1.82 was made after the closure of GSI-191
- RG 1.82, Rev 5 is a complete guidance document for the effects of debris on long-term core cooling
- Additional risk-informed guidance may be issued as the result of the 10CFR50.46c rulemaking currently with the Commission

FLEX Equipment – Defense-in-Depth

- FLEX strategies are designed for beyond-design-basis external events initiated by natural phenomena
 - Not intended or reviewed for response to postulated accidents
- Flex equipment and strategies are different between BWRs and PWRs
 - BWR FLEX includes equipment for direct connection to the RCS and the ability to vent containment
 - PWR FLEX RCS injection only has low volume pumps with connections to the RCS
 - For Shutdown or low leakage only, includes borated water supply
 - Decay heat is removed via the steam generators with higher volume pumps
 - Connecting steam generator FLEX pumps to the RCS may be possible for some plants but has not been pre-planned or verified to be feasible in general
 - No pre-determined strategy for containment pressure reduction
- BWRs FLEX strategies are more suited to provide DID for cooling by direct connection to the RCS
- PWRs FLEX strategies may be less effective as DID for long-term cooling
 - Effectiveness depends on plant-specific equipment capacities, layouts, connections, etc.
 - No boration available at higher flow rates
 - Lower flows could be adequate if it takes a long time for strainer blockage to occur



RG 1.82, REVISION 5, APPENDIX B

**GUIDANCE FOR THE USE OF CONTAINMENT ACCIDENT PRESSURE IN DETERMINING THE NET
POSITIVE SUCTION HEAD MARGIN FOR EMERGENCY CORE COOLING SYSTEM PUMPS AND
CONTAINMENT HEAT REMOVAL PUMPS IN BOILING WATER REACTORS AND PRESSURIZED
WATER REACTORS**

CONTENTS

1. Background
2. Use of CAP in Determining NPSH Margin
3. Containment Isolation and Containment Leakage
4. Quantifying NPSH Margin
5. Guidance Summary

1. **Background**

- ACRS critique on use of CAP; discontinue EPU reviews
- NRC approved BWROG topical report describing standard approach for crediting CAP
- Staff white paper (2008) to ACRS summarizing regulatory and technical bases on CAP
- ACRS recommendation in letter to EDO included in RG
 - Licensees to use guidance in RG 1.82 to demonstrate positive NPSH margin
 - Operator actions to control CAP should be reliable, risk should be acceptably small
 - Before CAP credit, licensees to justify impractical to modify plant
 - Modification not needed for small CAP credit
 - Support staff reassessment of problems with $NPSH_a \leq NPSH_r$
 - Agree with BWROG statistical calcs to calculate margin.
 - Margin ($NPSH_a - NPSH_r$) to consider uncertainty in $NPSH_r$
- Staff SECY - (1) deterministic analysis; ACRS – (2) deterministic analysis + plant specific PRA
- SECY-11-0014, Commission voted for Option (1)
- Commission directed staff to credit CAP using guidance in SECY-11-0014, Enclosure 1
- RG 1.82, Revision 5, Appendix B is based on SECY-11-0014, Enclosure 1

2. Use of CAP in Determining NPSH Margin

- $\text{NPSH margin} = (\text{NPSH}_a - \text{NPSH}_{r_{\text{eff}}})$, where $\text{NPSH}_{r_{\text{eff}}} = \text{NPSH}_{r_{3\%}} + \text{uncertainties}$
- For DBA NPSH analysis, $\text{NPSH}_{r_{\text{eff}}}$ should be used to determine the NPSH margin
- For BWR special events, $\text{NPSH}_{r_{3\%}}$ and realistic inputs may be used
- Negative NPSH margin is acceptable if tests demonstrate pump will perform safety function(s), Monte Carlo analysis 95/95 lower limit to demonstrate margin in deterministic analysis
- CAP up to the vapor press at the pool temperature can be used without Monte Carlo analysis
- CAP above vapor press at pool temperature, Monte Carlo, pre-existing leak monitoring necessary

3. Containment Isolation and Containment Leakage

- If CAP is used, the licensees should demonstrate loss of containment integrity and loss of containment isolation cannot occur, monitor leakage during operation.

4. Quantifying NPSH Margin

- DBA LOCA- Conservative bounding inputs, realistic and Monte Carlo analysis to determine conservatism, NPSH_r should include uncertainty.
- BWR special events - realistic analysis, NPSH_r may be used without uncertainty

5. **Guidance Summary**

- For DBA, NPSH analysis should use $NPSH_{\text{reff}} = (1 + \text{uncertainty}) NPSH_{r3\%}$
- For BWR special events, $NPSH_{r3\%}$ may be used to calculate margin
- Maximum flow rate for NPSHa analysis \geq flow rate used in safety analysis
- Loss of containment integrity (venting) should not occur during CAP use
- NRC-approved operator action to control CAP is acceptable.
- Negative NPSH margin if tests on same or similar pump demonstrate adequate performance
- Propose a method to determine pre-existing leakage rate during plant operation
- BWRs - follow NEDC-33347P-A/NEDO-33347-A
- PWRs - use the vapor pressure corresponding to the sump water temperature or use a procedure a statistical process similar to the BWROG.
- Mission time for pump using CAP to include recovery time from the accident.



U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

SECY-22-0076

Expansion of Current Policy on Potential Common-Cause Failures in Digital Instrumentation and Control Systems

Advisory Committee on Reactor Safeguards
November 1, 2022

Technical Staff Presenters

- **Samir Darbali** – Electronics Engineer, NRR/DEX
- **Steven Alferink** – Reliability and Risk Analyst, NRR/DRA
- **Norbert Carte** – Senior Electronics Engineer, NRR/DEX

Digital I&C Project Managers

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 - David Rahn
 - Richard Stattel
 - Michael Waters
 - Steve Wyman

Presentation Outline

- Introduction
- Background and Key Messages
- Purpose of SECY-22-0076
- Staff Position on ACRS Questions
- Proposed Expanded Policy
 - SECY-22-0076 Points
- Next Steps

Background

- Nuclear power plants continue to install digital I&C technology
- SRM-SECY-93-087 directs that, if the D3 assessment shows that a postulated CCF could disable a safety function, then a diverse means be provided to perform that safety function or a different function
- The staff developed SECY-22-0076 which provides recommended language for an expanded policy that allows for greater use of risk-informed approaches to address DI&C CCFs for high safety significance systems

Key Messages

- The proposed expanded policy in SECY-22-0076 encompasses the current points of SRM-SECY-93-087 (with clarifications) and expands the use of risk-informed approaches in points 2 and 3
- The four points when taken together provide criteria for the assessment of diversity and defense in depth against CCF
- Use of risk-informed approaches will be expected to be consistent with the Safety Goal Policy Statement, PRA Policy Statement, and SRM-SECY-98-0144
- The current DI&C CCF policy will continue to remain a valid option for licensees and applicants
- Point 4 ensures the health and safety of the public and already incorporates an implicit element of risk informing as it focuses only on those critical safety functions needed to ensure the safety of the facility

SECY-22-0076 Purpose

- To request that the Commission expand the current policy for digital I&C CCFs to allow the use of risk-informed approaches to demonstrate the appropriate level of defense-in-depth, including not providing any diverse automatic actuation of safety functions.
- This expanded policy would apply to requests for new or amended licenses and design approvals, for all nuclear power plant types, under 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” and 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants.”

Staff Positions on ACRS DI&C Subcommittee Questions

ACRS Question 1: *Would the revised policy be applicable to advanced reactors?*

Answer: The proposed expanded policy would apply to requests for all nuclear power plant types licensed under 10 CFR Part 50 and 10 CFR Part 52, including advanced reactors.

ACRS Question 2: *Do aspects of the policy for which the staff did not request a change carry forward unaltered?*

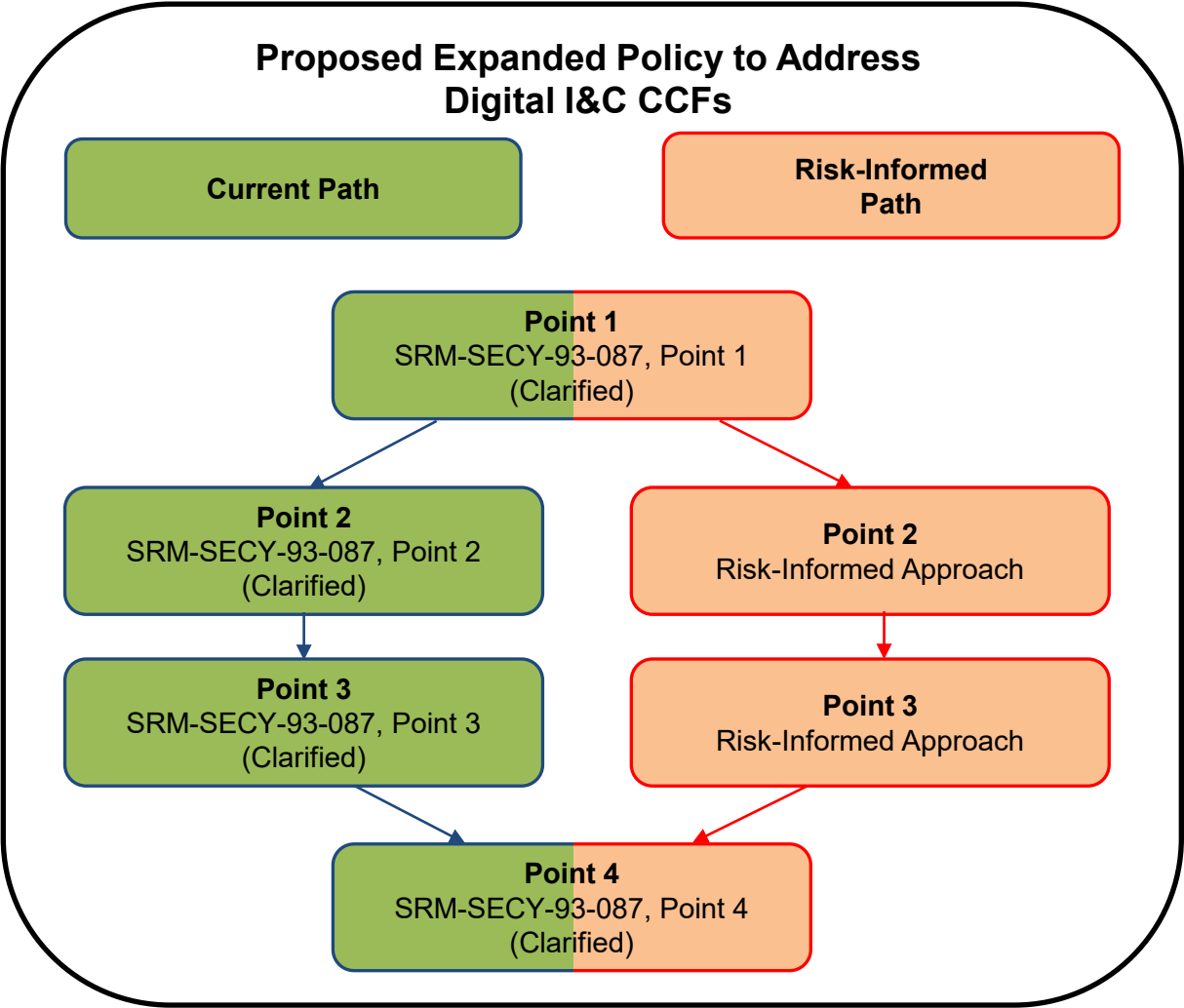
Answer: Yes

ACRS Question 3: *Might different reactor types warrant consideration of different critical safety functions?*

Answer: While the expansion of the policy is intended to be technology neutral it relies on the staff's licensing experience to date and assumptions about the design of the facility, such as the presence of a main control room. The staff acknowledges that the critical safety functions listed in the SECY and BTP 7-19 (reactivity control, core heat removal, reactor coolant inventory, containment isolation, and containment integrity) may not be the appropriate set for all reactor designs. The staff has existing regulatory tools (exemptions and alternatives), if necessary, to accommodate designs with different critical safety functions and, if the staff encounters a reactor design where the policy would not be applicable, the staff will engage the Commission as appropriate.

Proposed Expanded Policy to Address DI&C CCFs

The Current Path allows for the use of best estimate analysis and diverse means to address a potential DI&C CCF



The Risk-Informed Path allows for the use of risk-informed approaches and other design techniques or measures other than diversity to address a potential DI&C CCF

SECY-22-0076: Point 1

The applicant shall assess the defense in depth and diversity of the facility incorporating the proposed digital I&C system to demonstrate that vulnerabilities to digital CCFs have been adequately identified and addressed.

The defense-in-depth and diversity assessment shall be commensurate with the risk significance of the proposed digital I&C system.

SECY-22-0076: Point 1 Commentary

- Allows the defense-in-depth and diversity assessment to be commensurate with the risk significance of the proposed digital I&C system.
- This clarifying aspect of point 1 would be implemented consistent with the review guidance for graded approaches to digital I&C CCF in BTP 7-19, Revision 8.

SECY-22-0076: Point 2

In performing the defense-in-depth and diversity assessment, the applicant shall analyze each postulated CCF. This assessment may use either best-estimate methods or a risk informed approach.

When using best-estimate methods, the applicant shall demonstrate adequate defense in depth and diversity within the facility's design for each event evaluated in the accident analysis section of the safety analysis report.

When using a risk-informed approach, the applicant shall include an evaluation of the approach against the Commission's policy and guidance, including any applicable regulations, for risk-informed decision-making. The NRC staff will review applications that use risk-informed approaches for consistency with established NRC policy and guidance on risk-informed decision making (e.g., Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk Informed Decisions on Plant Specific Changes to the Licensing Basis").

SECY-22-0076: Point 2 Commentary

- Staff's goal is that the acceptance criteria for risk-informed approaches for digital I&C CCFs will be consistent with the NRC's broader (i.e., not specific to digital I&C) practices and guidance for risk-informed decision making.
- For example, the NRC staff will review license amendment requests for conformance to the guidance in RG 1.174 for applications employing risk-informed approaches.

SECY-22-0076: Point 3

The defense-in-depth and diversity assessment may demonstrate that a postulated CCF can be reasonably prevented or mitigated or is not risk significant. The applicant shall demonstrate the adequacy of any design techniques, prevention measures, or mitigation measures, other than diversity, that are credited in the assessment. The level of technical justification demonstrating the adequacy of these techniques or measures, other than diversity, to address potential CCFs shall be commensurate with the risk significance of each postulated CCF.

A diverse means that performs either the same function or a different function is acceptable to address a CCF, provided that the assessment includes a documented basis showing that the diverse means is unlikely to be subject to the same CCF. The diverse means may be performed by a system that is not safety-related if the system is of sufficient quality to reliably perform the necessary function under the associated event conditions. Either automatic or manual actuation within an acceptable timeframe is an acceptable means of diverse actuation.

If a postulated CCF is risk significant and the assessment does not demonstrate the adequacy of other design techniques, prevention measures, or mitigation measures,
then a diverse means shall be provided.

SECY-22-0076: Point 3 Commentary

- The staff expects that for a license amendment request, the risk significance of CCFs will be determined by any increase in risk to the facility from a postulated digital I&C CCF and that this risk increase would be determined using a quantitative bounding assessment.
- Current experience is insufficient to establish confidence in quantifying the probability of occurrence of digital I&C CCFs.
- The NRC staff will not be able to approve risk-informed quantitative approaches based on reducing the probability of occurrence of digital I&C CCFs through design techniques for high safety significance SSCs.

SECY-22-0076: Point 4

Main control room displays and controls that are independent and diverse from the proposed digital I&C system (i.e., unlikely to be subject to the same CCF) shall be provided for manual, system-level actuation of critical safety functions and monitoring of parameters that support the safety functions. These main control room displays and controls may be used to address point 3, above.

SECY-22-0076: Point 4 Commentary

- Point 4 is essential in staff's ability to conclude with reasonable assurance that a proposed digital I&C design does not adversely affect an operator's ability to manually control critical safety functions
- The staff's position is that the digital I&C system should not be able to take control of the facility away from the operator under all plant conditions (anticipated or unanticipated)
- Point 4 is consistent with the application of existing regulatory requirements for independence that are incorporated into the regulation (10 CFR 50.55a(h) and GDC 22)
- Point 4 already incorporates an implicit element of risk informing (in both SRM-SECY-93-087 and SECY-22-0076).
 - Point 4 is only applicable to critical safety functions (defined in SECY-93-087 and SECY-22-0076) and not to all the safety functions performed by the digital I&C system.
 - The diverse displays and manual controls do not have to be safety-grade or hardwired.

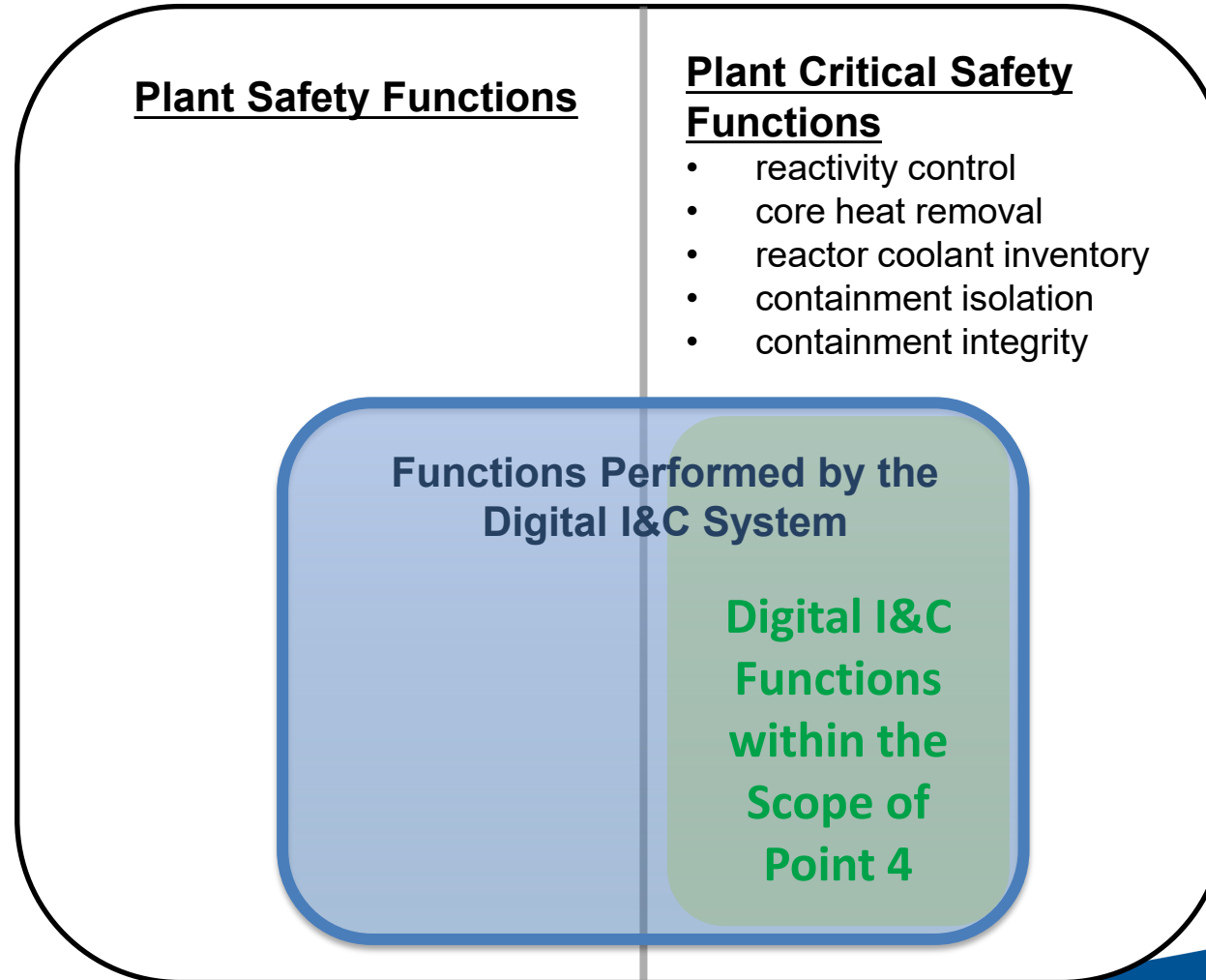
SECY-22-0076: Point 4 Commentary (contd.)

Point 4 only applies to:

- The critical safety functions performed by the digital I&C system.

Point 4 does not apply to:

- All safety functions performed by the digital I&C system.
- Critical safety functions not performed by the digital I&C system.



The diverse manual controls and displays for critical safety functions ensure the safety of the facility.

SECY-22-0076: Point 4 Commentary (contd.)

- Point 4 of SECY-22-0076 has not been an impediment to modern digital control room designs
 - e.g., the NuScale and Vogtle 3 & 4 designs meet the current Point 4 of SRM-SECY-93-087
- Licensees that want to use risk information to reduce the requirements for manual controls can request an exemption or an alternative to 10 CFR 50.55a(h) and the staff would inform the Commission before approving or denying such exemptions and alternatives
- The staff believes industry concerns can be addressed in implementing guidance

Key Messages

- The proposed expanded policy in SECY-22-0076 encompasses the current points of SRM-SECY-93-087 (with clarifications) and expands the use of risk-informed approaches in points 2 and 3
- The four points when taken together provide criteria for the assessment of diversity and defense in depth against CCF
- Use of risk-informed approaches will be expected to be consistent with the Safety Goal Policy Statement, PRA Policy Statement, and SRM-SECY-98-0144
- The current DI&C CCF policy will continue to remain a valid option for licensees and applicants
- Point 4 ensures the health and safety of the public and already incorporates an implicit element of risk informing as it focuses only on those critical safety functions needed to ensure the safety of the facility

Next Steps

- If the Commission approves the expanded policy, the staff will:
 - update the existing implementation guidance to address digital I&C CCFs, and
 - continue to engage stakeholders and the public to seek comments on the staff's implementation of the expanded policy.

Questions?

Acronyms

BTP	Branch Technical Position	NRC	Nuclear Regulatory Commission
CCF	Common Cause Failure	PRA	Probabilistic Risk Assessment
D3	Defense-in-Depth and Diversity	RG	Regulatory Guide
DI&C	Digital Instrumentation and Control	RPS	Reactor Protection System
ESFAS	Engineered Safety Features Actuation System	SAR	Safety Analysis Report
GDC	General Design Criteria	SECY	Commission Paper
I&C	Instrumentation and control	SRM	Staff Requirements Memorandum
NEI	Nuclear Energy Institute		