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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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681ST MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

OPEN SESSION

+ + + + +

WEDNESDAY

DECEMBER 2, 2020

+ + + + +

The Advisory Committee met via Video-
Teleconference, at 9:30 a.m. EST, Matthew W.
Sunseri, Chairman, presiding.

COMMITTEE MEMBERS:

- MATTHEW W. SUNSERI, Chairman
- JOY L. REMPE, Vice Chairman
- WALTER L. KIRCHNER, Member-at-large
- RONALD G. BALLINGER, Member
- DENNIS BLEY, Member
- CHARLES H. BROWN, JR. Member
- VESNA B. DIMITRIJEVIC, Member
- JOSE MARCH-LEUBA, Member

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DAVID A. PETTI, Member

PETER RICCARDELLA, Member

ACRS CONSULTANT:

MICHAEL CORRADINI

DESIGNATED FEDERAL OFFICIAL:

CHRISTINA ANTONESCU

ALSO PRESENT:

JOSEPH ASHCRAFT, NRR

JORDAN HOELLMAN, NRR

IAN JUNG, NRR

SCOTT MOORE, Executive Director, ACRS

JOHN SEGALA, NRR

DINESH TANEJA, NRR

STEPHEN VAUGHN, Public Participant

SANDRA WALKER, ACRS

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

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Roll Call and Opening Remarks by the ACRS Chairman
 Matthew Sunseri 4

New Design Review Standard for Chapter 7
 (Instrumentation and Control - I&C): Lessons Learned
 as a Result of Recent New Reactor Licensing Reviews
 Related to I&C

Charles Brown 7

John Segala 8

Jordan Hoellman 10

Joseph Ashcraft 15

Opportunity for Public Comment

Stephen Vaughn 53

Adjourn 55

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

9:30 a.m.

CHAIR SUNSERI: Well, good morning. It's 9:30 and the meeting will now come to order. This is the second day of the 681st meeting of the Advisory Committee on Reactor Safeguards. I'm Matthew Sunseri, Chair of the ACRS, and I'll now call the roll to confirm communications and a quorum.

I'll start with Ron Ballinger.

COMMISSIONER BALLINGER: Here.

CHAIR SUNSERI: Dennis Bley?

COMMISSIONER BLEY: Here.

CHAIR SUNSERI: Charles Brown?

COMMISSIONER BROWN: Here.

CHAIR SUNSERI: Vesna Dimitrijevic?

COMMISSIONER DIMITRIJEVIC: Here.

CHAIR SUNSERI: Walt Kirchner?

COMMISSIONER KIRCHNER: Here.

CHAIR SUNSERI: Jose March-Leuba?

MEMBER MARCH-LEUBA: Yes.

CHAIR SUNSERI: Dave Petti?

COMMISSIONER PETTI: Here.

CHAIR SUNSERI: Joy Rempe?

VICE CHAIR REMPE: Here.

CHAIR SUNSERI: Pete Riccardella?

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1 COMMISSIONER RICCARDELLA: I'm here.

2 CHAIR SUNSERI: All right. Good. We have
3 a quorum. The designated federal officer for this
4 meeting is Ms. Christina Antonescu. During today's
5 meeting the Committee will consider the following: We
6 will have a presentation on the New Design Review
7 Standard for Chapter 7, Instrumentation and Control,
8 I&C, lessons learned, as a result of recent new
9 reactor licensing reviews related to I&C. And
10 following that we will get into preparation of a
11 report on that topic.

12 A bridge line -- a phone bridge line has
13 been opened to allow members of the public to listen
14 in on the presentation and Committee discussions.
15 We've received no written comments or requests to make
16 oral statements from members of the public regarding
17 today's session. There will be an opportunity for
18 public comment and we have set aside time in the
19 agenda for comments from members of the public
20 attending or listening to our meeting. Written
21 comments may be forwarded to Ms. Christina Antonescu,
22 the designated federal officer.

23 A transcript of the open portions of the
24 meeting is being kept and it is requested that the
25 speakers identify themselves and speak with sufficient

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1 clarity and volume so that they may readily be heard.
2 Additionally, participants should mute themselves when
3 not speaking. I reviewed the -- what appears to be
4 the course of the agenda yesterday afternoon before we
5 recessed, and so today we will get into this topic,
6 but before we get started I need to let you know that
7 I've got some unavoidable personal conflicts with my
8 schedule today between 1:00 and 4:00 p.m. During this
9 time our Vice Chair, Joy Rempe, will be presiding over
10 the meeting.

11 And just looking at the agenda it's
12 possible that we could be completed with today's
13 activities before 4:00, so if so, Joy may recess the
14 meeting until 9:30 tomorrow, or she may use the
15 available time at the discretion of the Committee
16 consistent with the published agenda. Does any other
17 member -- do any members have any comments before we
18 get started with the topic of today?

19 All right. Then at this point I will turn
20 to Member Charles Brown to lead us on the subject.
21 Charlie?

22 COMMISSIONER BROWN: Let me un-mute my mic
23 and maybe we can get started.

24 (Laughter.)

25 COMMISSIONER BROWN: The mouse doesn't

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1 mouse. Okay. I'm Charles Brown, the Chairman of the
2 Instrumentation and Control Subcommittee. Today's
3 presentation will be by the staff on the New Design
4 Review Guide for Instrumentation and Controls in Non-
5 Light Water -- for Non-Light Water Reactor Reviews.
6 We've had two Subcommittee meetings on this. If my
7 memory serves me properly, I believe they were June
8 the 2nd of this year and October 21st of this year.

9 As a result of that second meeting, which
10 we had some very crisp interactive discussions which
11 were very productive, I passed on a number of comments
12 that we had made back to the staff. They have
13 proposed revisions to that, to the document that we
14 reviewed back on October 21st and they will be
15 presenting their resolution of those particular
16 comments -- or their response, excuse me, to those
17 particular comments with any discussion that the
18 members might like to carry out. And I asked them to
19 include some backup slides such that if it wasn't
20 clear, they could pull those slides up and make it a
21 little bit clearer as to what kind of changes they
22 made.

23 So those changes would be the ones that
24 end up based on the feedback we got when they gave us
25 the responses were the only significant changes to the

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1 document that we reviewed back in October. So I will
2 ask them to confirm that when I turn it over. Let me
3 see if I've missed anything. I think today our
4 presenters will be John Segala, the branch manager,
5 Jordan Hoellman and Joe Ashcroft -- excuse me, Joe
6 Ashcraft. Excuse me, Joe.

7 So with that in mind, John, I will turn it
8 over to you for your opening remarks.

9 MR. SEGALA: Good morning. Thank you,
10 Member Brown. Yes, my name is John Segala. I'm Chief
11 of the Advanced Reactor Policy Branch in the Division
12 of Advanced Reactors and Non-Power Production
13 Utilization Facilities in the Office of Nuclear
14 Reactor Regulation.

15 The purpose of today's briefing is to
16 provide the Full Committee an overview of the Design
17 Review Guide for Instrumentation and Controls. We
18 appreciate the observations and the comments we
19 received from the Subcommittee during the ACRS
20 meetings in June and October. We have made proposed
21 changes to the Design Review Guide to address the ACRS
22 comments and shared the changes with Member Brown.

23 The presentation today will summarize
24 these proposed changes to the Design Review Guide.
25 The staff plans to issue the Design Review Guide with

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1 the proposed changes after receipt of the ACRS letter.

2 I want to quickly take this opportunity to
3 place this effort in context with the staff's broader
4 efforts to develop advanced reactor guidance. The
5 development of the Instrumentation and Control Design
6 Review Guide was started to identify and apply
7 insights and lessons learned from past new reactor
8 application reviews that are important to be captured
9 and addressed in order for the Agency to be ready to
10 -- for future new and advanced reactor licensing
11 applications.

12 The Design Review Guide was initiated
13 prior to and for the most part was developed
14 separately from the Commission-approved Licensing
15 Modernization Project, and before the recent start of
16 activities associated with the industry-led
17 Technology-Inclusive Content of Application Project,
18 TCAP, and the staff-led Advanced Reactor Content of
19 Application Project, ARCAP, which will provide
20 guidance for risk-informing the scope and level of
21 detail of an application. Both TCAP and ARCAP are
22 based on the Licensing Modernization Project. The
23 staff plans to brief the ACRS on TCAP and ARCAP
24 efforts next calendar year.

25 More recently as the instrumentation and

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1 control guidance was further developed it incorporated
2 concepts from the Licensing Modernization Project.
3 The staff believes that the guidance for
4 instrumentation and control in the Design Review Guide
5 provides an important example of how a review can be
6 performed using concepts from the Licensing
7 Modernization Project. We're looking forward to
8 hearing from the ACRS Full Committee on this important
9 topic and any insights and feedback that you all may
10 have. At this point I could turn it over to Jordan
11 Hoellman to begin the presentation.

12 MR. HOELLMAN: Great. Thanks, John. This
13 is Jordan Hoellman. I'm a project manager in the
14 Advanced Reactor Policy Branch in NRR and I'm pleased
15 to be here again to present on the Design Review Guide
16 for Instrumentation and Controls.

17 So I'm moving onto the second slide, the
18 agenda slide. So the I&C Design Review Guide, or DRG,
19 provides guidance for the NRC staff to use in
20 reviewing the I&C portions of applications for
21 advanced non-light water reactors within the bounds of
22 existing regulations. This guidance leverages the
23 NuScale Design-Specific Review Standard, or DSRS,
24 Chapter 7 framework while factoring in lessons learned
25 from new reactor reviews.

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1 The guidance supports the NRC's vision and
2 strategy near-term Implementation Action Plans, or
3 IAPs, specifically IAP Strategy 3 which involves
4 developing guidance for flexible regulatory review
5 processes for non-light water reactors within the
6 bounds of existing regulations and a new non-LWR
7 regulatory -- a new advanced reactor regulatory
8 framework that is risk-informed and performance-based
9 and features staff's review efforts commensurate with
10 the demonstrated safety performance of advanced
11 reactor technologies.

12 So quickly to go over the agenda, we'll
13 provide a refresher on how the new DRG is organized
14 around the fundamental principles and how the review
15 process will ensure that each principle is met in the
16 design. We'll then discuss the proposed revisions to
17 the DRG that we plan to make based on ACRS
18 observations from our June and October Subcommittee
19 meetings. And then we will plan to issue the DRG
20 following receipt of the ACRS letter.

21 At the October Subcommittee meeting we
22 presented on some of the comments we received during
23 the public comment period. The resolutions to the
24 public comments did not impact how the fundamental
25 principles are applied by the reviewer in the DRG and

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1 the resolutions to the public comments did not modify
2 the DRG concepts that were presented in the June and
3 October meetings.

4 So next slide. I'll briefly discuss here
5 how the DRG was revised early in 2020 to align with
6 the Licensing Modernization Project. So the NRC
7 engaged with the Licensing Modernization Project, or
8 LMP, that was led by Southern Company and coordinated
9 by the Nuclear Energy Institute and costs shared by
10 the U.S. Department of Energy. The LMP's objective
11 was to develop technology inclusive risk-informed and
12 performance-based regulatory guidance for licensing
13 non-light water reactors for the NRC's consideration
14 and possible endorsement.

15 The LMP document, or NEI 18-04, outlines
16 an approach for use by reactor developers to select
17 licensing basis events, or LBEs, classify structure
18 systems and components, determine special treatments
19 and automatic controls and to assess the adequacy of
20 a design in terms of providing layers of defense-in-
21 depth. In the Staff Requirements Memorandum, or SRM,
22 to SECY-19-0177 the Commission approved the use of the
23 methodology described as a reasonable approach for
24 establishing key parts of the licensing basis and
25 content of applications for licensee -- licenses,

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1 certifications and approvals for non-light water
2 reactors.

3 Following receipt of the SRM the NRC
4 published Reg Guide 1.233 in June 2020, which endorses
5 with clarifications the principles and methodologies
6 in NEI 18-04 as one acceptable method for determining
7 the appropriate scope and level of detail for parts of
8 applications. The methodology described in NEI 18-94
9 and the Reg Guide also provided general methodology
10 for identifying appropriate scope and depth of
11 information to be provided in applications to the NRC.

12 The DRG has been coordinated to align with
13 the risk-informed performance-based LMP framework and
14 provides review guidance on all aspects of safety-
15 significant I&C systems which include safety-related
16 I&C systems and I&C systems that are not safety-
17 related but warrant special treatment. For example,
18 per NEI 18-04 safety-significant functions include
19 those classified as risk-significant or credited for
20 defense-in-depth.

21 Although the DRG aligns with the LMP
22 framework, the DRG provides the flexibility for staff
23 to perform I&C reviews for applications that do not
24 implement the LMP framework. The staff will continue
25 to ensure that the DRG aligns with the industry-led

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1 Technology-Inclusive Content of Application Project,
2 the NRC-led Advanced Reactor Content of Application
3 Project, and other advanced reactor initiatives
4 including the future Part 53 regulatory framework.

5 The staff has already had a few meetings
6 with the ACRS on the Part 53 and has scheduled routine
7 meetings with the ACRS on Part 53 and 20.21. And as
8 John mentioned, the ACRS will also be briefed on the
9 TCAP and ARCAP efforts in 2021.

10 I just wanted to take an opportunity to
11 note that an ACRS Subcommittee observation and NEI
12 comment we received on the DRG noted that the DRG
13 methodology could be used for the evaluation of any
14 new reactor design, light water reactor or non-light
15 water reactor. While the NRC staff agrees that the
16 DRG is technology inclusive and can be used to review
17 any new reactor application, it was developed to
18 address the immediate needs associated with the non-
19 LWR community and was intended to be consistent with
20 Reg Guide 1.233 and NEI 18-04, which also include the
21 four non-light water reactors in their titles.

22 So with that I'll turn it over to Joe
23 Ashcraft to go through the evolution of I&C review
24 guidance, unless there are any questions. Go ahead,
25 Joe.

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1 COMMISSIONER BROWN: Is Joe there?

2 CHAIR SUNSERI: I think he's on mute if
3 he's talking.

4 MR. ASHCRAFT: Oh. Now can you hear me?

5 COMMISSIONER BROWN: Got it. Go ahead.

6 MR. ASHCRAFT: Sorry about that. I
7 thought I did un-mute myself. All right. Once again
8 thank you, Jordan. Hello, my name is Joe Ashcraft and
9 I'm the I&C technical reviewer at NRR. I was part of
10 the team for the development of the NuScale Design-
11 Specific Review Standard and I'm part of the team for
12 the Design Review Guide.

13 So just a little background of how we got
14 here is the SRP is our primary staff guidance. And
15 this -- and we used it and it has been effective in
16 large light water reviews, but due to its nature the
17 use of the SRP for new reactor reviews had not always
18 been optimized as best they could. However, the staff
19 wanted to improve how we did I&C reviews for small
20 modulars by removing requirements that no longer apply
21 to the small modular reactors. Example: IEEE Standard
22 279, and removing duplicate reviews of the same
23 requirement as they reviewed in -- as many were
24 reviewed in each of the seven sections of the SRP.

25 So along with the Commission's policy that

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1 required us to develop a design-specific review
2 standard for each application for efficiency and
3 effectiveness, the staff took the opportunity to
4 develop the DSRS and -- it's significantly different
5 from the SRP. It is simpler, more risk-informed,
6 safety-focused while incorporating some lessons
7 learned from our other new reactor reviews.

8 Our primary objectives were to improve the
9 safety focus staff reviews by ensuring an applicant
10 had sufficient licensing bases details presented in
11 their applications to clearly demonstrate that the
12 applicable regulations are met and fundamental I&C
13 design principles are addressed. And we'll be able to
14 improve the efficiency of the reviews by eliminating
15 unnecessary information from being documented and
16 reviewed and by approving guidance to avoid
17 unnecessary and repeated RAIs.

18 So just to highlight, we were in close
19 coordination with the ACRS throughout our development
20 of the DSRS and we had multiple interactions with the
21 Committee. And early availability with the applicants
22 along with close preparation coordinations with the
23 applicant was essential. Unlike other previous new
24 reactor applications, the NuScale I&C review was a
25 huge success at efficiency and effectiveness. It was

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1 completed earlier than most other areas with no
2 significant challenges.

3 So now we're at the DRG, and it's an
4 evolution of the DSRS. So it reflects the safety-
5 focused approach from the DSRS including the four
6 fundamental I&C design principles and simplicity, but
7 was developed while factoring in the feedback from
8 lessons learned from other reviews. And the next
9 slide will discuss the goals of this document.

10 So slide 5, please? So the goal -- the
11 DRG goal is to modernize I&C safety reviews in support
12 of non-advanced -- of advanced non-light water
13 licensing applications. Success within this goal or
14 objective will be reflected by simpler, streamlined
15 and agile I&C review and regulatory infrastructure
16 that will effectively address I&C designs for new and
17 advanced non-light water reactors.

18 The I&C DRG was initiated as a proactive
19 way to modernize I&C safety review of advanced non-
20 light water applications and is demonstrated by the
21 experience with the NuScale DSRS I&C review. The
22 staff believes that the DRG will lead to more
23 efficient and effective reviews. Making it available
24 for non-light water designs early will help establish
25 predictable and efficient I&C reviews while the common

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1 goal of safety is ensured.

2 So the DRG supports the NRC version --
3 NRC's vision and strategy for advanced reactor safety
4 reviews as it could be used for advanced reactors with
5 vastly different technology. Also the DRG allows for
6 the flexibility of the review process within the
7 bounds of the existing regulation.

8 An ACRS Subcommittee observation from June
9 20th and an NEI comment furnished too noted that the
10 methodology could be used for evaluating any new
11 reactor design. And I think as Jordan said that while
12 we agree with that, it was specifically developed for
13 non-light water advanced reactors.

14 So next slide, please? So this is sort of
15 the I&C framework. And if you look at the top two
16 levels above the blue box, they're performed by the
17 Core Review Team with I&C support as necessary. This
18 review will formulate what is required for the I&C
19 staff to evaluate and the I&C reviewer would focus on
20 verifying the applicable attributes of the I&C design
21 that supports the plant-level performance objectives
22 as depicted by the Core Review Team.

23 So the blue box depicts the flow of the
24 review, the full I&C review. The I&C staff will be
25 evaluating that the demonstration -- that the I&C

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1 performance objectives have been met in terms of
2 reliability of the I&C design and robustness of the
3 I&C design. Okay. Reliability is the probability
4 that a design, that a system or component will meet
5 its minimum performance requirements under plant
6 conditions. Quantitative and qualitative performance
7 measures and criteria are used in support of this
8 portion of the assessment. And that's to the right
9 side of the blue box.

10 And robustness of the design -- I'm sorry.
11 That's to the left of the blue box. Robustness of the
12 I&C design, which is the degree a system or component
13 can function correctly in the presence of invalid
14 inputs or stressful environment conditions. Defense-
15 in-depth performance measures are used in support of
16 this portion of the assessment via the use of
17 fundamental I&C design principle from the DSRS as well
18 as the qualification measures such as quality.

19 The figure was revised to show that the
20 fundamental I&C principles show up, so one of our
21 previous Subcommittees -- the blue box in the center
22 -- or this bubble in the center of the blue box would
23 identify the I&C principles for -- I mean, it was in
24 the guide but it wasn't in this figure, so we just
25 added them. So the I&C reviewer should confirm that

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1 the applicant has established the appropriate set of
2 design principle -- principle design criteria,
3 applicable industry consensus standards and applicable
4 NRC regulatory guidance documents that will be used to
5 ensure the performance measures, defense-in-depth
6 levels and qualitative measures are met.

7 And finally, the I&C should interface with
8 other technical disciplines to verify that any cross-
9 disciplines issues are adequately identified and
10 resolved. And that's shown in this bottom bubble
11 below the blue box. So and one of the things we
12 learned with the DSRS we needed better coordination
13 with all the other chapters. I mean, we had it
14 before, but we really started creating more meetings
15 to discuss their issues and our issues and how they
16 conflict with one another. So we just carried that
17 forward and it worked out well.

18 So slide 7. So this just depicts the I&C
19 -- here's how the I&C will work within the DRG.
20 First, we're going to focus on the architecture and
21 system functions available. Optimally this portion of
22 the review is started during pre-application meetings.
23 And as Charlie has noted many times in his crisp
24 observations, getting a look at the architecture goes
25 a long way just to understanding the whole I&C design

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1 review and whether it's going to be simple or complex.

2 COMMISSIONER BROWN: Joe, can I interrupt
3 you just a second?

4 MR. ASHCRAFT: Sure, Charlie.

5 COMMISSIONER BROWN: Okay. Just --

6 MR. ASHCRAFT: Mr. Brown.

7 COMMISSIONER BROWN: -- listening to your
8 development as to how we eventually got here, one
9 thing that I recall; I went back and looked at this
10 just yesterday because I thought I remembered all of
11 this, back around 2010, a little bit earlier than
12 that, this idea of addressing architecture as opposed
13 to piece-parts, you know, that were more of a top-
14 down, was addressed not quite in the detail that we do
15 now, but in ISG 6, the licensing process, the Interim
16 Staff Guidance document, which you all prepared, which
17 we reviewed and wrote a letter on -- that was back in
18 September of 2010. I know we viewed that as kind of
19 a precursor to where we ended up with the DSRs and
20 everything after we went through the first couple of
21 design certifications.

22 So I just wanted to bring that up so that
23 the members would understand that there was what I
24 call some precursors to some of this stuff that set
25 kind of the architecture as the top-level thing we

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1 should be looking at. Just for amplification. Okay?
2 Thanks. I'm done.

3 MR. ASHCRAFT: Thank you, Mr. Brown. So
4 the second IRO the staff reviewed focuses on safety
5 and risk-significant functions and selected structure
6 systems and components, SSCs, that support them to
7 ensure that the I&C performance objectives are met.
8 And then finally, reduced or less staff review efforts
9 on SSCs that are not safety-related without special
10 treatment. Specifically the staff's review focuses on
11 ensuring that these SSCs will not inhibit performance
12 of the safety-significant functions.

13 So next slide, slide 8. So you guys --
14 members of the Full Committee, you probably heard this
15 many times, but I just wanted to highlight the four
16 principles plus simplicity, and I'll just briefly go
17 through each one of them.

18 So redundancy. The review should evaluate
19 the level of redundancy used in a safety-related
20 system to ensure that no single failure results in the
21 loss of safety functions and removal from service of
22 any component or channel does not result in the loss
23 of required minimum redundancy unless except if
24 reliability of operation of the I&C can be otherwise
25 demonstrated.

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1 Independence. The objective is to
2 evaluate the methods described in the application used
3 to demonstrate independence of I&C systems between
4 redundant portions of safety-related systems such as
5 redundant revisions, safety-related systems and the
6 effects of a licensing base event, and three, between
7 the safety-related systems and systems that are not
8 safety-related.

9 The staff should also assess the role of
10 independence in I&C systems designed as not safety-
11 related but warranting special treatment. The
12 reviewer should evaluate the physical logical
13 interfaces of the I&C system design including specific
14 performance information and the purpose of that
15 information and the meanings asserted in that
16 information. Example: hardware or data
17 communications. The review should include not only
18 permanent interfaces but also temporary connections.
19 Example: for maintenance work stations.

20 Diversity.

21 COMMISSIONER BROWN: Let me -- Joe, let me
22 interrupt one more second.

23 MR. ASHCRAFT: Sure.

24 COMMISSIONER BROWN: I'm not disagreeing
25 with anything you said on the redundancy and

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1 independence points. All well-taken. The point I
2 would just like to wrap that around, there is no
3 redundancy without independence. Okay? You don't
4 need independence if you don't have redundancy. Those
5 two are kind of the linchpins of everything having to
6 do with the architecture. And so that's why the
7 emphasis in most of our reviews have been focused on
8 that as well as how diversity is brought into the
9 picture. So I'll let you go on. I just wanted to
10 make sure that the connection between redundancy and
11 independence is emphasized for the record, because you
12 don't have one without the other. Thanks, Joe.

13 MR. ASHCRAFT: Okay. Let's see, I think
14 a member of team, Ian Jung, wanted to say something.
15 Are you able to un-mute, Ian?

16 MR. JUNG: Can you hear me?

17 MR. ASHCRAFT: Yes.

18 MR. JUNG: Yes. No, I was just checking
19 whether I can speak to it. I just want to mention one
20 thing that -- regarding Joe's diagram earlier. The
21 staff -- the diagram of the whole -- you know, big
22 picture is a simplification of the -- yes, I
23 appreciate that. This is Ian Jung in NRR.

24 I just want to mention that some of the
25 defense-in-depth measures: independence and

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1 redundancy, diversity, as well as qualification
2 measures, are very closely related to also reliability
3 portion on the left. So there are interrelated. I
4 just want to highlight that it's not a totally
5 separation of two different concepts, that they are
6 related to each other. And that's why it's shown at
7 the -- near the top of the blue box. Reliability and
8 robustness are interrelated there. I just want to
9 mention that. Thank you.

10 MR. ASHCRAFT: Okay. Thanks, Ian. So I
11 guess we're on diversity. The reviewer should
12 evaluate the common cause failure analysis results
13 provided by the applicant to verify that a potential
14 CCF due to latent systematic faults within the digital
15 I&C system will not result in exceeding the applicable
16 radiological release limits.

17 In performing this evaluation for which
18 event -- evaluating the safety analysis the applicant
19 should perform a D-3 assessment to determine whether
20 a potential CCF due to a systematic fault in the
21 digital I&C could disable a safety function. And two,
22 a diverse means not subject to the same common cause
23 failure is available to perform either the same
24 function -- different functions such that a
25 radiological release are not exceeded. Note that the

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1 overall analysis of the licensing basis event and
2 related defense-in-depth assessments for safety
3 functions may include potential contributions from I&C
4 systems.

5 So let's go on to determination. And we
6 call it predictability and repeatability now, but the
7 reviewer should confirm that the application provides
8 a detailed timing analysis describing how the I&C
9 systems that support safety-significant functions
10 including supporting communication systems address the
11 concept of predictability and repeatability. A
12 reviewer should confirm that the application provides
13 sufficient information. For example, in the form of
14 architecture descriptions, functional block diagrams,
15 description of operation, to demonstrate that the
16 proposed digital I&C system's real-time performance is
17 predictable and repeatable.

18 And lastly, simplicity. So in the DSRS
19 simplicity was an appendix. And so we brought it into
20 the DRG, the forefront. So while review guidance for
21 simplicity is not expressly provided, the reviewer
22 should verify that the applicant has incorporated this
23 design in the concept. And what I mean by that is --
24 and it starts really with the architecture. I mean
25 when they provide the architecture, and depending on

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1 the wires going in and out and just the confusion that
2 we've seen in past designs -- or not confusion, but
3 the complexity -- maybe that's the best word to use --
4 that that's sort of what we're looking for. And
5 there's other measures of simplicity that we would be
6 aspiring to.

7 So let's go to the next slide, slide 9.
8 So this gets into refinements based on ACRS feedback.
9 And one -- I'm just going to read the bullets here:
10 Improve the discussion in Section X.0.1.1., Scope and
11 Review. And the third paragraph, to solely focus on
12 the DRG intent and delete any reference to the type of
13 applications under review.

14 And two -- second bullet: Improve
15 discussions of Item 8, Section X.2.2.1.3, Diversity in
16 support of defense-in-depth to address common cause
17 failures on provisions of displays and controls.

18 And three, added a new Item 7 in Section
19 X.2.2.1.4, Predictable and Repeatable Behavior on
20 Watchdog Timers.

21 COMMISSIONER BROWN: Joe, can you hold on
22 a minute?

23 MR. ASHCRAFT: Sure.

24 COMMISSIONER BROWN: Bullets 2 and 3 are
25 pretty straightforward. The first one most people

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1 don't -- probably don't -- won't remember this, but in
2 the item we reviewed on October 21st, in the preamble
3 part; I think it was like Section 1.1, the scope tried
4 to differentiate between the level of detail that you
5 might need less or more elements of review. And they
6 had separate out the items such as COLs, site permits,
7 certifications, operating licenses, manufacturing
8 licenses, et cetera, et cetera, and tried to
9 differentiate as to which ones may or may not need
10 more or less review.

11 Unfortunately, they put the design certs
12 in the not needing as much, so I made that
13 observation. Then the thrust of their refinement is
14 that they removed the attempt to try to differentiate
15 and just use that particular paragraph now to say
16 that, hey, you'll use the DRG to assess that the
17 applicant demonstrates all the parameters that we like
18 to see.

19 There's a copy of it if you wanted to read
20 it. It's on slide -- what -- I've forgotten what
21 slide it is, but that was the thrust of the thing.
22 And it's -- that way there's -- we're not trying to
23 make a differentiation as to what particular parts of
24 any -- applicants may submit. We're not going to tell
25 them -- tell the staff. They should review it to make

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1 sure it meets the staff requirements, period.

2 So did I phrase that right, Joe?

3 MR. ASHCRAFT: Yes, you did. And I think
4 Jordan pulled up slide 14, which -- so we originally
5 were going to make -- refined your observations from
6 what the NEI comment was, but back and forth with OGC
7 and the fact that ARCAP and TCAP really is where this
8 information should revise. So that's why we decided
9 just to delete all that out of the DRG. And that --
10 as it states there, we're just going to assess I&C
11 systems in how they're demonstrate.

12 COMMISSIONER BROWN: Okay. Do any of the
13 members have any questions on that? I wanted to make
14 sure that was clear. It's a little bit muddy, but --
15 I mean it was if you don't -- if you're not steeped in
16 it.

17 Hearing none, go ahead, Joe. Thank you.

18 COMMISSIONER KIRCHNER: Yes, this is an
19 improvement, Charlie. This is Walt.

20 COMMISSIONER BROWN: Oh, yes.

21 COMMISSIONER KIRCHNER: Yes. Thank you.

22 COMMISSIONER BROWN: Definitely agree. I
23 was glad to see it. They initially thought about just
24 taking all the stuff up and not differentiating, and
25 then that obviously came out in subsequent discussions

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1 with others that, hey, we ought not even be talking
2 about this. There's other documents that give good
3 direction on that. So this is a very good improvement
4 over what was there before. So thank you for --
5 thanks, Joe, for the amplification.

6 MR. ASHCRAFT: Okay. Thank you for
7 bringing it up. So let's go onto slide 10, if there's
8 no more questions on slide --

9 COMMISSIONER BROWN: Hold it. Go back
10 again. I'm going to work on you hard in this. I'd
11 like to hit each bullet and make sure that we make
12 what the specific changes were. So can you go to
13 slide 15?

14 MR. ASHCRAFT: Sure. I knew you were
15 going to do that, Mr. Brown, but --

16 COMMISSIONER BROWN: Well, I've been
17 through it in detail, but the members haven't had as
18 much opportunity as I've had.

19 MR. ASHCRAFT: Understood.

20 COMMISSIONER BROWN: And we did discuss
21 all these six items during the meeting, so go ahead.

22 MR. ASHCRAFT: Okay. So the change that
23 we made in Section X.2.2.1.3, as you can see here,
24 this is the exact -- I mean, this is the change that
25 we made. And what we wanted to do -- I think one of

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1 the observations was main control room or outside. So
2 that is available, but we revised it so that it's very
3 clear as to what's needed, et cetera.

4 COMMISSIONER BROWN: Yes, their initial
5 change -- their initial version we reviewed just
6 deleted any references to a main control room and
7 there was a provision of a set of controls and
8 displays just accessible to the operator somewhere.
9 We commented that that seemed a little bit vague and
10 it -- like a main control room doesn't exist. So they
11 fixed that, and that's the way they fixed it, which is
12 also an improvement. Okay Joe, you can go on with the
13 last bullet on that page and then pick up slide 16.

14 MR. ASHCRAFT: Okay. Well, I think I'm
15 not going to go back to slides 9 and 10 because
16 they're just bulleted items of what we presented in
17 the backup slides.

18 COMMISSIONER BROWN: Okay.

19 MR. ASHCRAFT: So for the third bullet in
20 slide 9, if you go to the next slide, which is
21 slide --

22 COMMISSIONER BROWN: Sixteen.

23 MR. ASHCRAFT: -- 16. Yes. So this is
24 the change that we made for the predictability and
25 repeatability behavior, and I think the observation

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1 was we needed to bring the watchdog timer part of it
2 from back in the Appendix A to this section. So as
3 opposed to just pointing back to that appendix we
4 decided just to bring in a new item which discusses --
5 and basically this is the item that --

6 COMMISSIONER BROWN: Which I totally agree
7 with.

8 MR. ASHCRAFT: All right. Well, if
9 there's no other questions from the Full Committee,
10 let's go to slide 17. So this just depicts the
11 bullets or the changes that we presented on slide 10,
12 but this is the actual changes made to the DRG. So
13 we'll just go with this slide.

14 So this is for control of access. And I
15 know we've had many crisp observations going back and
16 forth on this, but this is the change that we've come
17 up with and we hope that it clears everything up. And
18 basically we added to Item 3, Hardware Characteristics
19 that Enforce Unit Directional Communication Features.

20 Example: use of unit directional non-
21 software base 3 that is connected to a transmitter in
22 the higher classified system and a receiver in the
23 lower classified systems are considered by the
24 applicant as the preferred means for mitigating any
25 hazards associated with the communication paths. And

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1 needless to say, this will be as usual a high area of
2 focus in our reviews.

3 COMMISSIONER BROWN: This provided some
4 additional amplification that wasn't there before. It
5 just said you should look at communications. And
6 that's about all it said. So you can see it in the
7 first sentence, and they added some additional
8 clarification. And this reflects actually our
9 conclusions in subsequent and all of our other reviews
10 that we've done.

11 MR. ASHCRAFT: All right. So let's go
12 onto slide 18. And this was for an Appendix A,
13 Section A, multi-unit stations. The observation is
14 Items 1 and 2 seem to conflict, and so the -- oh, are
15 we -- did you -- okay. Yes. So we revised Item 1 as
16 stated and deleted Item 2. So hopefully that removes
17 the conflict that was brought up during the last
18 Subcommittee meeting. I'll let you take a look at it.
19 I don't guess I need to read it unless you want me to.

20 COMMISSIONER BROWN: I just wanted to
21 point out one thing to the members, which we will
22 probably also discuss later in the letter writing. In
23 the initial version of this if you look the lined-out
24 section, that was Item 1. And it said safety-related
25 I&C SSCs are not shared unless it can be shown that

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1 they do not significantly impair the ability to
2 perform safety functions. And the second one then
3 said you shouldn't use them -- you shouldn't share
4 them at all.

5 So there was a conflict. This conflict
6 will still exist, as you see. The not-shared
7 statement is now the first sentence and the second
8 sentence now says almost the same thing except the
9 word significantly is deleted. Am I correct in that,
10 Joe?

11 MR. ASHCRAFT: I'm going to say yes to
12 that, and I -- yes.

13 COMMISSIONER BROWN: It's close enough.

14 MR. ASHCRAFT: Yes. I agree with you, Mr.
15 Brown.

16 COMMISSIONER BROWN: Significantly agree
17 that delete -- the -- significantly is in the Rule 55,
18 10 C.F.R. 55-something. And IEEE 603 says just
19 impaired.

20 MR. ASHCRAFT: Right.

21 COMMISSIONER BROWN: You all deferred to
22 the impaired from 603 because you retain -- still
23 retain the option to share fundamentally? And that
24 includes reactor trip and safeguard systems. There's
25 no differentiation in what type of safety-related SSCs

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1 we're talking about.

2 MR. ASHCRAFT: That's correct.

3 COMMISSIONER BROWN: Okay. All right.
4 You can go on. Just wanted to make sure everybody
5 understood the differentiation.

6 MR. ASHCRAFT: Okay. Let's see, I guess
7 we're onto slide 19. So the concern or the
8 observation here was while -- how it was written
9 didn't necessarily reflect the best way the guidance
10 of the Reg Guides were used when we were looking at
11 this automatic and manual controls. And I believe
12 it's Reg Guide 1.62. But we revised the words here as
13 written to address the observation from the last
14 Subcommittee meeting. And bottom line is -- the last
15 sentence I guess says it all, is the connection should
16 not compromise the integrity of interconnecting cables
17 and interfaces between local electrical or electronic
18 cabinets and the plant's electrical mechanical
19 equipment.

20 And I guess the best to describe it, as
21 Charlie was about -- Mr. Brown was about ready to say,
22 is you want your manual controls to be independent
23 from the software, I&C safety system or digital
24 components.

25 COMMISSIONER BROWN: Yes, the key

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1 amplification here is if you look at the lined-out
2 part, it -- after it goes through they should be
3 downstream and not compromise, the last sentence said
4 the manual controls may be connected either to
5 discrete hardwired components or to simple dedicated
6 and diverse software-based digital equipment that
7 performs the coordinated actions.

8 That just seemed to be counterproductive,
9 that you really want your manual controls to be
10 downstream. You don't want to be mucking with other
11 software processes that may compromise your manual
12 operations. So they've revised it to be consistent
13 with that. Am I correct in saying that, Joe?

14 MR. ASHCRAFT: That is correct, Mr. Brown.

15 COMMISSIONER BROWN: Thank you. Where are
16 we now?

17 MR. ASHCRAFT: Well, so I guess if you
18 jump up to slide 11, basically it's our next steps and
19 we look forward the ACRS' letter of recommendation.
20 And we're prepared to publish the final DRG in 2021,
21 or as soon as possible.

22 COMMISSIONER BROWN: Okay.

23 COMMISSIONER BLEY: This is Dennis Bley.
24 I know I've asked you this before, but I'd like to get
25 it today in our Full Committee meeting.

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1 Several times you mentioned that while
2 this was developed to support the LMP approach, it
3 really applies to any kind of reactor anywhere. And
4 your development was really based on to a large extent
5 lessons learned from LWR design certs over the last 10
6 years. And the next LWR design cert, if you had one,
7 really wouldn't use the current SRP; it would use
8 something very close to what you have here.

9 What's the link for a new LWR coming in to
10 get you to something that looks like this? Is it ISGs
11 that you have or how do you update that SRP? And when
12 do you think you might really update the SRP?

13 MR. ASHCRAFT: Well, I think I'll let
14 Dinesh Taneja address this because they are working on
15 a revision to the SRP, but keep in mind the SRP really
16 -- so for existing reactors, if they come in with an
17 amendment that say just affects RPS or whatever -- so
18 it's kind of broken out into systems as opposed to any
19 new reactor design which would be coming in totally
20 digital for the most part where say RPS and SFAS are
21 in the same platform, et cetera. You don't really
22 need to do both chapters in the SRP to accomplish the
23 review. So that's sort of how we progressed from the
24 SRP.

25 But having said that, I think it would be

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1 up for the application coming up and our management to
2 establish what kind of guidance we would be using to
3 review their application, whether it be similar to the
4 DSRS or this DRG, which either one could review any
5 new application coming in. But it's just a matter of
6 how it be determined up front before it gets to the
7 I&C.

8 COMMISSIONER BROWN: Well, Joe, I've read
9 this thing. Just to amplify Dennis' comment -- is
10 that okay, Dennis? Did I interrupt you or did you
11 want to follow up or can I make an --

12 COMMISSIONER BLEY: That's fine, Charlie.
13 I'm glad you're going to because I -- it's just a
14 little less that satisfying right now.

15 COMMISSIONER BROWN: Yes, that's --
16 exactly that's my response. I mean I've read this
17 thing four times now beginning to end and you made the
18 differentiation between somebody coming in with a
19 license amendment to maybe just replace the RPS and
20 SFAS systems with new computer-based on integrated
21 systems like this.

22 And there's another -- for the life of me
23 I can't see any differentiation at all in any of the
24 requirements or any that we would -- if I would -- if
25 it was me -- up to me, I would use this to review a

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1 license amendment because it's got all the elements of
2 the architecture in it. And all your connection
3 points to go out to other existing pipes, valves,
4 pumps, et cetera are still the same. So I think --

5 COMMISSIONER BLEY: And it incorporates
6 the lessons learned that you've actually used in the
7 last reviews.

8 COMMISSIONER BROWN: Exactly. When you
9 look at Diablo Canyon, it meets this in spades. All
10 the elements you call out in this Design Review Guide
11 are easily covered and absorbed into that Diablo
12 Canyon review.

13 MR. TANEJA: This is Dinesh Taneja. Let
14 me -- I guess there's couple efforts that are underway
15 right now. Your points, Mr. Brown, are very well-
16 taken and we are taking all these into consideration,
17 but there is a project which is the SRP Modernization
18 Project that's underway right now where we are going
19 back and revisiting Chapter 7 of the SRP to see how we
20 can address some of these issues, the lessons that
21 we've learned and best practices that -- how we move
22 forward with that.

23 And in addition to that, there is a
24 parallel effort. There is an ISG being developed to
25 support possibly looking at a Part 50 application for

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1 a small modular light water reactor and --

2 COMMISSIONER BROWN: Why wouldn't this
3 apply to the BWRX-300's RPS system?

4 MR. ASHCRAFT: Precisely.

5 MR. TANEJA: Right. So what we are doing
6 is -- I think there is an ISG being put together where
7 we are basically in the ISG -- I think what we are
8 pointing towards is use of maybe the DSRS of NuScale
9 and the DRG in combination and then evaluating the
10 design for a small modular reactor.

11 So there are those two parallel efforts
12 that are underway right now that we're trying to
13 figure out how to get this concept into that.

14 COMMISSIONER BROWN: But it sounds to me
15 like you're trying to drive your car through the same
16 tracks that you went before, but you're going to allow
17 yourself to wander off course. I mean --

18 MR. TANEJA: Well --

19 (Simultaneous speaking.)

20 COMMISSIONER BROWN: Dinesh, let me finish
21 first here --

22 MR. TANEJA: Okay.

23 COMMISSIONER BROWN: -- please? Thank
24 you. There -- well, I almost lost my thought here.
25 You've -- the template -- this DRG is an expansion of

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1 the mPower DSRS and whatever changes you all made for
2 the NuScale. I'm not sure you made any at all. I
3 mean, fundamentally it looked like you used the mPower
4 DSRS for that review. I mean, that's what
5 fundamentally what we -- I did. Same approach.

6 So it's difficult to understand why we
7 want to generate new documents when this particular
8 DRG has been rewritten in such a manner to be
9 virtually complete for anything. Why try to duplicate
10 it in some other verbiage? That's just -- I think
11 that -- to Dennis to I that seems -- correct me if I'm
12 wrong, Dennis -- that just doesn't seem to be
13 efficient or productive.

14 MR. TANEJA: I understand exactly your
15 point. And so I think the approach is overall SRP
16 issue and how we had taken the opportunity when we
17 were asked to prepared DSRS to really revamp Chapter
18 7. And now I think we are again same challenge.
19 There is the effort to address the SRP modernization
20 as a whole. And then how Chapter 7 gets addressed, we
21 have the opportunity right now to clean that up.

22 COMMISSIONER BROWN: Why not just put
23 Chapter 7 onto this and stick it in the SRP?

24 MR. TANEJA: Well, that might be the way
25 to go.

1 COMMISSIONER BROWN: How about --

2 MR. TANEJA: That's a possibility.

3 COMMISSIONER BROWN: You want a hint from
4 us?

5 MR. TANEJA: Yes.

6 COMMISSIONER BROWN: We'll probably --

7 COMMISSIONER KIRCHNER: I would -- this is
8 Walt. I would second that. The one objection I've
9 had through this all along is this non-LWR
10 nomenclature. I just -- so I just want to reinforce
11 your and Dennis' points. I just don't see why we're
12 narrowing this down to non-LWR. And when we know, or
13 at least anticipate -- there's likely to be an
14 advanced LWR concept coming in and this should fit
15 fine for the purposes of that review.

16 MR. JUNG: Yes, this is Ian Jung,
17 technical staff in the NRR. I just want to mention
18 that I think at the staff level having involved in
19 this effort we fully understand the Committee members'
20 position and desire. I think technically we agree.
21 Yes, I just want to -- I don't want to go too far
22 here, but I think this whole non-LWR versus
23 technology-inclusive nature, this not unique to the
24 particular area.

25 And in addition -- and it say just the

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1 dynamics of certain efforts where some are more
2 progressive and more risk-informed and some are not.
3 And when we -- for example, if we bring the light
4 water reactors, then we need to go through whole lot
5 of the engagement and concurrence, and it could
6 potentially delay that and we'll end up dealing with
7 non-concurrence and other topics. That's the nature
8 of where we are. There are people who are not
9 necessarily -- might have brought up on some of these
10 concepts.

11 And I just want to share that that's --
12 I'll take -- I'll put that as my personal opinion, but
13 I think the decision to expand this non-LWR guide into
14 more technology inclusive nature -- I personally 100
15 percent agree, but I think it's a matter of the
16 management and the resources to go with it and
17 potentially delaying the schedule aggregations of
18 this. That's some down side to it. That's -- I just
19 want to share that perspective.

20 MR. SEGALA: And this is John Segala.
21 Just from a bigger picture, we're undertaking a large
22 effort to develop 10 C.F.R Part 53, the new
23 technology-inclusive risk-informed performance-based
24 regulation of advanced reactors as required by the
25 NEIMA Law. And that -- in NEIMA they revised -- in

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1 January of 2019 they revised the definition of
2 advanced reactors to include non-light water reactors,
3 light water, small modular reactors, as well as fusion
4 reactors.

5 So as we -- and we're going to be engaging
6 extensively with ACRS on that whole effort. We plan
7 to use -- to utilize the existing efforts that we've
8 done on the Licensing Modernization Project, which we
9 endorsed in a Reg Guide, but we endorsed it only for
10 non-light water reactors. Again, that effort, even
11 though it was endorsed only for non-light water
12 reactors, is a technology-inclusive methodology, which
13 theoretically could be used no matter what the reactor
14 technology is.

15 And so as -- and then the TCAP and ARCAP
16 projects that I talked to that are content of
17 application projects looking at how you build your
18 application for the NRC to review and risk-inform that
19 is also a technology-inclusive process, but is also
20 focused on non-light water reactors. But as we use
21 those -- moving into the future as we develop Part 53,
22 Part 53 is going to have to also work for the light
23 water SMRs. And so we're going to be making sure that
24 the guidance moving forward as it supports Part 53 as
25 one acceptable way of meeting the regulations, that

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1 that guidance, even though it's -- it was originally
2 approved only for non-light water reactors because
3 it's technology-inclusive, would be applicable to
4 light water SMRs as well.

5 And so sort of as we started off on
6 advanced reactors, we were originally focusing
7 advanced reactors only on non-light water reactors,
8 but then as NEIMA has expanded the scope things have
9 changed. A lot of other light water SMRs have started
10 engaging in NRC in pre-application activities. So
11 we're trying to move forward and make progress on
12 guidance that we developed -- started developing many
13 years ago. And we're trying to get those issued, but
14 also to help some of the early movers for the non-
15 lights, but also to try to have a longer-term vision
16 of how we're going to make all this fit in with Part
17 53 as we develop that. And there will be numerous
18 ACRS meetings on Part 53 as well as TCAP and ARCAP.

19 I don't know if any of that's helpful.

20 COMMISSIONER BROWN: Well, I will -- I'm
21 just going to make an observation based on this. And
22 I'm not criticizing. I mean, you've gone through what
23 you guys are going through, but fundamentally this
24 document is about as technology-neutral as you can
25 get. You can risk-inform anything you want to. I

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1 mean, about the only thing you can risk-inform on a --
2 for a reactor protection system is you don't have one.
3 I think that's kind of hard to imagine for any reactor
4 that's a fission reactor, a fusion reactor, or
5 anything else, that it's so safe that we don't need to
6 know what it's doing anytime and don't have to be able
7 to shut it down quickly. And it's independent of any
8 reactor characteristic type. It's totally neutral
9 from that.

10 You could build this -- a fusion reactor.
11 It doesn't matter. You're going to have
12 instrumentation to protect it or provide some type of
13 safeguard as they're defined for that particular
14 reactor design. And this guide would apply for any
15 types of electronics that you apply. I mean you could
16 build them out magnetic amplifiers or vacuum tubes, or
17 discrete transistorize. You'd be kind of foolish, but
18 you could do that.

19 MR. SEGALA: Well, and I --

20 COMMISSIONER BROWN: So I mean, I just
21 have a hard time seeing wasted effort on spinning your
22 wheels on rewriting what you've already written. This
23 is -- after 12 years of working on this, this is the
24 best compilation I've seen over the last times we've
25 been doing it to address any new design, whether it's

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1 a light water, a large light water, a small SMR light
2 water, a non-light water, whatever. It doesn't
3 matter. This document does not differentiate anywhere
4 within it other than the words in your preamble about
5 non-light water. That's all. End of --

6 (Simultaneous speaking.)

7 MR. SEGALA: And I think also to make this
8 document work and be consistent, be able to work
9 within the licensing modernization framework you have
10 to keep in mind that LMP uses a lot of similar
11 terminology that's used in the light water reactor
12 world, but some of those definitions have changed as
13 we define them in the Licensing Modernization Project.

14 So to just take a document that was
15 originally developed for non -- that was developed to
16 try to work for non-light water reactors and then made
17 to work within the LMP and then just change the title
18 to say this automatically works for a light water
19 reactor that was -- didn't us LMP, it may create some
20 challenges to go back and make sure that the
21 terminology and the definitions that we have in here
22 work no matter where -- what framework you've designed
23 your facility under.

24 COMMISSIONER BLEY: John --

25 COMMISSIONER KIRCHNER: John, this is Walt

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1 Kirchner. I'm sorry, Dennis. Go ahead.

2 COMMISSIONER BLEY: I'd go back to where
3 I started. You mentioned wasted effort; I agree with
4 that, but the main thing we're concerned about is this
5 is an evolution of how you've been reviewing I&C
6 systems for light water reactors. And it's applicable
7 to the non-light water reactors. And if you start
8 rethinking and doing things, you're going to lose --
9 the worry -- my worry is you're going to lose some of
10 what you've gained in terms of simplicity and clarity
11 in how you do the reviews. But for me that's enough
12 said.

13 COMMISSIONER KIRCHNER: If I may, Dennis,
14 I just -- I agree with you. And, John, maybe -- you
15 know, things do change. They evolve. What's on your
16 plate is different than probably what you were looking
17 at when the LMP was first envisioned. But this is
18 just one member's opinion. I would just recommend not
19 constantly putting non-LWR in these documents. Just
20 call them advanced reactors or whatever. But for all
21 the reasons Charlie and Dennis cited, this works and
22 it's derivative from your experience with NuScale.
23 And you are evolving towards a technology-inclusive or
24 neutral, or whatever the current terminology is.

25 And then just one further observation.

1 Whether it's I&C or it's PRA, in all these areas the
2 advanced LWRs are probably going to have the most
3 mature experiential base to back them up. So the best
4 tested LMP and the risk-based approach would probably
5 be an advanced LWR because it's going to have the most
6 database experimental operational controls, everything
7 to back up the estimates that are used and selection
8 of design-basis events, et cetera, et cetera.

9 So I just -- I think we've lodged; or at
10 least I have, this objection many times in the past.
11 I just would recommend that you don't keep propagating
12 this non-LWR terminology in these documents because
13 you've come up with something that's really flexible
14 and inclusive in terms of technologies and yet it kind
15 of starts out with a preamble that boxes it out for an
16 advanced LWR concept. Enough said.

17 COMMISSIONER BROWN: Are there any other
18 members that have a comment or would like to weigh in?

19 COMMISSIONER PETTI: Charlie, I agree with
20 all the discussion and what the members have said.

21 COMMISSIONER BROWN: Okay. Thank you,
22 Dave.

23 COMMISSIONER PETTI: Yes.

24 COMMISSIONER BROWN: Matt, is it time for
25 me to go request public comment?

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1 CHAIR SUNSERI: Charlie, if this is the
2 conclusion of the staff's presentation and members
3 have no questions about the presented material, then
4 yes, you may turn to the public line.

5 COMMISSIONER BROWN: Okay. Let me make
6 sure one more time. Staff, are you -- I think it's --
7 probably we've now spent the last discussion to a
8 fair-the-well. So do you have any other comments
9 you'd like to make relative to the discussions we've
10 had so far before I got hit the members again and then
11 hit the public comments?

12 Absence of silence -- absence of noise,
13 rather, would say you agree -- you don't. One last
14 round, members. Anybody else have anything else
15 before I go off to the public line?

16 MR. ASHCRAFT: I'm sorry. This is Joe
17 Ashcraft. I've been trying to cut in several times,
18 but my microphone was muted.

19 COMMISSIONER BROWN: Okay.

20 MR. ASHCRAFT: I just want to thank Mr.
21 Bley for starting this conversation. And we agree
22 with your comments and look forward to this being in
23 your letter, because I think that would be a way to
24 let our management see the issue as much as any issue
25 that would be in your letter. Anyway, so if you'd go

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1 to slide 12, that's the end. That's my smoke stack.
2 So the staff is done unless there's any questions.

3 COMMISSIONER BROWN: Okay. Hearing
4 nothing else from the members, is the public line
5 open?

6 MR. DASHIELL: Public bridge line is open.

7 COMMISSIONER BROWN: Okay. Is there
8 anybody on the public line that would like to make a
9 comment? Is there anybody in the public --

10 (Simultaneous speaking.)

11 MR. VAUGHN: -- Brown, this is Steve
12 Vaughn with NEI. Can you hear me?

13 COMMISSIONER BROWN: Say that again?

14 MR. VAUGHN: This is Stephen Vaughn with
15 the Nuclear Energy Institute. Can you hear me?

16 COMMISSIONER BROWN: Yes. Yes.

17 MR. VAUGHN: Okay. Yes. Thank you. This
18 is again Steve Vaughn with the Nuclear Energy
19 Institute and I just had one comment to make. In
20 reviewing the most recent revision of the Design
21 Review Guide I wanted to point specific attention to
22 Section 2.2.1.3 entitled Diversity in Support of
23 Defense-in-Depth to Address Common Cause Failures.

24 And, Member Brown, just to kind of
25 continue with your analogy with the cars and the

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1 tracks, a lot of what they've got in here comes from
2 a SECY from 1993, and that addressed diversity in
3 defense-in-depth and various software common-cause
4 failure. And take your -- whatever the popular car
5 was in 1993, it sounds like this starts again in 2020,
6 take whatever electric car you want now, but that car
7 is driving the same tracks. And so one high-level
8 comment I want to make is that this car should be on
9 a new set of tracks.

10 So I feel like it's been -- the guidance
11 here is 30 years old. The state-of-the-art in how to
12 do a digital design to minimize systematic failures
13 and design defects that would -- could cause common-
14 cause failures with the safety-related components that
15 the digital I&C is designed to control an instrument,
16 this is new state-of-the-art. And I'd just ask that
17 the 10 sort of criteria we have in this section --
18 I'd just offer -- I know it's kind or somewhat late in
19 the game, but maybe start with a blank slate. Maybe
20 we can just -- with what we know now and all the
21 techniques we have now that do elegant design in
22 digital I&C we -- maybe these 10 steps will actually
23 take us down the wrong path. Maybe there's a better
24 way to do this. And, so that's a high-level comment.

25 And one specific comment is in Appendix D

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1 of this -- in the Design Review Guide for this
2 section. It articulates what sort of disciplines that
3 NRC would need to do the review. And for this section
4 the PRA Group isn't even one of the groups to help
5 support the review. And I would offer that if you
6 mention the term common-cause failure, I think you
7 should bring the risk analyst folks in, because they
8 have a lot of expertise to offer in this area. Thank
9 you.

10 COMMISSIONER BROWN: Okay. Thank you very
11 much, Dave. Is there anyone else on the line that
12 would like to make a public comment?

13 Hearing none, we'll close the public line.
14 Is Thomas on the line to --

15 MR. DASHIELL: Public bridge line is
16 closed.

17 COMMISSIONER BROWN: Thank you very much,
18 Thomas. Matt, with that I think I'm through. I'll
19 pass it back to you.

20 CHAIR SUNSERI: All right. Thank you,
21 Charlie. So let me ask you do you have a draft report
22 prepared for review?

23 COMMISSIONER BROWN: Yes.

24 CHAIR SUNSERI: All right. And I'll ask
25 Scott or Larry, is Sandra available to -- or whoever

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1 you have to pull up our draft letter?

2 MR. MOORE: This is Scott. Well, let's
3 ask. Sandra, are you on right now?

4 MS. WALKER: Yes.

5 MR. MOORE: Can you -- do you have
6 Charlie's letter to pull up?

7 MS. WALKER: Yes.

8 MR. MOORE: Okay. So, Matt, there's the
9 answer.

10 CHAIR SUNSERI: Okay. Great. Thank you.
11 So, Charlie, I think we could go forward with a read-
12 through. And then following that we would get comment
13 from the members on major comments. And then
14 depending on what work may need to be necessary after
15 their major comments, we could go into them either
16 line-by-line or we could send you off to address the
17 major comments. But that's kind of the two forks in
18 the road I see right at this point. So why don't we
19 go ahead with the read-through and then we'll take it
20 from there.

21 COMMISSIONER BROWN: Is everybody okay
22 break-wise?

23 CHAIR SUNSERI: Oh, that's a good
24 question. I got a little ahead of myself. It's
25 10:45. So let's take a 15-minute break to -- well,

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1 let's see, members like a little longer break, so
2 let's take a 30-minute break to 11:15.

3 (Whereupon, the above-entitled matter went
4 off the record at 10:46 a.m.)

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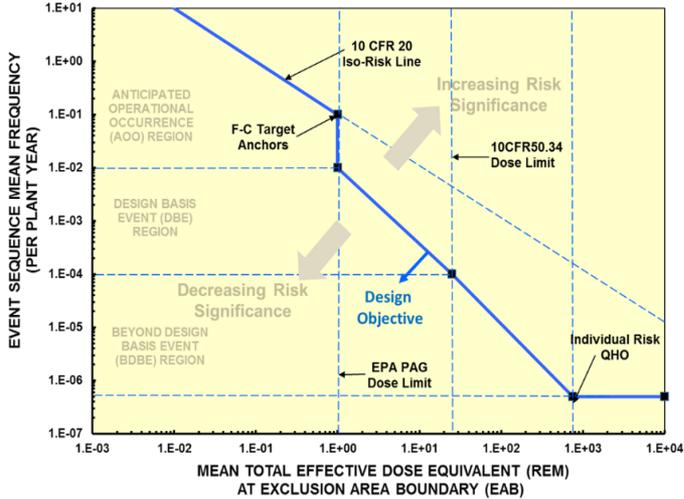
Design Review Guide (DRG): Instrumentation and Controls for Non-Light Water Reactor (Non-LWR) Reviews

Advisory Committee on Reactor Safeguards
(ACRS) Full Committee Meeting
December 2, 2020

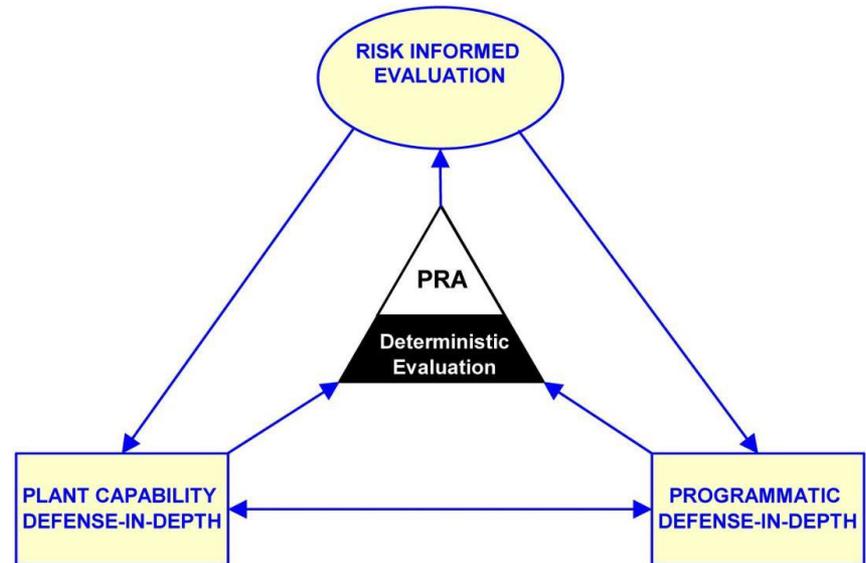
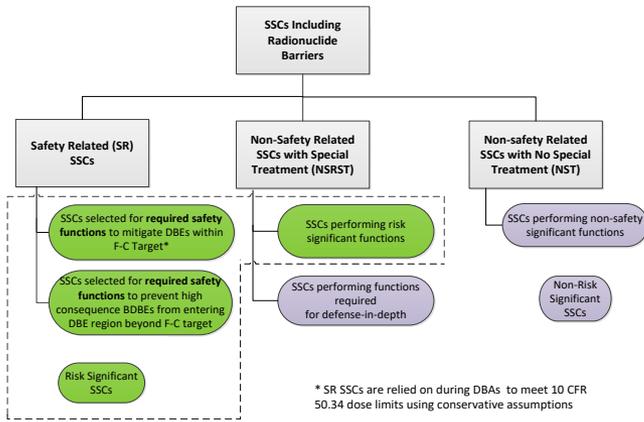
Agenda

- Introduction/Background
- Overview of instrumentation and controls (I&C) DRG for non-LWR application reviews
- Fundamental I&C Design Principles
- Overview of revisions to the DRG to address ACRS observations from the subcommittee meetings

Licensing Modernization Project



- Licensing Basis Events (LBEs)
- Classification of Structures, Systems, and Components (SSCs)
- Defense-in-Depth (DID)



Evolution of I&C Review Guidance

- NUREG-0800, Standard Review Plan (SRP) Chapter 7
 - System-based approach for light-water reactor (LWR) licensing reviews
 - Guidance not suitable for non-LWRs applications
- NuScale Design-Specific Review Standard (DSRS) Chapter 7
 - Improved safety-focused licensing review approach
 - Improved licensing review's efficiency and effectiveness
- DRG for I&C
 - Leverages the DSRS concepts
 - Leverages lessons learned from recent new reactor I&C licensing reviews

Goals

- Modernizes the I&C safety review in support of advanced non-LWR licensing applications

Safety-focused

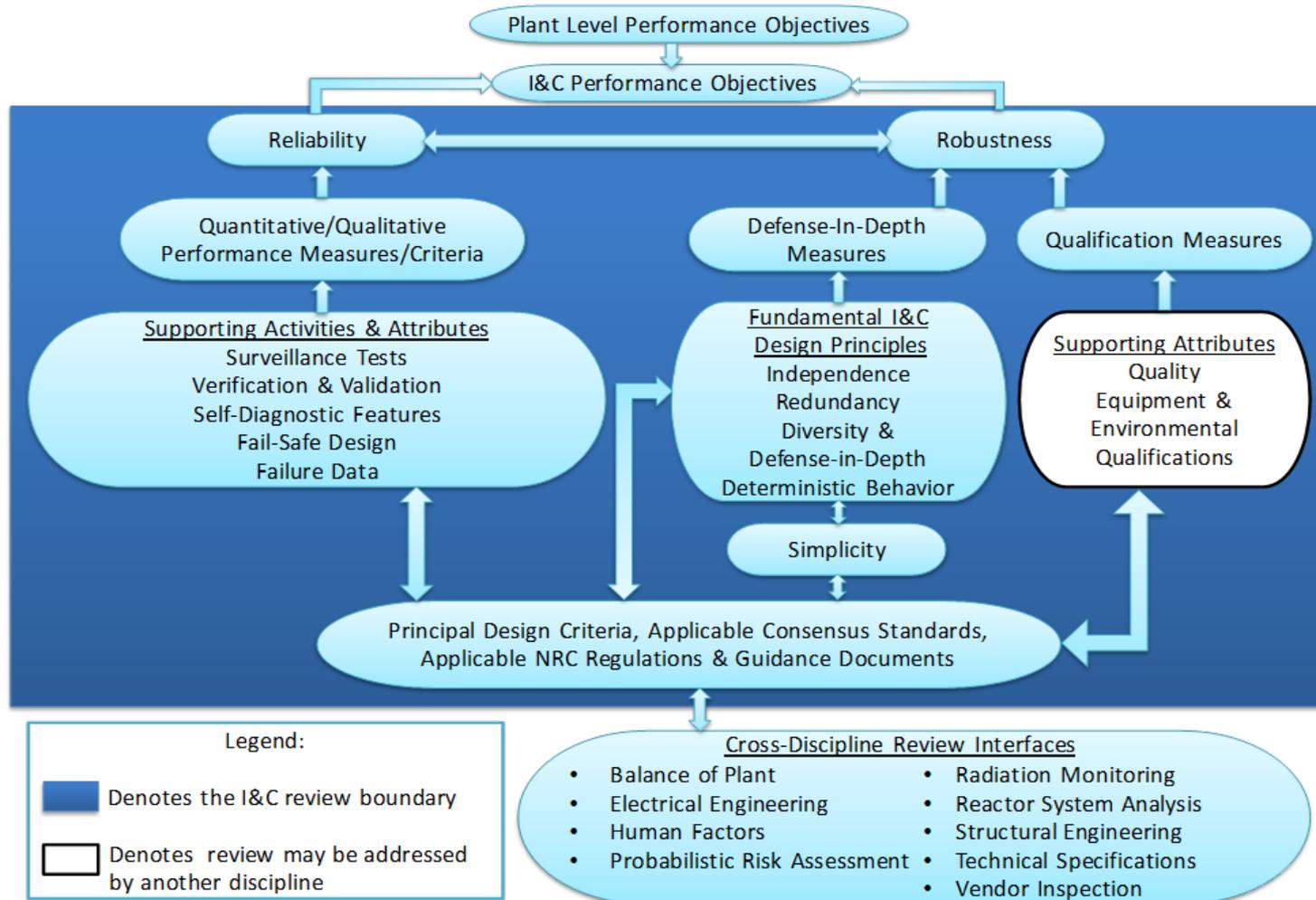
Risk-informed

Performance-based

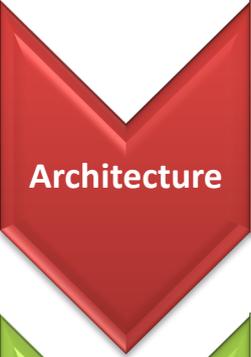
Technology-Inclusive

- Supports the NRC's vision and strategy for advanced reactor safety reviews
- Incorporates principles from Regulatory Guide (RG)-1.233

I&C System Review Framework



Overall Review Approach



Architecture

- The NRC staff review starts at the I&C architecture level
- Ensure that the information necessary to understand the proposed I&C architecture and system functions are available



Safety-Significant Functions

- The NRC staff review focuses on safety-significant functions and selected SSCs that support them
- Ensure that the I&C performance objectives are met



Functions Not Safety-Significant

- The design-related review for SSCs that the NRC staff determined are not safety-related and not risk significant should be less
- The NRC staff review focuses on ensuring that failure or operation of such SSCs will not prevent other SSCs from performing their safety-significant functions or adversely affect DID adequacy

4 Principles plus Simplicity

Redundancy

Independence

Diversity

Determinism

Simplicity

Refinements based on ACRS Feedback

- Improved discussion in Section X.0.1.1 (Scope of Review), third paragraph to solely focus on the DRG intent and deleted any reference to the type of applications under review.
- Improved discussion in Item 8 of Section X.2.2.1.3 (Diversity in Support of Defense-in-Depth to Address CCFs) on provision of displays and controls.
- Added a new Item 7 in Section X.2.2.1.4 (Predictable and Repeatable Behavior) on ‘Watch Dog Timer’.

Refinements based on ACRS Feedback (Cont.)

- Added discussion in Item 3 of Appendix A, Section A.6 (Control of Access), on hardware characteristics that enforce unidirectional communication feature(s).
- Improved discussion in Appendix A, Section A.8 (Multi-Unit Stations) on sharing safety-related I&C SSCs among nuclear power plant units.
- Improved discussion in Appendix A, Section A.9 (Automatic and Manual Control) on manual controls.

Status and Next Steps

- ACRS letter of recommendation
- Prepare/publish final DRG in 2021



Acronyms

- ACRS – Advisory Committee on Reactor Safeguards
- CCFs - common cause failures
- DID - defense-in-depth
- DRG - Design Review Guide
- DSRS - design-specific review standard
- I&C - instrumentation and controls
- LBE - licensing basis event
- LWR - light water reactor
- non-LWR - non-light water reactor
- RG - Regulatory Guide
- SRP - standard review plan
- SSCs - structures, systems, and components

Backup Slides – Proposed Revisions

- Section X.0.1.1, Scope of Review – Page X-2 and X-3

~~The type of application under review largely determines the review activities to be conducted and impacts the complexity and scope of the review. The scope and the level of detail for the I&C design should be the same for operating licenses, combined licenses, and manufacturing licenses while less detail is an option for design certifications, standard design approvals, or construction permits. The NRC staff should use the DRG to and customize its use as needed for reviewing these types of applications. Specifically, the NRC staff review should assess whether the applicant demonstrates how the specified I&C systems support the overall nuclear~~

power plant (NPP) performance objectives for a particular plant design. The reviewer considers the systematic assessment used in the application to assess the adequacy of the I&C architecture and systems design. The reviewer should consider whether the assessment provides assurance that the I&C design is reliable and robust by demonstrating that: (1) the design criteria and testing and qualification requirements have been met and (2) credible hazards and failure modes of the design are identified and controlled. Therefore, the reviewer should focus on verifying the applicable attributes of the I&C system design that support the plant level performance objectives as depicted in Figure X-1. This figure depicts a hierarchical

Backup Slides – Proposed Revisions

- Section X.2.2.1.3, Diversity in Support of Defense-in-Depth to Address CCFs, Item 8 – Page X-19

8. Provision of a set of displays and controls located in the main control room, or in a location that supports the operator needs based on a human factors engineering analysis, for manual system level actuation of critical safety functions and monitoring of parameters that support the safety function.
~~Provision of a set of displays and controls accessible to the operators for manual system level actuation of critical safety functions and monitoring of parameters that support the safety function.~~ These displays and controls should be independent and diverse from the digital I&C system identified in Items 5 and 6 above.

Backup Slides – Proposed Revisions

- Section X.2.2.1.4, Predictable and Repeatable Behavior, add Item 7 – Page X-20

The reviewer should confirm that the application provides sufficient information (for example, in the form of architectural descriptions, functional block diagrams, descriptions of operation) to demonstrate that the proposed digital I&C system's real-time performance is predictable and repeatable. This evaluation should include verifying that:

6-7. Logic processing units are monitored by an independent hardware-based, diverse means that produces a trip in the affected redundant portion of the system if the logic processing unit ceases operation or "locks-up" (i.e., ceases to respond)

Backup Slides – Proposed Revisions

- Appendix A, Section A.6, Control of Access, Item 3 –
Page X-29

The reviewer should confirm that the design allows for the administrative control of access to safety-related I&C system equipment. These administrative controls should be supported by provisions within the systems, by provisions in the generating station design, or by a combination thereof. The reviewer should verify the following information is provided in the application:

3. Measures are included to ensure that I&C systems do not present an electronic path by which unauthorized personnel can change plant software or display erroneous plant status information for the operators. Hardware characteristics that enforce unidirectional communication feature(s) (e.g., the use of a unidirectional/non-software based link that is connected to a transmitter in the higher classified system and a receiver in the lower classified system) are considered by the applicant as the preferred means for mitigating any hazard(s) associated with communication paths.

Backup Slides – Proposed Revisions

- Appendix A, Section A.8, Multi-Unit Stations, Items 1 and 2 – Page X-31

A.8 Multi-Unit Stations

Since SSCs can be shared among NPP units of multi-unit stations, the reviewer should confirm the following:

1. I&C design descriptions in the application provide assurance that safety-related I&C SSCs are not shared among units in multi-unit stations. If safety-related I&C SSCs are shared among NPP units then, the reviewer should confirm that the ability to simultaneously perform required safety functions in all units is not impaired. ~~Safety-related I&C SSCs are not shared among NPP units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.~~
2. ~~I&C design descriptions in the application provide assurance that safety related I&C SSCs are not shared among units in multi unit stations.~~

Backup Slides – Proposed Revisions

- Appendix A, Section A.9, Automatic and Manual Control – Page X-32

The reviewer should confirm that the manual controls are independent and diverse from the digital I&C safety systems (e.g., simple, dedicated, discrete hardwired logic components). The manual controls provided in the I&C design should be connected downstream of the plant's digital I&C safety system outputs. These connections should not compromise the integrity of interconnecting cables and interfaces between local electrical or electronic cabinets and the plant's electromechanical equipment.

~~The manual controls provided in the I&C design should be connected downstream of the plant's digital I&C safety system outputs. These connections should not compromise the integrity of interconnecting cables and interfaces between local electrical or electronic cabinets and the plant's electromechanical equipment. The manual controls may be connected either to discrete hardwired components or to simple, dedicated, and diverse software-based digital equipment that performs the coordinated actuation logic.~~