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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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704TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

WEDNESDAY

APRIL 5, 2023

+ + + + +

The Advisory Committee met via hybrid In-Person and Video-Teleconference, at 8:30 a.m. EDT, 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
- CHARLES H. BROWN, JR., Member
- VICKI M. BIER, Member
- VESNA B. DIMITRIJEVIC, Member
- GREGORY H. HALNON, Member
- JOSE MARCH-LEUBA, Member
- MATTHEW W. SUNSERI, Member

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1 ACRS CONSULTANT:

2 DENNIS BLEY

3 STEPHEN SCHULTZ

4

5 DESIGNATED FEDERAL OFFICIAL:

6 CHRISTINA ANTONESCU

7

8 ALSO PRESENT:

9 JOE ASHCRAFT, NRR

10 ERIC BENNER, NRR

11 GILBERTO BLAS RODRIGUEZ, NRR

12 SAMIR DARBALI, NRR

13 KHOI NGUYEN, NRR

14 JASON PAIGE, NRR

15 RICHARD STATTEL, NRR

16 DINESH TANEJA, NRR

17 BRIAN YIP, NSIR

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

8:30 a.m.

MEMBER REMPE: So good morning. This meeting will now come to order. This is the first day of the 704th meeting of the Advisory Committee on Reactor Safeguards. I'm Joy Rempe, Chairman of the ACRS.

Other members in attendance are Ron Ballinger, Vicki Bier, Charles Brown, Vesna Dimitrijevic, Greg Halnon, Walt Kirchner, Jose March-Leuba, Dave Petti and Matt Sunseri. We do have a quorum today.

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 slides presented at the meetings.

The Committee provides its advice on safety matters to the Commission through its publicly available letter reports.

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1 The Federal Register notice announcing
2 this meeting was published on March 9, 2023. This
3 announcement provided a meeting agenda as well as
4 instructions for interested parties to submit written
5 documents or request opportunities to address the
6 Committee.

7 The Designated Federal Officer at today's
8 meeting is Mr. Larry Burkhart.

9 The communications channel has been opened
10 to allow members of the public to monitor the open
11 portions of the meeting. Members of the public can
12 use the MS Teams link to also view slides and other
13 discussion materials during these open sessions. The
14 MS Teams link information was placed in the Federal
15 Register notice and agenda on the ACRS public website.

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

21 Written comments may be forwarded to Mr.
22 Larry Burkhart, today's Federal Officer.

23 During today's meeting, the committee will
24 consider the following topics, follow-up items from
25 our international outreach activities and our ACRS

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1 retreat and then roadmap of instrumentation and
2 controls regulatory requirements, industry and staff
3 guidance and commission meeting preparation.

4 A transcript of the open portions of the
5 discussion for the second topic will be kept, and
6 during that time we do request that speakers identify
7 themselves and speak with sufficient clarity and
8 volume so they can be readily heard. Additionally,
9 participants should mute themselves when not speaking.

10 So if not -- do any other members have any
11 opening comments or remarks? So if not, I'd like to
12 ask the court reporter at this time to let us go off
13 the record and then return at 1:00 p.m. for our
14 discussion on Topic 2. Okay?

15 (Whereupon, the above-entitled matter went
16 off the record at 8:32 a.m. and resumed at 1:00 p.m.)

17 CHAIR REMPE: Okay. It is 1:00 p.m. on
18 the East Coast, and we are going to restart. And we
19 are back on the record. And at this point, I'd like
20 to ask Member Brown to lead us through this topic.
21 Charlie?

22 MEMBER BROWN: Well, you're ahead of me.

23 CHAIR REMPE: Turn your mic on, too,
24 please.

25 MEMBER BROWN: I got to find my slides.

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1 You will have to hold on a second. There they are.
2 All right. We've got a triumphant trio up here who is
3 going to present. I think, Jason, is going to lead
4 off with a few comments. Samir and Gilberto, I'm
5 trying to get the names correct, and they will go
6 through this roadmap.

7 Just for a little intro, I had forgotten
8 how long ago it was, but it was, I don't know, a few
9 couple months ago when Walt and I think Dennis and
10 Greg in some way, shape or -- I think those were the
11 folks who mentioned that after all the Reg. Guides we
12 went through, how were all these interrelated and what
13 do they do and where are we going?

14 So since I was doing all these Reg. Guides
15 and aggravating people, that's part of my job when
16 you're young like I am. So I will turn it over to you
17 all to provide a coherent discussion of where we are
18 going, what the Reg. Guides are for and their
19 orientation and how do they fit together in the big
20 picture? Okay. Have at it, Jason.

21 MR. PAIGE: All right. Thank you. Good
22 afternoon. My name is Jason Paige. I'm the Branch
23 Chief of the Long-Term Operations and Modernization
24 Branch in the Division of Engineering and External
25 Hazards in NRR.

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1 Our branch leads the strategic
2 enhancements of the agency's INC infrastructure. As
3 you recall and you alluded to, from the full committee
4 meeting on Reg. Guide 1.152 in November of 2022, it
5 was requested that the staff provide an informational
6 briefing on the regulatory infrastructure showing the
7 relationships between the regulations and INC
8 guidance.

9 To prepare for this meeting, this was a
10 collaborative effort between NRR, NSIR and research.
11 Gilberto Blas Rodriguez, the farthest from me, and
12 Samir Darbali, are the co-leads for this effort and
13 will be presenting today.

14 Samir has extensive experience with
15 completing regulatory reviews utilizing the INC
16 infrastructure. Gilberto started at the agency in
17 January of this year. And he served two purposes for
18 co-leading this effort. One, to provide fresh eyes
19 and perspectives to identify ways to clearly
20 communicate our infrastructure. And two, it was used
21 as a training exercise to help him get up to speed on
22 our infrastructure.

23 Before I turn it over to Gilberto and
24 Samir, I will note that our presentation serves two
25 purposes. One it provides a roadmap of our INC

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1 infrastructure to show where we started and where we
2 are going to improve the clarity of our
3 infrastructure. And second, it provides the mapping
4 of our infrastructure to show the relationships
5 between the regulations and INC guidance.

6 So thank you for this opportunity to brief
7 you today on our regulatory infrastructure. And I
8 will turn it over to Gilberto.

9 MR. BLAS RODRIGUEZ: Okay. Thank you,
10 Jason. Good afternoon, everyone. My name is Gilberto
11 Blas --

12 MEMBER BROWN: With one hand, pull the mic
13 over toward you, and the speaker is on. And I'll turn
14 mine on. Normally, nobody has a problem hearing me.
15 But he does. Just so that we get full coverage. If
16 you don't get close, then we get lost, and we don't
17 want to miss any of your tidbits.

18 MR. BLAS RODRIGUEZ: All right. Thank
19 you. All right. Good afternoon, everyone. My name
20 is Gilberto Blas. And I'm an electronics engineer
21 supporting the Long-Term Operations and Modernization
22 Branch under Jason Paige.

23 For today's brief, we're going to be going
24 over the purpose and objectives. We're going to be
25 covering background information to explain

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1 developments that have contributed to the
2 instrumentation and control of regulatory
3 infrastructure that is in place, accomplishments that
4 have transpired because of those developments. And
5 then we'll be going into the NRC/INC licensing
6 infrastructure from the top of the Code of Federal
7 Regulations for regulatory and staff guidance,
8 providing an explanation of the documents available to
9 staff and their role.

10 We will be doing a deeper dive into each
11 of the main technical areas in INC, showing the
12 mapping between regulations and guidance documentation
13 and explain the interrelationships between the
14 documents.

15 Last, we will be presenting a look ahead
16 into what efforts are underway associated with INC as
17 it relates to established regulatory guidance.

18 Next slide, please. All right. So as
19 Jason stated, the main purpose of today's meeting is
20 to brief on the INC regulatory infrastructure mapping,
21 connecting the regulatory requirements with our
22 applicable guidance.

23 Objectives include communicating the
24 staff's continued efforts to modernize and improve
25 clarity of the INC regulatory infrastructure and the

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1 interrelationships between INC requirements, guidance
2 and industry standards.

3 Next slide, please. All right. Let's get
4 into it. Let's start with some insight and
5 perspectives to our previous efforts related to the
6 INC regulatory infrastructure that happened to shape
7 it to what it is right now.

8 So back in 2016, the commission issued
9 SRM-SECY-15-016 where it directed the staff to develop
10 an integrated strategy to modernize the NRC INC
11 regulatory infrastructure.

12 The staff responded with SECY-16-0070,
13 where they presented the Integrated Action Plan, the
14 IAP, to modernize the NRC's instrumentation and
15 control regulatory infrastructure.

16 The Commission approved the IAP in SRM-
17 SECY-16-0070 and throughout its implementation, the
18 staff engaged with external stakeholders and completed
19 significant improvement to the digital INC regulatory
20 infrastructure.

21 These include revisions to Branch
22 Technical Position 719 and Interim Staff Guidance 06
23 that had enabled the expanded safe use of the INC in
24 commercial nuclear reactors. This is evidenced by
25 licensees and applicants using and planning for more

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1 complex digital INC projects that are supported by
2 elements contained in guidance developed under the
3 IAP.

4 So the staff provided annual updates on
5 this effort since its beginning in 2016 until its
6 completion as communicated in SECY-19-0112. The
7 staff's vision from carrying out the IAP was to
8 modernize the INC regulatory infrastructure with
9 reduced uncertainty that enables the safe us of INC.

10 As a result, licensees are implementing
11 digital INC modifications and more given that the
12 staff is realizing on that vision by conducting
13 licensing activities with the use of products that
14 came from the IAP.

15 Next slide, please. Okay. So here are
16 the accomplishments that have been made since the last
17 ACRS briefing on digital INC infrastructure and
18 licensing activities held back in September of 2021.

19 In October of 2022, the NRC staff issued
20 Regulatory Guide 1.250, Dedication of Commercial Grade
21 Digital Instrumentation and Control Items for Use in
22 Nuclear Power Plants. Specifically, the guidance
23 supports digital modernization by enabling licensees
24 to procure and accept commercial grade digital
25 equipment for INC items.

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1 On August of 2022, NRC staff issued SECY-
2 22-0076 recommending to the commission to expand the
3 current common-cause failure policy in data licensing
4 systems that provides for the use of risk-informed
5 approaches.

6 NRC staff has also issued Reg. Guidance
7 1374 that is Reg. Guide 1.152, Rev. 4, that endorses
8 IEEE Standard 7432-2016, which is currently out for
9 public comment.

10 And in the preparation of future advanced
11 reactor INC reviews, the staff has held multiple
12 industry workshops on the INC licensing framework for
13 advanced reactors in February and April of this year.

14 MEMBER BROWN: Before you go on, you all
15 issued that two or three weeks ago. I remember you
16 were going to do it after the meeting after you
17 incorporated our suggestions, some of our suggestions.
18 When did you all actually -- is it actually out now?

19 MR. PAIGE: Is that the draft guide you
20 are talking you?

21 MEMBER BROWN: Yeah, the draft guide.

22 MR. PAIGE: That's still in its public
23 comment period.

24 MEMBER BROWN: Okay.

25 MR. PAIGE: And it should be ending

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1 shortly.

2 MEMBER BROWN: How long did you all put it
3 out for, two months?

4 MR. PAIGE: What was it -- from when to
5 when?

6 MR. NGUYEN: This is Khoi Nguyen. Reg.
7 Guide 1374 is under the public comment period for 30
8 days.

9 MEMBER BROWN: Oh, 30 days.

10 MR. NGUYEN: It's supposed to ended April
11 10. We're supposed to get all the comments by April
12 10.

13 MEMBER BROWN: Okay. Thank you. I just
14 like to know what's coming next or you were probably
15 going to tell me that later probably. Go ahead.

16 MR. BLAS RODRIGUEZ: Thank you. Next
17 slide, thank you. All right. So overview of NRC INC
18 licensing infrastructure. I'm going to start at the
19 top with an overview of the NRC instrumentation and
20 control infrastructure. It follows and supports the
21 requirements and policies established by Title 10 of
22 the Code of Federal Regulations and staff requirements
23 memoranda as seen in the top of the pyramid.

24 Now these are supported by established
25 Regulatory Guides which provide guidance to licensees

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1 and endorse industry standards.

2 Best practices and guides. It is also
3 supported by the staff review guidance which are for
4 NRC staff to conduct the reviews for licensing
5 activities.

6 On the next slide, we will be going into
7 more detail to the staff review guidance. Next slide,
8 please. So we have staff review guidance for the
9 review of light water reactors, which consist of the
10 following Standard Review Plan, Chapter 7, which
11 contains the branch technical positions and is
12 supported by interim staff guidance. These documents
13 are going to be covered in the next slide to more
14 detail.

15 For the review of specific reactor
16 designs, the staff developed design specific review
17 standards. For non-light water reactors, the design
18 review guide was developed. And for non-power
19 reactors, NUREG-1537 for the Non-powered Production
20 and Utilization Facility Review Guide was developed.

21 MR. BLEY: Excuse me. This is Dennis
22 Bley. Up there on your first bullet, Standard Review
23 Plan, did you say that the branch, the BTPs and the
24 ISGs are incorporated in Chapter 7?

25 MR. BLAS RODRIGUEZ: Only the branch

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1 technical positions.

2 MEMBER BROWN: They're incorporated by
3 reference. They're not literally --

4 MR. BLEY: They're not part of the SRP.

5 MEMBER BROWN: Let me try to clarify.

6 MR. BLEY: I'd rather hear him, Charlie.

7 MEMBER BROWN: Okay. I'll let him talk.

8 MR. BLAS RODRIGUEZ: So my understanding
9 is that the branch technical positions are part of the
10 SRP. The interim staff guidance accompanies the SRP.
11 It's not part of the SRP.

12 MR. BLEY: Okay, Charlie, maybe you can
13 clarify.

14 MEMBER BROWN: You did not put the BTPs
15 word-for-word into the SRP, did you? I don't remember
16 that they are referenced in the SRP as guidance to be
17 followed.

18 MR. BLEY: That's my memory.

19 MEMBER BROWN: That's my memory of what
20 was done.

21 MR. BLAS RODRIGUEZ: So the next slide
22 will actually go into what the BTPs and this
23 conversation --

24 MEMBER BROWN: This conversation.

25 MR. BLAS RODRIGUEZ: Yes, sir.

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1 MEMBER BROWN: Okay. One other question
2 hopefully you will address. When we started doing the
3 first DSRS was mPower, I think.

4 MR. BLAS RODRIGUEZ: Yes.

5 MEMBER BROWN: It was quite a while ago,
6 which set the standard for developing the expanded
7 DSRS, which is architecture focused for the most part,
8 at least it started setting the architecture focus for
9 these reviews and then it expanded into the NuScale as
10 well as it was used.

11 At one time, you all made the comment, I
12 don't know. This has been so long ago I'm not sure
13 I'm correct on this. That the SRP itself was going to
14 be revised to be more in line with the flow of the
15 DSRS's. Is that still on the table or are you all
16 sticking with the present game plan the way that it is
17 organized?

18 MR. PAIGE: So I think you are referring
19 to ACRS meeting back in September of 2021 where it was
20 briefed on the modernization of Chapter 7.

21 MEMBER BROWN: It would be nice if I
22 remembered that way back then.

23 MR. PAIGE: Yeah. So I think Dinesh was
24 one of the presenters for that meeting. So he's
25 welcome to the mic.

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1 MR. TANEJA: Yeah. This is Dinesh. So,
2 you know, I basically know a little bit of background.
3 So the branch technical position right now are there,
4 you know, as part of the SRP Chapter 7. And they are
5 specific to some technical areas.

6 So what we did with the DSRS is that we
7 took all the BTPs and we incorporated the BTPs within
8 the body of the design specific review standard that
9 we used for the NuScale review. Okay?

10 And then with the BRG also is essentially
11 a, you know, standalone review guidance that includes
12 all the relevant BTPs within the body of it. Okay?

13 Now there is the SRP modernization project
14 that has the intent of consolidating the BTPs within
15 the body, which we haven't done that yet because we
16 are just kind of seeing, you know, I guess cost
17 benefit type of thinking that the SRPs right now serve
18 very well for doing the, you know, license amendment
19 requests that are coming in on a piecemeal basis on
20 operating reactors. All the new reactors, they either
21 want to use the DRG or the DSRS.

22 MR. BLEY: Dinesh?

23 MR. TANEJA: Yes?

24 MR. BLEY: Dennis Bley. I thought you
25 folks told us, and maybe that's where you are headed

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1 here, is that you envisioned that the DSRS would
2 eventually probably with very little change become the
3 new Chapter 7 in the SRP. Is that still correct?

4 MEMBER BROWN: Well, you know, that's what
5 we were intending to do. But, you know, thinking of
6 redoing the SRP Chapter 7 somehow, you know, it's
7 counter to doing the, you know, work that we need to
8 do for a license amendment request on operating
9 reactors, which are in various different sizes. It
10 could be the, you know, we are seeing in some comment
11 just for a tech spec change. Some comment for a very
12 minor little. The SRP serves very well for that
13 purpose, right?

14 But if I'm getting a brand new
15 application, then the applicants are telling us that
16 we want to tailor our application to the DSRS or the
17 DRGs so we can use that guidance that's available to
18 us.

19 So do we want to just get rid of Chapter
20 7 SRP and replace it with DSRS? It doesn't really do
21 anything for us because DSRS is there for us to use so
22 we are using it, you know? That's the thought right
23 now.

24 MR. BLEY: Okay.

25 MEMBER BROWN: Does that answer your

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1 question, Dennis? Are you there, Dennis?

2 MR. BLEY: As well as will happen.

3 VICE CHAIR KIRCHNER: I have a question.

4 MEMBER BROWN: Go ahead.

5 VICE CHAIR KIRCHNER: Just kind of from a
6 philosophical standpoint, why would you have a DSRS
7 and a DRG, picking on an old topic that we hit before
8 this distinction between non-LWRs and LWRs. I mean,
9 advanced reactors are advanced reactors. They are
10 going to need a reactor protection system.

11 They probably hopefully don't have so many
12 controls and so many bells and whistles and so on and
13 so forth. But from a philosophical standpoint, if the
14 coolant is sodium or the coolant is Flibe or the
15 coolant is helium or the coolant is light water, in
16 terms of designing architectures for reactor
17 protection systems, et cetera, it's all the same.

18 Will this all eventually in your mind come
19 together, or as Dinesh just said, it's just convenient
20 to leave it as it is, SRP Number 7, and go on your way
21 with new reactors? But in particular, the two rows
22 there, why would there be any substantial difference
23 between a design specific review standard and a DRG?

24 MR. TANEJA: Let me try to answer that.

25 So when we had the mPower applicant coming in, and

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1 there was a number of applicants potentially coming
2 with small modular reactors, the commission directed
3 us to come up with the review guidance that was
4 specific to each design at that time. And it was to
5 basically, because these designs are passive, they
6 were small modular, and they were intended to be
7 somewhat different, so the direction that we got from
8 the commission was to come up with the DSRS that is
9 specifically designed.

10 So we started out with the mPower. And
11 then mPower pulled out the application. They decided
12 not to proceed. And then we ended up using that same
13 one for NuScale.

14 And now I think evaluating that, if a
15 future applicant does come in with an ASMR and if they
16 want to really tailor their application using the DSRS
17 format, we have that guidance available to us.

18 So the DRG was really created to be in
19 line with the LMP framework. It's, you know,
20 basically to be, you know, risk informed with a more
21 PRA-initiated type of a risk-informed regulatory
22 framework. So to be in line with that, we created the
23 DRG.

24 So, you know, we are going through that
25 process of trying to figure it out because now we have

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1 GEH that just told us that even though it's a light
2 water reactor, they want to really tailor their
3 application using the DRG. We are working with them
4 right now to figure out because they said, well, you
5 know, we are risk informing our design so I think it
6 works best for us that we follow it.

7 MEMBER BROWN: When we reviewed the DRG,
8 if I remember correctly --

9 MR. TANEJA: Yes, yes. We --

10 MEMBER BROWN: -- and we commented that
11 once you finish going through that DRG, you might as
12 well take off the non-light water or light water and
13 just say design review standard for digital items.

14 VICE CHAIR KIRCHNER: Yeah, that's what I
15 meant when I just said --

16 (Simultaneous speaking.)

17 MEMBER BROWN: You know, for not digital
18 but for plants, period. It doesn't really make any --
19 the requirements, not requirements, excuse me, the
20 guidance in the architecture in all the common-cause
21 stuff and the BTPs is all kind of blended throughout
22 it so it's vanilla. And we actually suggested taking
23 away the -- I probably didn't do that. It still says
24 non-light water reactors, right, non-LWRs? Is that
25 correct?

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1 MR. TANEJA: Well, based on the feedback
2 that we got from the SERS, we did add a footnote.

3 MEMBER BROWN: Yeah, that's right. I got
4 the footnote. If you want to use it, you can. Okay.
5 I remember that now. Thank you.

6 MEMBER HALNON: So on the slide, the
7 NUREG-1537, I don't know if you've gotten there yet
8 because mine sort of stopped. But that's a 1997
9 document. Doesn't that pre-date some of the good
10 practices we've learned in the 2000s and in the teens?
11 It seems like that is a little old to be relying on
12 for any past review guidance in this area.

13 MR. PAIGE: Yes. That's a good point. So
14 that document is currently being updated to
15 incorporate lessons learned from, you know, previous
16 history so.

17 MEMBER HALNON: Okay. So this is
18 referring to the next rev that we'll see which we will
19 probably be reviewing. Okay.

20 MEMBER PETTI: Because I understood that
21 it was Kairos you guys used being DSRS, the two of
22 you. I thought that is what we were told, right?

23 MEMBER HALNON: Right.

24 MEMBER BROWN: No, that's what they said
25 directly.

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1 MEMBER PETTI: Right. That's what they
2 said.

3 MEMBER BROWN: In their write-up that they
4 used the DSR.

5 MEMBER PETTI: Right.

6 MEMBER BROWN: And the staff used the DSR
7 as guidance and for their review.

8 MEMBER PETTI: Joe has his hand up. Oops.
9 Maybe not.

10 MR. ASHCRAFT: Yeah. This is Joe
11 Ashcraft. What I told you yesterday is we use NUREG-
12 1537 for most of the, you know, bullet points to look
13 at. But in addition, I also use the DSRS specifically
14 for the principle design INC criteria and also the
15 appendix and the architecture just to help me go
16 through what I was looking at. But officially, Kairos
17 was reviewed using NUREG-1537.

18 MEMBER PETTI: Thanks.

19 MEMBER BROWN: And I wanted to amplify one
20 other thing just from a historical standpoint. If you
21 go back to roughly 2009 or so, largely, at least the
22 first review I did of an INC system, it was for ESPWR,
23 that was largely a bottom-up review for the staff.
24 They looked at it position by position, IEEE standard
25 position. If you met the positions, you were okay.

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1 The committee did not -- I won't say
2 didn't. We didn't think that was a good way to do it.
3 The fact is there is now way we could ever review
4 anything to go through dozens of documents position by
5 position. So we didn't get a figure that was worth
6 anything, a one line diagram.

7 So after about a year and a half, we
8 finally got everybody convinced to generate that. And
9 we have changed the review process from a bottom-up to
10 a top-down review starting with architecture. And to
11 me that's been a significant change. And hopefully
12 the applicants, it's much easier for them if they
13 present the information in a top-down manner, and you
14 can really see whether it is satisfactory or not and
15 then pick up the loose ends as boilerplate.

16 So this is a significant change in my own
17 opinion in terms of how, based on what we've seen, at
18 least in my time here, is how the staff reviews it
19 overall. And it has certainly eased our ability to
20 review the same in a timely manner and get it back to
21 them. And I think that has proven itself in
22 particularly the APR-1400 and NuScale reviews. Those
23 went very smoothly. That's just a little background
24 for everybody at the same time.

25 All right. Sorry to interrupt. I always

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1 have to provide instructional details. Thank you.

2 MR. BLAS RODRIGUEZ: Okay. Next slide,
3 please. All right. So the INC portion of the SRP
4 Chapter 7 provides guidance for review of the INC
5 portions of applications for nuclear reactor license
6 or permits and amendments to assist in licenses.

7 And for branch technical positions, they
8 are contained within Chapter 7. The BTPs represent
9 guidelines intended to supplement the acceptance
10 criteria establishing regulations and the guidelines
11 provided in Reg. Guides and applicable industry
12 standards.

13 The ISGs are supplemental information to
14 Chapter 7. And these are all things used to clarify
15 or expand on guidance found in Standard Review Plans
16 or Regulatory Guides and facilitate the resolution of
17 technical or licensing issues within established
18 regulatory processes.

19 One thing to note is that ISGs are
20 intended to be incorporated into the Standard Review
21 Plan.

22 MEMBER PETTI: So you said intended. So
23 we haven't seen an interim for an awful long time. I
24 mean, is there a schedule for putting that into the
25 SRP?

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1 MR. BLAS RODRIGUEZ: All right. So right
2 now the guidance in ISG-04 is being incorporated in
3 IEEE 7432.16 and then for ISG-06, we are waiting until
4 we gather lessons learned from the Limerick and Turkey
5 Point licensing reviews before incorporating them into
6 the SRP.

7 MEMBER BROWN: ISG-6 was the licensing --

8 MR. BLAS RODRIGUEZ: Licensing process.

9 MEMBER BROWN: ISG-4 was -- I have
10 forgotten the titles.

11 MR. TANEJA: Communications independence.

12 MEMBER BROWN: Oh, yeah, right. Okay.
13 All right. Those I remember doing 6, 12 years ago or
14 something like or 10 years. Go ahead.

15 MR. BLAS RODRIGUEZ: Okay. With that, I
16 will pass it over to my colleague, Samir Darbali.

17 MEMBER BROWN: One other observation.
18 When we did the Diablo Canyon review, Richard, you
19 were on that, right? That was done from an
20 architectural standpoint. That one also went very
21 smoothly in my personal opinion. Am I correct?

22 MR. DARBALI: Yup.

23 MEMBER BROWN: It was one and done. And
24 it really eased and smoothed out the whole process.
25 So this new process I view as wonderful.

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1 MR. DARBALI: Okay. All right. Thank
2 you, Gilberto, and good afternoon everybody.

3 MEMBER BROWN: Get closer.

4 MR. DARBALI: Is that better?

5 CHAIR REMPE: Yes.

6 MR. DARBALI: Okay.

7 MEMBER BROWN: Thank you.

8 MR. DARBALI: Good afternoon, everyone.
9 As Gilberto mentioned, we have several regulatory
10 requirements, items, documents and endorsed industry
11 standards. And this covers a range of INC topics.
12 This is going to make it hard to follow how all these
13 documents fit together or to see how the big picture
14 of a regulatory infrastructure looks like.

15 To address this, the staff came up with an
16 approach through the regulatory and licensing guidance
17 into nine technical areas, which include eight INC
18 technical areas that are focused on safety and tied
19 back to the requirements in 10 CFR Parts 50 and 52
20 and one cybersecurity area that ties back to the
21 requirements of Part 73 for security.

22 We have included cybersecurity because of
23 the nexus between safety and security throughout the
24 design, implementation, operation and modification of
25 the licensing process.

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1 This approach to group the regulatory and
2 staff guidance into technical areas provides clarity
3 and cohesiveness of the INC infrastructure by allowing
4 applicants, licensees, vendors and NRC staff to
5 effectively navigate and use the regulatory guidance.

6 This particular slide is set up in a way
7 that one can click through any of the technical areas,
8 and the presentation will take you to that detailed
9 mapping slide. So in the following slides, what we'll
10 do is we'll look at the mapping between the regulatory
11 requirements and guidance for each of these nine
12 technical areas.

13 When we get to these slides, you will see
14 the applicable regulatory requirements on the left-
15 hand side of the slide, the applicable regulatory
16 guides and endorsed industry standards in the middle
17 of the slide and the staff reviewed guidance on the
18 right-hand side of the slide.

19 We also have two backup slides at the end
20 that map the INC technical areas to the IEEE 7432
21 clauses and to the ISG-06 sections. We have included
22 these two slides for additional reference material.
23 If you have any questions, we can go over these slides
24 later as well.

25 So with that, we are going to start with

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1 the mapping of the criteria for safety systems
2 technical are. Any questions on what we're showing
3 here?

4 So let's start with the criteria for
5 safety systems technical area. So this technical area
6 covers those aspects of the system architecture that
7 includes the fundamental design principles.

8 On the left side of the slide are the
9 applicable regulatory requirements and policy. And
10 these include Part 50 and 52 that contain the
11 requirements for different licensing process.

12 Part 50, being a two-step process with a
13 construction permit and an operating license and Part
14 52 being a one-step process with a combined operating
15 license and as part of that combined operating
16 license, applicants can reference sort of by design.

17 Part 50 also contains technical
18 requirements such as the general design criteria in
19 Appendix A and the quality assurance criteria in
20 Appendix B.

21 We also have IEEE Standard 60 and 279,
22 which are incorporated by reference in 5055(a)(H) and
23 also the common-cause failure policy in SRM-SECY-93-
24 087.

25 One thing to note is that depending on the

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1 specific application, there might be other applicable
2 regulatory requirements that are not captured in the
3 slide. For example, a particular application may be
4 related to ATWS, in which case 50.62 may also be
5 applicable.

6 In the middle of the slide, we have the
7 applicable Regulatory Guides and endorsed industry
8 standards. In this slide and in the following slides,
9 we will see the latest revision number for these Reg.
10 Guides. However, the applicable revision will be
11 determined by the individual plan's licensing basis.

12 The Reg. Guides for this technical area
13 cover, amongst other things, periodic testing, QA
14 requirements, bypass and inoperable status indication,
15 single failure, manual initiation of protection
16 actions and independence. You can see that some Reg.
17 Guides don't endorse any industry standards and that's
18 because the specific guidance is in the Reg. Guides
19 themselves.

20 And then on the right side of the slide
21 are the applicable staff guidance documents. We note
22 the SRP Chapter 7 sections listed here and also BTP 7-
23 8, which provides guidance for applying Reg. Guide
24 1.22, BTP 7-19, that's for diversity and the ISG-06
25 sections for system description.

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1 So we also note the ISG-06 section --

2 MEMBER BROWN: Before you go on, did the
3 reporter get everything?

4 MR. DARBALI: Yeah, where did I leave off?

5 MEMBER BROWN: Joy, can I --

6 CHAIR REMPER: Yes, sir.

7 MEMBER BROWN: Okay. You got everything.
8 Okay. Thank you.

9 MR. DARBALI: Thank you. I apologize.
10 And so we also have the ISG-06 sections for system
11 description, system architecture and compliance with
12 IEEE Standard 603.

13 We have an asterisk here at the bottom
14 where we identified those documents that are specific
15 to Line C. So in this slide, that would be the CCF
16 policy and that's SECY-93-087, BTP 7-19, diversity and
17 defense-in-depth for computer systems, and ISG-06, the
18 licensing process for digital modifications.

19 MEMBER BROWN: Okay. Question?

20 MR. DARBALI: Yes.

21 MEMBER BROWN: You just finished dealing
22 with 22-0076, SECY. Is there an SRM out on that yet?

23 MR. DARBALI: Not yet.

24 MEMBER BROWN: I didn't think it had been.
25 I had not seen that.

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1 MR. DARBALI: Right, right.

2 MEMBER BROWN: Okay. But we did provide
3 comment, and you all provided whatever machinations
4 you did relative to that. But we actually issued our
5 letter report after SECY was a SECY, right?

6 MR. DARBALI: Right, right.

7 MEMBER BROWN: So you're not getting
8 anything back from the commission at all?

9 MR. DARBALI: Right. We're still waiting
10 for the SR from the commission. And as we receive
11 that and there are other updates made to what you will
12 see in this slide and other slides, we will be making
13 an update for that.

14 MR. BLEY: Hey, this is Dennis Bley. I
15 just wanted to compliment you on this slide. This is
16 the kind of thing I was envisioning when we asked this
17 question. And it looks pretty complete. There might
18 be things that need to be polished up on it.

19 But, you know, by the time the staff gets
20 around to actually incorporating things as we were
21 talking earlier and getting rid of the ISGs and BTPs,
22 you guys will all be retired and gone, and this will
23 help whoever is going to do it. They don't have to
24 build this for themselves. Thanks for it.

25 CHAIR REMPE: You look pretty young,

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1 Dennis, to be retired. But maybe I'm more optimistic
2 about timing.

3 MR. BLEY: I think you put the senior --
4 you put the junior staff in front of us today.

5 MR. BENNER: Bingo, younger staff. This
6 is Eric Benner. We put the people who are going to
7 have to live with this framework for the next two
8 decades.

9 VICE CHAIR KIRCHNER: And the ACRS.

10 MR. DARBALI: Thank you.

11 VICE CHAIR KIRCHNER: I just want to echo
12 Dennis' compliment. This is very good. So it begs
13 the question, has industry seen this yet or is this
14 the first rollout?

15 MR. DARBALI: Yes. This is the first time
16 we have made this public.

17 VICE CHAIR KIRCHNER: I would think that
18 this would be invaluable to especially the newer
19 applicants who haven't labored through the processes
20 before.

21 MR. DARBALI: Right.

22 VICE CHAIR KIRCHNER: Very well done.
23 Thank you.

24 MR. DARBALI: Right. And, you know, as
25 you have seen, and you will continue to see, we do

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1 have some ability that you can click through some of
2 the technical areas. And I will take you to that
3 slide, so.

4 VICE CHAIR KIRCHNER: I see the arrow at
5 the bottom.

6 MEMBER MARCH-LEUBA: Yeah. So following
7 up on the topic, ACRS meetings, this is going to be
8 forever enshrined, you know, what page. I know that
9 we find it.

10 MR. DARBALI: Mm-hmm.

11 MEMBER MARCH-LEUBA: So you need to
12 consider making this part of a document --

13 MR. DARBALI: Right.

14 MEMBER MARCH-LEUBA: -- that's easier to
15 find. I don't think it raises to the level of NUREG-
16 KM, knowledge management.

17 MR. DARBALI: Right.

18 MEMBER MARCH-LEUBA: But someplace that it
19 can be found.

20 MR. DARBALI: Yes, yes.

21 MEMBER MARCH-LEUBA: We were talking this
22 morning about searching ADAMS.

23 MR. DARBALI: Mm-hmm.

24 MEMBER MARCH-LEUBA: Make it findable,
25 easy.

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1 MR. DARBALI: Yes.

2 MEMBER MARCH-LEUBA: Not just in ADAMS.

3 MR. PAIGE: So to that point, we've
4 actually had conversations on how to put this in a
5 more permanent location. We've also talked about
6 putting it on the NRC public website so that it is
7 available to everyone so we are having those
8 conversations.

9 MEMBER MARCH-LEUBA: I wanted --

10 MEMBER BROWN: One other question -- I'm
11 sorry. Go ahead.

12 MEMBER MARCH-LEUBA: I wanted to make a
13 point. I mean, there is something called NUREG-KM.
14 That's knowledge management. That for sure you can
15 always find it. And it doesn't need to be 150 pages.
16 It can be only 10.

17 MEMBER BROWN: On 22076, have you all had
18 any communications back or questions that you all have
19 been asked relative to that or is that just still off
20 in the ether somewhere in the commission space?

21 MR. DARBALI: I was going to say we did do
22 a briefing to the commissioner's assistants back in
23 January.

24 MEMBER BROWN: Okay. So there is some
25 action going on. It's not just dead on arrival.

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1 MR. DARBALI: Right.

2 MEMBER BROWN: Okay.

3 MR. DARBALI: And we did receive two
4 votes.

5 MEMBER BROWN: Oh, yeah. I remember
6 seeing two votes. They weren't real extensive.

7 MR. DARBALI: Right.

8 MEMBER BROWN: Okay. Thank you.

9 MR. DARBALI: Okay. And we appreciate the
10 comments on the slide. The team here and supporting
11 staff put a lot of work into this. And it was
12 gathering a lot of knowledge and digging through
13 documents. So it's going to be a very useful tool
14 also to staff. And we're also seeing how this can
15 help inspectors as well to be more efficient in their
16 inspections.

17 MEMBER BROWN: Well, the presentation --
18 I've been doing this for almost 15 years now come next
19 month in May. And this is the first time I've seen an
20 organized layout. I mean, I've kind of absorbed it by
21 osmosis as we went through all the processes, but
22 never in quite as crisp a manner. So I want to echo
23 Dennis' and Jose's comments.

24 MR. DARBALI: Thank you.

25 MEMBER BROWN: This is a -- I'm really

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1 glad you guys asked the question that NUREG Guide
2 1.152 needed. Very productive. So go ahead.

3 MR. DARBALI: Billy, do you have the file?
4 If you could click on the back button, and it will
5 take you again to the technical areas. So now we're
6 going to be looking at the criteria for safety system
7 for programmable digital devices technical area.

8 So this technical area covers those
9 digital specific licensing aspects that supplement the
10 criteria for safety systems, technical area. Again,
11 the applicable regulations and policy are on the left.
12 And they are mostly the same as in the previous slide.

13 The applicable Regulatory Guide that
14 covers this technical area is Reg. Guide 1.152,
15 Revision 3, which endorses the 2003 version of IEEE
16 7432. We've also identified here at Draft Guide 1374
17 for Revision 4 of Reg. Guide 1.152 to endorse the 2016
18 version of 7432.

19 As you know, IEEE 7432 supplements the
20 criteria of IEEE 603 with criteria specific to
21 computers or programmable digital devices. Because of
22 this, the clauses in 7432 parallel those clauses of
23 IEEE 603.

24 In the table in this slide, we're showing
25 the clauses within the latest revision of 7432, which

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1 is the 2016 version, that are applicable to this
2 technical area. This includes applying the single
3 failure criteria to programmable digital devices,
4 system integrity, communication independence, control
5 of access, reliability and common-cause failure.

6 The staff guidance for performing the
7 licensing interviews is found in Chapter 7 of the SRP,
8 most notably in BTP 7-17 for self-test and
9 diagnostics, BTP 7-19 for defense-in-depth and
10 diversity and BTP 7-21 for real-time performance of
11 digital systems.

12 In addition, ISG-04 provides guidance on
13 data communications. And this guidance, as Gilberto
14 mentioned, is now captured in the 2016 version of
15 7432.

16 And finally the ISG-06 sections for system
17 description, system architecture, applying a digital
18 INC topical report in compliance with IEEE 603 in
19 conformance to 7432 and the secure operational
20 environment aspect of STO.

21 MEMBER BROWN: How old is 7-21?

22 MR. DARBALI: I don't know how old 7-21
23 is. I would have to check.

24 MEMBER BROWN: I know there has been no
25 revisions to it since I have been here that I remember

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1 unless you all flagged one by me.

2 MR. DARBALI: Right. Okay.

3 MEMBER BROWN: Richard, do you know that?
4 Do you use 7-21?

5 MR. STATTEL: No.

6 MEMBER BROWN: Dinesh?

7 (Simultaneous speaking.)

8 MEMBER BROWN: That one is a golden oldie
9 of some kind because I haven't seen any changes in the
10 last 15 years.

11 MR. DARBALI: Okay.

12 MEMBER BROWN: Of course, I'm tending to
13 forget some of those so.

14 MR. DARBALI: So when you get that, just
15 let me know. Okay? So that's the criteria for safety
16 systems, programmable digital devices. If there are
17 no questions, I can move to the next technical area.

18 MEMBER HALNON: Yeah. I have a general
19 question. Just it doesn't apply necessarily
20 specifically to this one. But have you had a chance
21 to look at the Part 53? Does that plug in here, I
22 mean, complimentary or is it something you're going to
23 have to do extensive work beyond what you have here?

24 MR. DARBALI: Right. So since we don't
25 have a final Part 53, we did not look at that. But I

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1 think the regulatory guidance that you see here, a lot
2 of it really just ties back to IEEE 603.

3 MEMBER HALNON: It is required to be a
4 plug-in. It should almost, probably.

5 MR. DARBALI: Right. Licensees and
6 applicants will have an option to follow the
7 regulatory guidance to make their safety case.

8 MEMBER HALNON: But you don't have
9 anything on the docket list, punch list to write
10 something special for Part 53, the proposed language
11 yet?

12 MR. DARBALI: Not at this time.

13 MEMBER HALNON: Okay. Thanks.

14 MR. TANEJA: Well, you know, the DRG is
15 really following the LMP framework. So that is the
16 performance-based, risk-informed, you know,
17 architecture that it follows. So when the Part 53
18 rulemaking is finalized and if there are companion
19 guidance, I think DRG would be a good place for us to
20 get started with, you know? So we do have something
21 that's in line.

22 MEMBER HALNON: Thank you.

23 MR. DARBALI: Thank you. Okay. Now we're
24 going to the digital development and reliability
25 technical area.

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1 MR. PAIGE: Just some information, in 2016
2 it was revised, not that long ago.

3 (Simultaneous speaking.)

4 MEMBER BROWN: That's one of the
5 difficulties. I try to keep track. I would have to
6 go have somebody send that to me so I can -- can you
7 send a copy of that to Christina so she can get to --
8 you know, Christina, right? I'm sure.

9 MR. DARBALI: So going back to the digital
10 development and reliability technical area, so this
11 technical area covers the digital life cycle
12 activities that ensure the quality and reliability of
13 the digital system. This includes software
14 requirement specifications, verification and
15 validation, configuration management, software and
16 system test documentation and software unit testing.

17 In addition to the Regulatory Guides 1.168
18 through 1.173, we also note Reg. Guide 1.152 that
19 endorses the IEEE Standard 7432 because Clause 5.3 of
20 7432 provides additional guidance on software
21 development, software tool, independent V&V and
22 configuration management. We also note Clause 5.9 for
23 control of access, which is applicable to the
24 development environment.

25 And for the staff guidance, we include BTP

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1 7-14 on performing software reviews and ISG-06,
2 Section D.4 for system development under the ultimate
3 review process. Section D.9 for development under the
4 tier review process and Section D.8 for the secure
5 development aspect of STO.

6 We're now going to --

7 VICE CHAIR KIRCHNER: I have a question.
8 It's a cross-cutting question.

9 MR. DARBALI: Yes.

10 VICE CHAIR KIRCHNER: What is your
11 thinking on quality assurance? And specifically,
12 obviously for the existing fleet, Appendix B applies
13 and that essentially is NQA-1, ASME NQA-1.

14 Now a lot of this pre-supposes that in
15 this case that development is done under an NQA-1 like
16 quality program. I'm just looking ahead. 10 CFR 53,
17 the advanced reactors, well, right now, they are under
18 50 and 52 so that's the only licensing option going
19 ahead.

20 But how will you handle quality assurance
21 if an applicant proposes to use something that's not
22 NQA-1, and you basically have an architecture here of
23 regulatory guidance that is very structured to NQA-1
24 and IEEE standards? Any thoughts on that or is it
25 like Dinesh said that you go to your DRG framework for

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1 the review?

2 MR. DARBALI: The next technical area is
3 commercial dedication. So it just touch-up on that,
4 but I see Dinesh stood up.

5 MR. TANEJA: So far, I think everybody's
6 QA program is pretty much following the NQA-1, right?

7 VICE CHAIR KIRCHNER: Right.

8 MR. TANEJA: And NQA-1 basically has
9 guidance that points out to IEEE 7432, which for --
10 you know, I mean, it gives you the framework for the
11 software QA, but then the specifics get into the IEEE
12 standard, and it points to that. So the NQA-1 does
13 that.

14 And the only other thing that we are
15 seeing right now is that maybe the IEC standards that
16 are being used in lieu of IEEE standards for the
17 specific areas of configuration management, RV&V and
18 the life cycle development activities. So we are kind
19 of working on that to try to work with each applicant
20 as to, you know, what standards that they intend to
21 use.

22 VICE CHAIR KIRCHNER: Thank you.

23 MR. TANEJA: Yeah.

24 VICE CHAIR KIRCHNER: Thank you.

25 MR. DARBALI: Okay. Now we'll move on to

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1 the commercial grade dedication technical area. And
2 for this technical area, we note 10 CFR Part 21 under
3 the regulatory requirements.

4 So the regulatory guidance includes
5 generic guidance for commercial grade dedication, as
6 found in Reg. Guide 1.164, which points to the staff
7 evaluation of EPRI Reports 106439 and 107330 for the
8 dedication of digital equipment and programmable logic
9 controllers.

10 We also have the recently issued Reg.
11 Guide 1.250 for verifying an item's dependability
12 critical characteristics based on an accredited
13 certification. And finally, we're pointing here to
14 DG-1374 to endorse the 2016 version of IEEE 7432
15 because the 2016 version includes a Clause 5.17 on
16 commercial grade dedication.

17 And then the applicable staff guidance
18 includes, again, BTP 7-14 and ISG-06, Section D.99,
19 for commercial grade dedication under the TR review
20 process.

21 With that, we'll move back to the next
22 technical area, which is equipment qualification. For
23 this technical area, we note under the regulatory
24 requirements 5049. And the regulatory guidance
25 includes generic guidance for equipment qualification

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1 as found in Reg. Guide 1.89, which is currently being
2 revised under DG-1361.

3 The digital specific guidance is found in
4 Reg. Guide 1.209, Reg. Guide 1.100, that endorses
5 three standards for seismic qualification, Reg. Guide
6 1.180, that endorses eight standards for
7 electromagnetic interference and radiofrequency
8 interference, and also Reg. Guide 1.152 because IEEE
9 Standard 7432 contains Clause 5.4 on equipment
10 qualifications. And then the applicable staff
11 guidance includes ISG-06, Section D.3, on hardware
12 equipment qualification.

13 If there are no questions, we'll go to the
14 next technical area, which is accident monitoring
15 communication. And for this technical area, we note
16 under the regulatory requirements 50.34(f)-2019, for
17 the TMI related requirements and 51.55(e) for spent
18 fuel pool monitoring.

19 The applicable regulatory guidance is in
20 Reg. Guide 1.97. That endorses IEEE Standard 497.
21 And for the staff review guidance, we note BTP 7-10
22 for guidance on applying Reg. Guide 1.97.

23 MEMBER BROWN: This is largely the PAM,
24 isn't it?

25 MR. DARBALI: Yes, PAMs, correct. And

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1 we'll go now to the next technical area, which is set
2 point establishment and maintenance. For this
3 technical area, we note under the regulatory
4 requirements of BT-36(c)(1)(ii)(A) and the regulatory
5 guidance is in Reg. Guide 1.105 that endorses ANSI
6 ISA-670401.

7 And the staff review guidance includes BTP
8 7-12 on establishing and maintaining instrument set
9 points and also Section D.7 of ISG.

10 The last INC technical area is instrument
11 sensing lines. And for this technical area we note
12 under regulatory requirements 50.36(c)(2)(ii) because
13 it addresses install instrumentation used to detect
14 and indicating the control room a significant and
15 normal degradation of the reactor coolant pressure
16 boundary.

17 The regulatory guidance for this technical
18 area is in Reg. Guide 1.151, which endorses two
19 standards. And we don't have any specific staff
20 review guidance for this technical area other than the
21 generic Chapter 7 review guides.

22 So that completes the eight INC technical
23 areas. And now we'll move to the cyber security
24 technical area. And we note here under the regulatory
25 requirements, the operating license under Part 50 and

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1 the combined operating license under Part 52, which
2 require that a cyber security control program be
3 placed at the time the plant begins operations.

4 We also note Part 73, regulatory
5 requirements, 73.1, is the purpose and scope of Part
6 73, 73.54, commonly known as the cyber security rule
7 or the cyber rule, requires operating reactor
8 licensees and applicants to ensure that digital
9 computer and communication systems associated within
10 a power plant safety, security and emergency
11 preparedness functions are protected from cyber-
12 attacks up to and including the design basis threat.
13 And 73.77 for reporting of cyber security event
14 notifications.

15 The applicable guidance for implementing
16 the requirements of 73.54 is in Reg. Guide 571, and
17 the applicable guidance for implementing the
18 requirements of 73.77 is in Reg. Guide 583. And the
19 staff guidance for evaluating an applicant's cyber
20 security plan to meet the requirements of 73.54 is
21 documented in Section 1366 of the SRP.

22 The scope of the staff's review in this
23 area is programmatic as part of the overall conduct of
24 operations assessment.

25 MEMBER HALNON: Samir, I expected to see

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1 the 5.71 or something from the NEI document that most
2 applicants -- or not applicants, but operating
3 reactors are to. And also it seems like the
4 inspection program drove the requirements for a while
5 because they were learning through these steps. Has
6 all that learning been incorporated in the 800 now of
7 the SRP?

8 MR. DARBALI: I don't know about if it's
9 being incorporated into the SRP. I do know 5.71 was
10 recently revised so a lot of lessons learned from the
11 earlier inspections after being there.

12 MEMBER HALNON: Yeah. We reviewed that.
13 We came away a little bit on the empty side from the
14 standpoint that nobody is using it.

15 MR. DARBALI: Okay.

16 MEMBER HALNON: Again, that's the existing
17 ones. The new applicants probably. At least that's
18 out there that they can see it.

19 MR. DARBALI: Right.

20 MEMBER HALNON: But NEI, I think it's 04-
21 04 or something like that is --

22 MR. DARBALI: Right. Also NEI 13-10, I
23 think all of those are reviewed by letters rather than
24 endorsed by Reg. Guides. So that's why they are not
25 included here. I believe there is going to be a cyber

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1 security meeting on May 17.

2 MEMBER HALNON: Right.

3 MR. DARBALI: So maybe that's --

4 (Simultaneous speaking.)

5 MEMBER HALNON: That's going to be less
6 geared toward what the operating plants are doing and
7 more geared toward the interagency coordination that
8 we're having. But I guess I expected to see almost
9 more of a spaghetti mess on this one than any of the
10 other ones.

11 MR. DARBALI: Okay. Okay.

12 MR. YIP: This is Brian Yip from the cyber
13 security branch. I could jump in and address a little
14 bit of that. So in Reg. Guide 5.71, Revision 1, we
15 did add some language approving NEI 10-04 and NEI 13-
16 10 for use.

17 We are undertaking the initial stages of
18 an effort now to revise -- well, the industry is
19 working on revising NEI 8-09 to Revision 7. So we are
20 in the beginning stages of engaging with the industry
21 on that.

22 And we are also in the beginning stages,
23 now that we have 5.71, Revision 1, completed, we are
24 in the initial stages of looking at the standard
25 review plan for cyber security to see whether or not

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1 it needs to be updated.

2 MEMBER HALNON: Okay. So we're still
3 catching up on all the last decade of learnings in the
4 cyber area. Is that fair?

5 MR. YIP: Yeah, I think --

6 MEMBER HALNON: When I say catching up, I
7 mean, updating the official document. The stuff is
8 out there. It's just not all collated into one area
9 yet.

10 MR. YIP: Yeah. That's correct.

11 MEMBER HALNON: Thanks.

12 MR. DARBALI: Thank you, Brian. So if
13 there aren't any other questions, that concludes our
14 tour of the nine technical areas of the INC regulatory
15 infrastructures. And so I'll turn it over to Jason
16 for the next slide.

17 MR. PAIGE: Thank you. So we also wanted
18 to provide a look ahead to some things that we are
19 prioritizing to continue to implement revision for
20 modernizing the INC infrastructure as communicated in
21 SECY-19-0112.

22 So in general, our vision includes
23 modernizing guidance to enable the expanded safety use
24 of digital INC, strategic updates to Reg. Guides to
25 endorse the latest standard and reducing the

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1 complexity of our infrastructure by consolidating
2 and/or closing out interim guidance.

3 And so this slide provides the specific
4 activities that we're focusing on. So the first one
5 is the modernization of Chapter 7, which we briefly
6 talked about during today's meeting in reference --
7 you know, we presented our plans for modernizing
8 Chapter 7 during the September 2021 ACRS meeting.

9 Second, update digital development and
10 reliability guidance to endorse the latest IEEE
11 Standard 1012. Third --

12 MEMBER BROWN: Before you go, 1.68, the
13 last we reviewed that a long time ago, 68, 69, 70, 71,
14 72 and 73. They're all kind of tied together. They
15 seem to be kind of tied together in terms of this
16 particular, the whole task that you're looking for
17 software stuff. Is that going to entail then of a
18 trickle down of changes to the rest or is this just
19 isolated to the basic --

20 (Simultaneous speaking.)

21 MR. PAIGE: So we're trying to take a
22 strategic approach. So I think our first step is to
23 update the Reg. Guide 1.68 and then we will look into
24 consolidating those Reg. Guides and taking those
25 steps.

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1 MEMBER BROWN: So there is a little more
2 in the bag possibly depending on what you see with
3 1.68?

4 MR. PAIGE: Do you want to add anything,
5 Rich?

6 MR. STATTEL: So I would just add --
7 pardon? Oh, this is Richard Stattel. I would just
8 add, so we are prioritizing as far as which Reg.
9 Guides we are going after for revision. And 1.68 is
10 of particular interest to us because there have been
11 like three revisions to the IEEE standard and so there
12 is significant change in the V&V activities that are
13 being used by the industry. And this is not just the
14 nuclear industry. This is all of the computer
15 industry.

16 And what we're looking for in this Reg.
17 Guide in particular is we're revisiting and refocusing
18 on what our position is because the IEEE standard is
19 intended to be a graded approach to V&V. In other
20 words, you do the amount of V&V activities that are
21 appropriate for the type of software that is being
22 developed. And our Reg. Guide kind of goes counter to
23 that by forcing all safety-related software to be a
24 particular grade.

25 So we're kind of refocusing on that and

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1 revisiting the actual regulatory position on that one.

2 MEMBER BROWN: Does that apply to FPGA
3 type software?

4 MR. STATTEL: Yes.

5 MEMBER BROWN: So it applies, and it's not
6 -- okay.

7 MR. STATTEL: Absolutely.

8 (Simultaneous speaking.)

9 MEMBER BROWN: -- it covers the whole panel
10 of --

11 MR. STATTEL: That's correct. A lot of
12 the early guidance was written with a lot of software
13 verbiage, written for the computer or PLC industry.
14 And what we've learned over the years is these other
15 technologies, like FPGAs and complex logic devices,
16 it's equally applicable, right?

17 So the guidance, the terminology we're
18 trying -- as these IEEE standards are developed, we're
19 trying to go to more generic terminology that can be
20 applied to the different technologies that are being
21 implemented.

22 MEMBER BROWN: Thank you.

23 MR. PAIGE: So continuing on with the
24 third bullet. So with the issuance of Reg. Guide
25 1.52, we will take the necessary steps to sunset ISG-

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1 04.

2 The fourth bullet, when we receive
3 commission direction, we will follow that direction by
4 regarding SECY-22-0076. And lastly, we are discussing
5 internally a path forward for industry's use for IEEE
6 Standard 603-2018. As you are aware, the 1991 version
7 is IBR'd so we're discussing to determine how --

8 MEMBER BROWN: It's what?

9 MR. PAIGE: IBR'd, oh, incorporation by
10 reference.

11 MEMBER BROWN: Oh, yeah.

12 MR. PAIGE: Sorry. A path for industry to
13 use the latest version. So these are the items --

14 MEMBER BROWN: Does that mean a rule
15 change?

16 MR. PAIGE: So we're still discussing
17 internally. That's one of the options that we are
18 considering.

19 MEMBER BROWN: That's one of the -- that's
20 kind of an anchor. 603-1991 is an anchor, a strong
21 anchor relative to the general framework we've been
22 talking about. It touches all of those even though it
23 only covered physical access on the control of access.
24 All of the rest of the stuff in there meets -- not
25 necessarily the deterministic versus interrupt driven

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1 software for microprocessors and stuff. But we tried
2 to cover that with time response type looking.

3 But that is one heck of an anchor to keep
4 all this stuff focused so that people don't go flying
5 off the deep end with I'll do what I want to when I
6 want to do it type of approach. So I'm just
7 cautioning some carefulness that we don't throw babies
8 out with the bath water here when we go to 603-2018.

9 The general progression of IEEE standards
10 that I've seen seems to be pablumizing some of the
11 good stuff in 603. You know, they're putting some
12 mush words in. So I just hate to lose that anchor.

13 We still use it thoughtfully. It's not
14 like we're going to go stick a knife in our heart just
15 because the rule says to do that. But it is an anchor
16 for a starting point. So just keep that in mind.

17 MR. PAIGE: Okay. Thank you. And so with
18 that, that concludes our presentation. Any additional
19 questions?

20 CHAIR REMPE: So full of thoughts. I also
21 thought this was a great way to organize things. And
22 actually I'm watching it and knowing your plans for
23 changes, I think your website, again, it's just one
24 member's comment is a good place to do this because it
25 reminds me of some of the guidance for advanced

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1 reactors where things are changing. And so this will
2 allow you to make changes and people know to go to the
3 latest version. So I think you are taking a wise path
4 but that's my opinion.

5 The other thing I'm thinking about is this
6 was a good way to organize it, and I think maybe it
7 was motivated by our request that you might not have
8 done it without it. And I'm seeing some heads shaking
9 up and down.

10 And I think in light of that, it's an
11 information briefing. But in our monthly meeting
12 summary, I'm not suggesting a letter here, but a
13 couple of paragraphs saying we had this meeting, and
14 the members agreed that it was a great way to organize
15 it.

16 And I think it would be a good idea. And
17 that's one member's suggestion to try and make Member
18 Brown do a little work. And we could even take a soft
19 vote. But it's a couple of paragraphs, Charlie, but
20 I think, it's a good thing to acknowledge it.

21 (Simultaneous speaking.)

22 MEMBER BROWN: -- four or five weeks
23 because I have forgotten enough of it that I can't
24 repeat it very well.

25 CHAIR REMPE: Well, anyway I think we

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1 ought to acknowledge it.

2 MEMBER MARCH-LEUBA: Charlie, you can
3 delegate it to Christina.

4 CHAIR REMPE: And then have you review it,
5 of course.

6 MEMBER MARCH-LEUBA: Do you want me to ask
7 ChatGPT to write it for you?

8 MEMBER BROWN: I'm glad you all did that.
9 Christina worked with you all, I think, closely. She
10 did an excellent job, I thought, coordinating with the
11 staff. We went through several iterations in terms of
12 developing clarity.

13 I mean, you all had the framework there,
14 but there were a lot of -- I know I got emails, and we
15 had some back and forths. And I said charge. So I
16 really appreciate Christina's efforts on this and your
17 all's non-reluctance to work with, to take some
18 feedback from us as you developed this.

19 I knew it was very important relative to
20 some of the comments from the members to get a good
21 clear view of how all this tangled web of Reg. Guides
22 and everything. This certainly is a real compliment
23 coming from me, and I think you've heard that from
24 other committee members also, that this really
25 untangles that web very, very well.

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1 MEMBER HALNON: Yeah, I would go one step
2 further and say, you know, we've had a couple of
3 presentations of roadmaps. And this one has been the
4 best organized and easiest to get through. So I would
5 suggest holding this up, at least from my opinion, as
6 a model for the future.

7 It seems like hyperlinks are fairly simple
8 technology, and they're just pictures, right, but they
9 really drive you where you need to go.

10 MEMBER BROWN: Any other members have any
11 other comments?

12 CHAIR REMPE: I want to push the issue.
13 I think it ought to be acknowledged in our meeting
14 somehow.

15 MEMBER BROWN: Do any of the members other
16 than Joy have any other comments?

17 MEMBER HALNON: Seconded. I second.

18 VICE CHAIR KIRCHNER: Just well done. It
19 answers --

20 MEMBER HALNON: I third it then.

21 MEMBER BROWN: Third what?

22 MEMBER HALNON: Joy's comment. I second
23 Dave's second.

24 CHAIR REMPE: Again, not a letter. If you
25 wanted more, we could do more. But I think --

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1 MEMBER BROWN: No, we couldn't.

2 CHAIR REMPE: -- it's something you could
3 point to also if you need anything to say, hey, you
4 know, the ACRS is pleased we did this and stuff like
5 that.

6 MR. BENNER: This is Eric Benner. Chair
7 Rempe, Member Brown and all members, we do appreciate
8 the prodding. We had pieces of this to close out the
9 creative action plan we did. We did have an action
10 there of a strategic look of sort of how this was put
11 together so we had piece parts.

12 And I really want to thank Gilberto
13 because he's just been with us for months, and Jason
14 said, hey, I'm going to have Gilberto do this because
15 if he can understand it, and he said -- I'm not going
16 to say what he said.

17 And we said that's a great, great idea.
18 And a lot of people got together. But we saw the
19 benefit of -- I just half jokingly said we have people
20 presenting who are going to be the people doing this
21 work for the next couple of decades, but it was just
22 half joking because they need to understand this
23 moving forward. And what the members have pointed out
24 is the applicant, typically new applicants, have to
25 understand it too.

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1 So we're going to leverage it. We are
2 going to leverage this in multiple workshops with the
3 advanced reactors. There we will make it readily
4 accessible. So we appreciate, you know, the committee
5 prodding us to get this done. Because now that we've
6 got it done, we're seeing all kinds of ways we're
7 going to be able to use it so.

8 MEMBER BROWN: I would also suggest that
9 you -- I know you all -- BDO's overall operation and
10 its presence, it does brief the commission on stuff.
11 This is a complicated area that is controversial and
12 has been in terms of how it's executed.

13 And this would provide, I think, a pretty
14 valuable short briefing in whatever time it is. But
15 I think this didn't take long at all. It took longer
16 because of the Q&A that we had. This was largely
17 about a half an hour presentation if you don't have
18 any questions. And I think it would be useful for the
19 commissioners to know that there has been real
20 progress on doing this.

21 I mean, it's obviously up to your all
22 bosses, but that's another thought process.

23 MR. BENNER: Yeah. One of the uses I was
24 going to do, we occasionally brief our senior
25 management on just interesting topics. And I was

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1 going to suggest this as a topic. And in that
2 briefing, we can talk about it going further.

3 MEMBER BROWN: That's fine. Did you have
4 something else, Greg? You look like you were about to
5 say something.

6 MEMBER HALNON: I was just going to say
7 you're writing your paragraph.

8 MEMBER BROWN: I will never remember what
9 I just said.

10 CHAIR REMPE: Eric is giving us good input
11 for that paragraph is what I would say.

12 MEMBER BROWN: Do you want to write a
13 paragraph for me?

14 MR. BENNER: I'll happily draft a
15 paragraph for you.

16 (Simultaneous speaking.)

17 MEMBER BROWN: I'll see if I can jumble
18 together a few coherent words. But you know anytime
19 I start doing this, you know how it gets. You have to
20 have background, facts, discussion.

21 CHAIR REMPE: A summary paragraph. We can
22 give you something Ron has done.

23 MEMBER BROWN: It will only be 200 or 300
24 lines long.

25 CHAIR REMPE: Okay. But anyway, I think

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1 it ought to be done is all I'm saying. And it might
2 help in the future. Thank you very much though for
3 coming.

4 MEMBER BROWN: Okay. Again, thank you all
5 very much. And with that, any public comment? Can we
6 go out to public comment if there is anybody on the
7 phone lines that would like to provide an observation
8 or comment, this is your opportunity.

9 CHAIR REMPE: I would add, if you're on
10 the phone, sometimes you have to press star 6 to
11 unmute yourself.

12 MEMBER BROWN: Not hearing anything, I
13 will pass it back to the chairman.

14 CHAIR REMPE: Okay. So at this point,
15 we're going to go off the record. And, again, thank
16 you for coming in. And why don't we take a 15 minute
17 break and then let's come back. I'm going to ask
18 Member Ballinger to go first with his presentation
19 because I have not had time to -- against the last two
20 slides of mine. Is that okay? Okay. Go for it.
21 Let's come back then at 2:30.

22 (Whereupon, the above-entitled matter went
23 off the record at 2:16 p.m.)

24

25



NRC Instrumentation and Controls (I&C) Regulatory Infrastructure for Reactors

**Advisory Committee on Reactor Safeguards (ACRS)
Full Committee Informational Briefing
April 5, 2023**

Presentation Outline

- Purpose & Objectives
- Background
- Accomplishments
- Overview: NRC I&C Licensing Infrastructure
- Overview: NRC I&C Staff Review Guidance
- I&C Regulatory Infrastructure Technical Areas
 - Mapping between regulations and guidance
- Look Ahead
- Closing Remarks

Purpose & Objectives

- **Brief the Advisory Committee on Reactor Safeguards (ACRS) on the NRC's I&C regulatory infrastructure mapping connecting the regulatory requirements with applicable guidance**
 - Familiarize the ACRS with the NRC's I&C regulatory infrastructure
 - Communicate the staff's efforts to continue to modernize and improve clarity of the I&C regulatory infrastructure
 - Communicate the interrelationships between the I&C requirements, guidance, and industry standards

Background

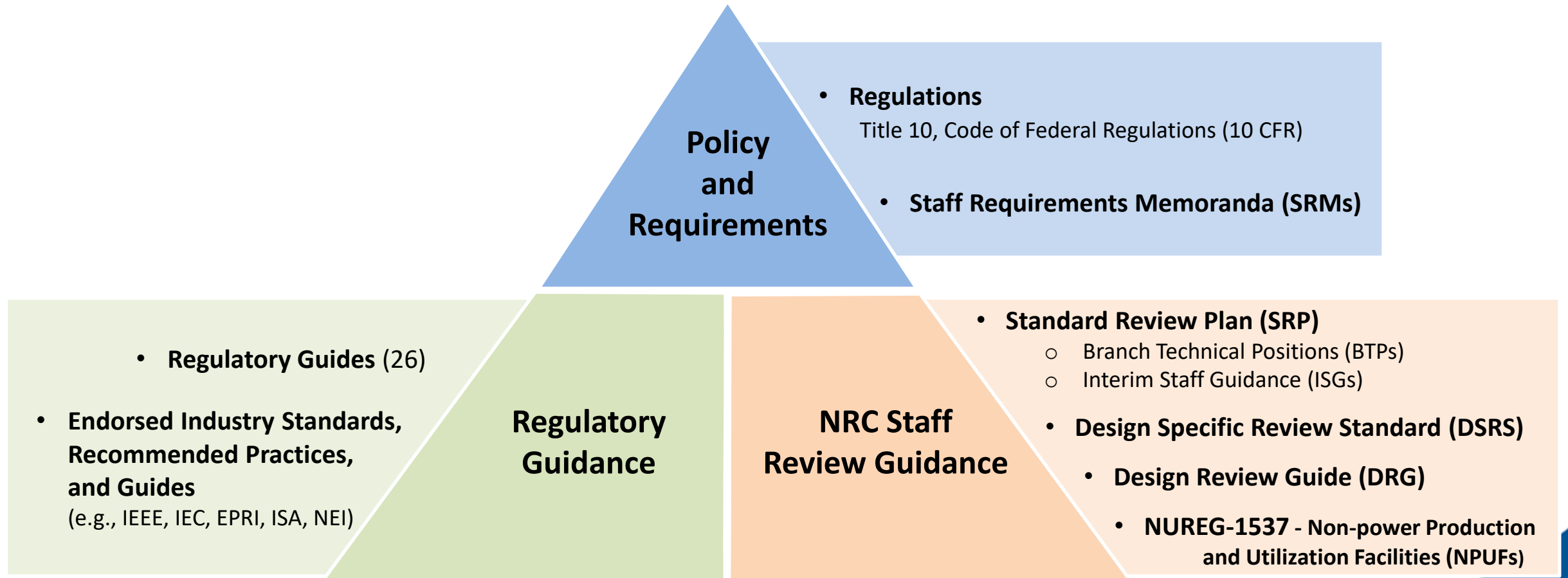
- The Commission issued SRM-SECY-15-0106 (February 25, 2016)
 - Directed the staff to develop an integrated strategy to modernize the NRC's I&C regulatory infrastructure
- The Commission issued SRM-SECY-16-0070 (October 25, 2016)
 - Approved the implementation of the staff's Integrated Action Plan (IAP) to modernize the NRC's I&C regulatory infrastructure
- The staff issued SECY-19-0112 (November 2019)
 - Vision for modernized I&C regulatory infrastructure with reduced uncertainty that enables the expanded safe use of digital I&C
- The staff is currently implementing the vision

Accomplishments Since Sept. 2021 ACRS Briefing on Digital I&C (DI&C) Infrastructure and Licensing Activities

- Issued guidance for verifying a DI&C item's dependability critical characteristics based on an accredited certification during the dedicating process
 - Issued RG 1.250, Rev. 0: Endorses NEI 17-06 on Commercial Grade Dedication
- Issued SECY-22-0076 to expand the DI&C common-cause failure policy
- Issued DG-1374 (RG 1.152, Rev. 4) to endorse IEEE Std 7-4.3.2-2016
- Held industry workshops on the I&C licensing framework for advanced reactors

See [SECY-21-0091](#) and [SECY-22-0095](#) for staff's annual updates to the Commission

Overview: NRC I&C Licensing Infrastructure



Overview: NRC I&C Staff Review Guidance

NRC Staff Review Guidance

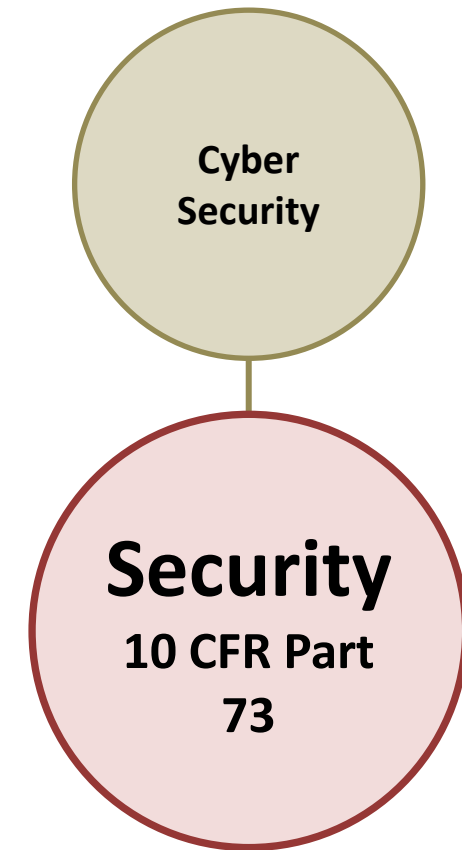
- **Standard Review Plan (SRP)**
 - Branch Technical Positions (BTPs)
 - Interim Staff Guidance (ISGs)
- **Design Specific Review Standard (DSRS)**
 - **Design Review Guide (DRG)**
 - **NUREG-1537 - Non-power Production and Utilization Facilities (NPUFs)**

Document	Description
SRP Chapter 7, BTPs, ISGs	Licensing review guidance for Light Water Reactors (LWR)
DSRS Chapter 7	Design specific review standard (e.g., NuScale)
DRG	Generic licensing review guidance for non-LWR reactors
NUREG-1537	Licensing review guidance for NPUFs

Overview: I&C Licensing Review Guidance

Staff Review Documents	Description
Standard Review Plan – Chapter 7 (Instrumentation and Controls)	Chapter 7 of the SRP provides guidance for review of the I&C portions of: (1) applications for nuclear reactor licenses or permits and (2) amendments to existing licenses
Branch Technical Positions (contained within Chapter 7)	The BTPs represent guidelines intended to supplement the acceptance criteria established in regulations and the guidelines provided in regulatory guides and applicable industry standards
DI&C Interim Staff Guidance (supplemental information to Chapter 7)	ISGs are often used to clarify or expand on guidance found in standard review plans or regulatory guides, and facilitate the resolution of technical or licensing issues within established regulatory processes

I&C Regulatory Infrastructure Technical Areas



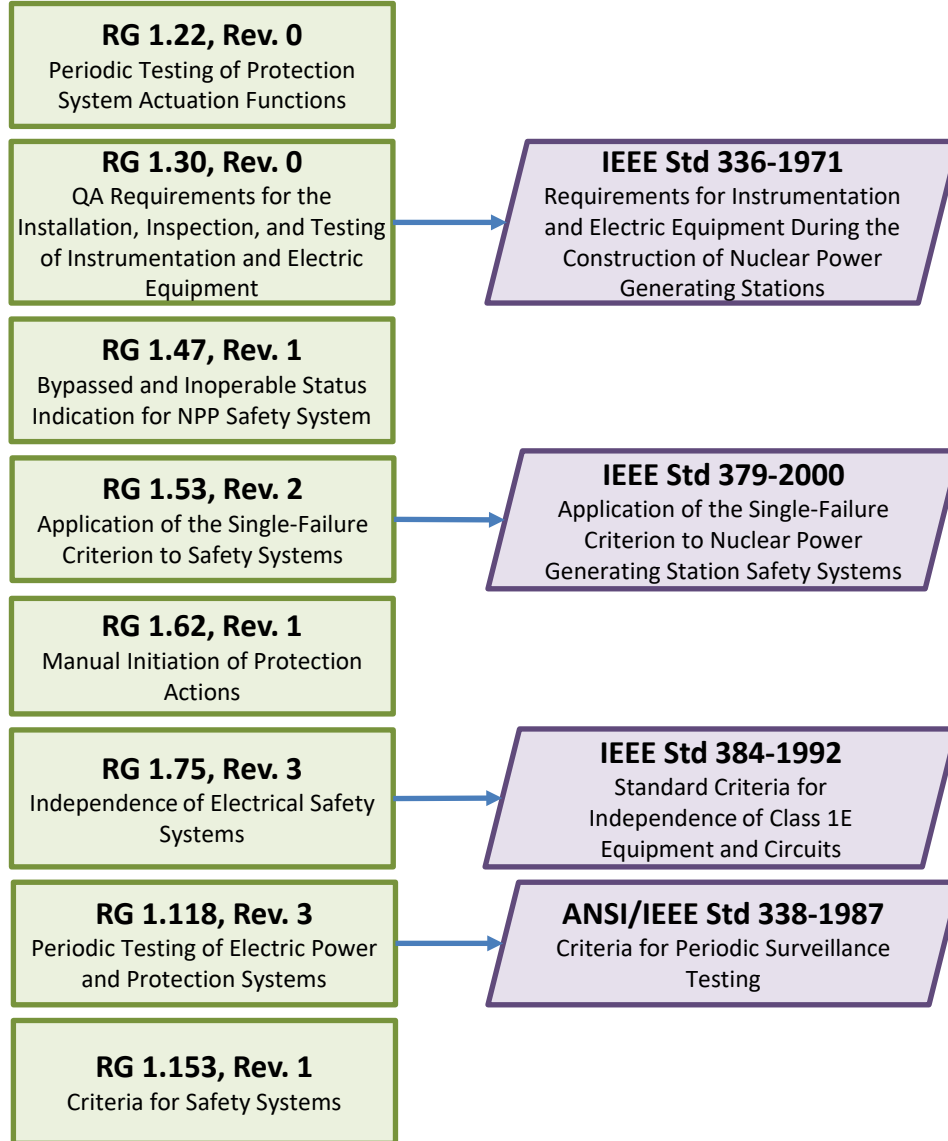
Criteria for Safety Systems

Regulatory Requirements & Policy

Criteria for Safety Systems

- 10 CFR Part 50**
Construction Permit (CP),
Operating License (OL)
- 10 CFR Part 52**
Design Certification (DC),
Combined Operating
License (COL), Standard
Design Approval (SDA),
Manufacturing License (ML)
- 10 CFR Part 50,
Appendix A**
General Design Criteria
1,2,4,13,19,
20,21,22,24,25,29,34
- 10 CFR Part 50,
Appendix B**
Quality Assurance Criteria
- 50.55a(h)**
IEEE Std 603-1991
IEEE Std 279-1971
- SRM-SECY-93-087 ***
Item 18

Regulatory Guidance



Staff Guidance

- NUREG-0800**
Standard Review Plan, Chapter 7 – I&C
7.1 – Introduction,
7.2 - Reactor Trip System,
7.3 - Engineered Safety Features Systems,
7.4 - Safe Shutdown Systems,
7.5 - Information Systems Important to Safety,
7.6 - Interlock Systems Important to Safety,
7.7 - Control Systems,
7.8 - Diverse Instrumentation and Control
Systems,
7.9 - Data Communication Systems
- BTP 7-8**
Guidance for Application of
Regulatory Guide 1.22
- BTP 7-19 ***
Guidance for Evaluation of Diversity and
Defense-in-Depth in Digital Computer-
Based I&C Systems
- ISG-06 ***
Licensing Process
(D.1 – System Description,
D.2 – System Architecture,
D.6 – IEEE Std 603/IEEE Std 7-4.3.2
Compliance/Conformance)

*Digital-Specific

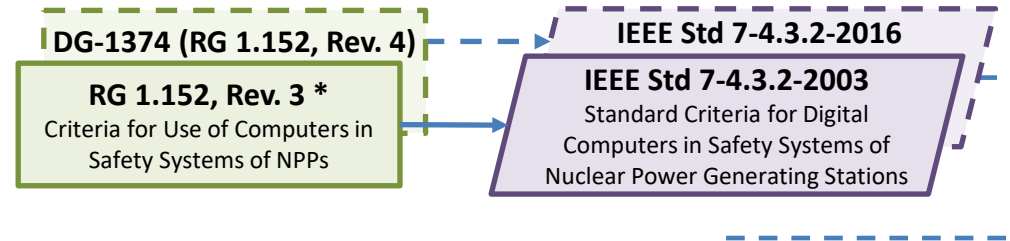
Criteria for Safety System Programmable Digital Devices

Criteria for Safety System Programmable Digital Devices

Regulatory Requirements & Policy

- 10 CFR Part 50
CP, OL
- 10 CFR Part 52
DC, COL, SDA, ML
- 10 CFR Part 50,
Appendix A
General Design Criteria
21
- 10 CFR Part 50,
Appendix B
Quality Assurance
Criteria
- 50.55a(h)
IEEE Std 603-1991
IEEE Std 279-1971
- SRM-SECY-93-087 *
Item 18

Regulatory Guidance



Applicable IEEE Std 7-4.3.2-2016 Clauses	
5.1	Single-Failure Criterion
5.5	System Integrity
5.5.1	Design for PDD Integrity
5.5.2	Design for Test and Calibration
5.5.3	Fault Detection and Self-Diagnostics
5.5.4	Prioritization of Functions
5.6	Independence
5.7	Capability for Testing and Calibration
5.8	Information Displays
5.9	Control of Access
5.11	Identification
5.15	Reliability
5.16	Common Cause Failure Criteria
5.18	Simplicity

Staff Guidance

- NUREG-0800
Standard Review Plan, Chapter 7
- BTP 7-17 *
Guidance on Self-Test and Surveillance
Test Provisions
- BTP 7-19 *
Guidance for Evaluation of Diversity
and Defense-in-Depth in Digital
Computer-Based I&C Systems
- BTP 7-21 *
Guidance on Digital Computer
Real-Time Performance
- ISG-04 *
Highly-Integrated
Control Room Communications
- ISG-06 *
Licensing Process
(D.1 – System Description,
D.2 – System Architecture,
D.5 – Applying a Topical Report,
D.6 – IEEE Std 603/IEEE Std 7-4.3.2
Compliance/Conformance,
D.8 – SDOE)

*Digital-Specific

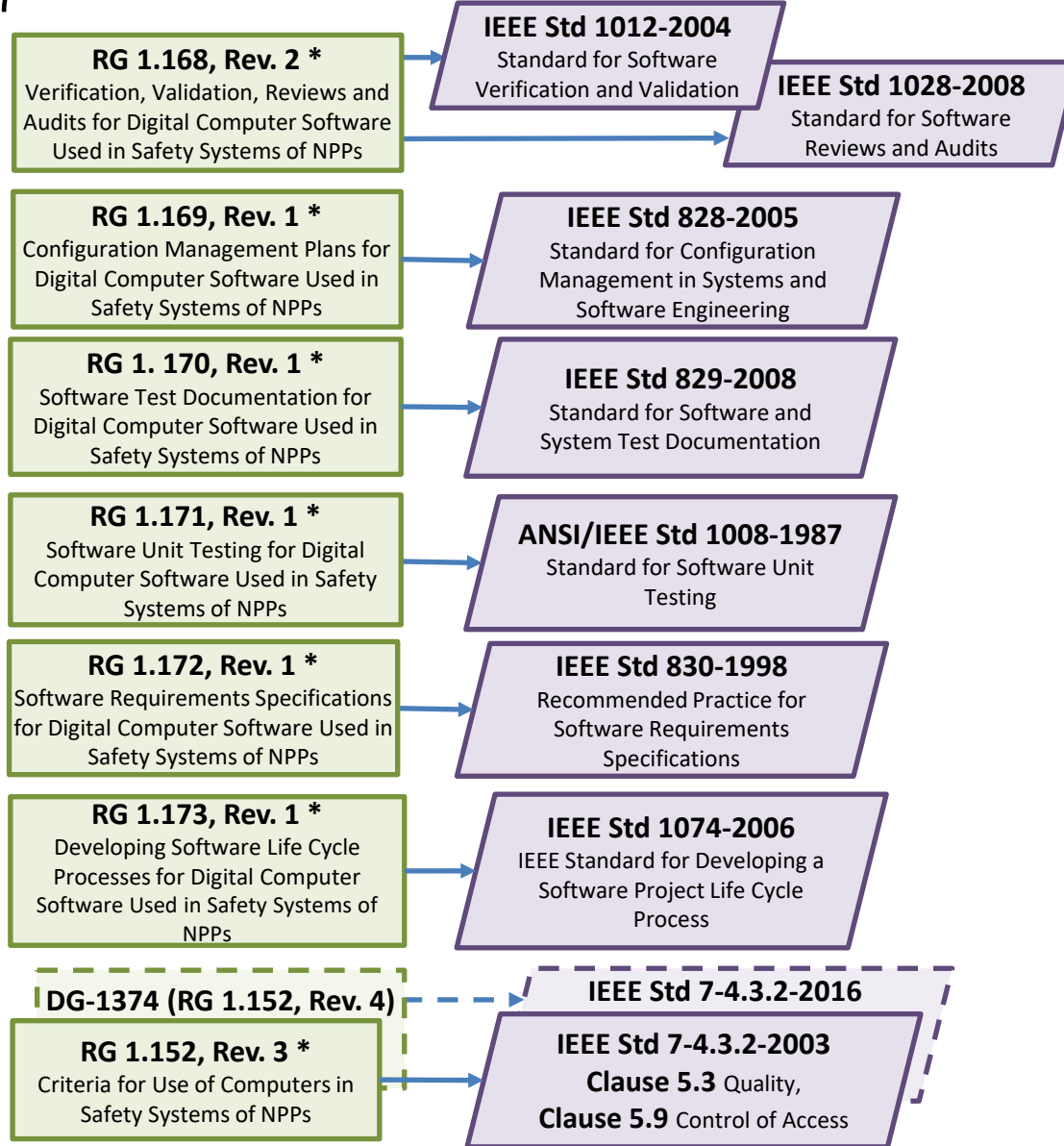
Digital Development and Reliability

Digital Development and Reliability

Regulatory Requirements

- 10 CFR Part 50
CP, OL
- 10 CFR Part 52
DC, COL, SDA, ML
- 10 CFR Part 50, Appendix A
General Design Criteria 1, 21
- 10 CFR Part 50, Appendix B
Quality Assurance Criteria
- 50.55a(h)
IEEE Std 603-1991
IEEE Std 279-1971

Regulatory Guidance



Staff Guidance

- NUREG-0800**
Standard Review Plan, Chapter 7
- BTP 7-14 ***
Guidance on Software Reviews for Digital Computer-Based I&C Systems
- ISG-06 ***
Licensing Process (D.4 – Digital I&C System Development Processes, D.8 – SDOE, D.9 – Other Review Guidance for Tier 1, 2, and 3 Reviews)

*Digital-Specific

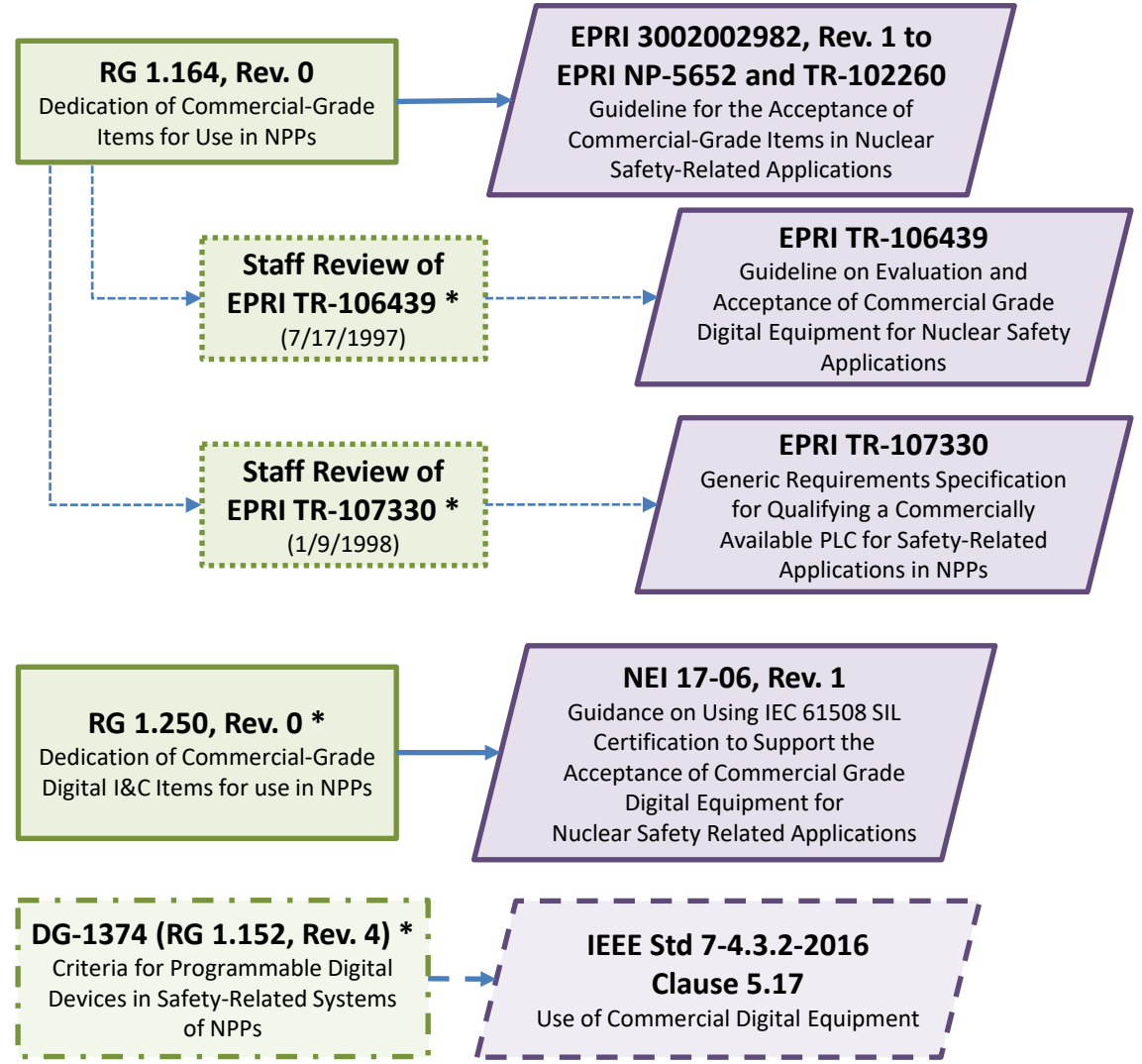
Commercial Grade Dedication

Commercial Grade Dedication

Regulatory Requirements

- 10 CFR Part 21**
Reporting of Defects and Noncompliance
- 10 CFR Part 50**
CP, OL
- 10 CFR Part 52**
DC, COL, SDA, ML
- 10 CFR Part 50, Appendix A**
General Design Criteria 21
- 10 CFR Part 50, Appendix B**
Quality Assurance Criteria
- 50.55a(h)**
IEEE Std 603-1991
IEEE Std 279-1971

Regulatory Guidance



Staff Guidance

- NUREG-0800**
Standard Review Plan, Chapter 7
- BTP 7-14 ***
Guidance for Software Review for Digital Computer-Based Instrumentation and Control Systems
- ISG-06 ***
Licensing Process (D.9.9 – Commercial-Grade Dedication of Digital Equipment)

*Digital-Specific

Equipment Qualification

Equipment Qualification

Regulatory Requirements

10 CFR Part 50
CP, OL

10 CFR Part 52
DC, COL, SDA, ML

10 CFR Part 50, Appendix A
General Design Criteria
1,2,4,13,21,23

50.49
Environmental Qualification of Electric Equipment Important to Safety for NPPs

50.55a(h)
IEEE Std 603-1991
IEEE Std 279-1971

Regulatory Guidance

DG-1361 (RG 1.89, Rev. 2)

RG 1.89, Rev. 1

Environmental Qualification of Certain Electric Equipment Important to Safety for NPPs

RG 1.209, Rev. 0 *
Guidelines for EQ of Safety-Related Computer-Based I&C Systems in NPPs

RG 1.100, Rev. 4

Seismic Qualification of Electric and Mechanical Equipment for NPPs

RG 1.180, Rev. 2

Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related I&C Systems

DG-1374 (RG 1.152, Rev. 4)

RG 1.152, Rev. 3 *
Criteria for Use of Computers in Safety Systems of NPPs

IEC/IEEE Std 60780/323-2016

IEEE Std 323-1974

Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations

IEEE Std 323-2003

Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations

IEEE Std 344-2013

Standard for Seismic Qualification of Equipment

IEEE Std C37.98-2013

Seismic Qual. Testing of Protective Relays and Auxiliaries

ASME QME-1-2017

Qualification of Active Mechanical Equipment

IEEE Std 1050-2004

MIL-STD-461G

IEEE Std C62.45-2002

IEC 61000-3

IEEE Std C62.41.1-2002

IEC 61000-4

IEEE Std C62.41.2-2002

IEC 61000-6

IEEE Std 7-4.3.2-2016

IEEE Std 7-4.3.2-2003, Clause 5.4
Equipment Qualification

Staff Guidance

NUREG-0800
Standard Review Plan,
Chapter 7

ISG-06 *
Licensing Process
(D.3 – Hardware
Equipment Qualification)

*Digital-Specific

Accident Monitoring Instrumentation

Accident Monitoring Instrumentation

Regulatory Requirements & Orders

- 10 CFR Part 50
CP, OL
- 10 CFR Part 52
DC, COL, SDA, ML
- 10 CFR Part 50, Appendix A
General Design Criteria 19
- 10 CFR 50.34(f)(2)(xix)
Additional TMI-related Requirements
- 10 CFR 50.155(e)
Spent Fuel Pool Monitoring

Regulatory Guidance

RG 1.97, Rev. 5
Criteria for Accident Monitoring Instrumentation for NPPs

IEEE Std 497-2016
Standard Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations

Staff Guidance

- NUREG-0800**
Standard Review Plan, Chapter 7
- BTP 7-10**
Guidance on Application of Regulatory Guide 1.97

Setpoint Establishment and Maintenance

Regulatory Guidance

Regulatory Requirements

10 CFR Part 50
CP, OL

10 CFR Part 52
DC, COL, SDA, ML

10 CFR Part 50, Appendix A
General Design Criteria
13, 20

10 CFR 50.36(c)(1)(ii)(A)
Technical Specifications

50.55a(h)
IEEE Std 603-1991
IEEE Std 279-1971

RG 1. 105, Rev. 4
Setpoints for Safety-Related
Instrumentation

ANSI/ISA 67.04.01-2018
Setpoints for Nuclear Safety-
Related Instrumentation

Staff Guidance

NUREG-0800
Standard Review Plan,
Chapter 7

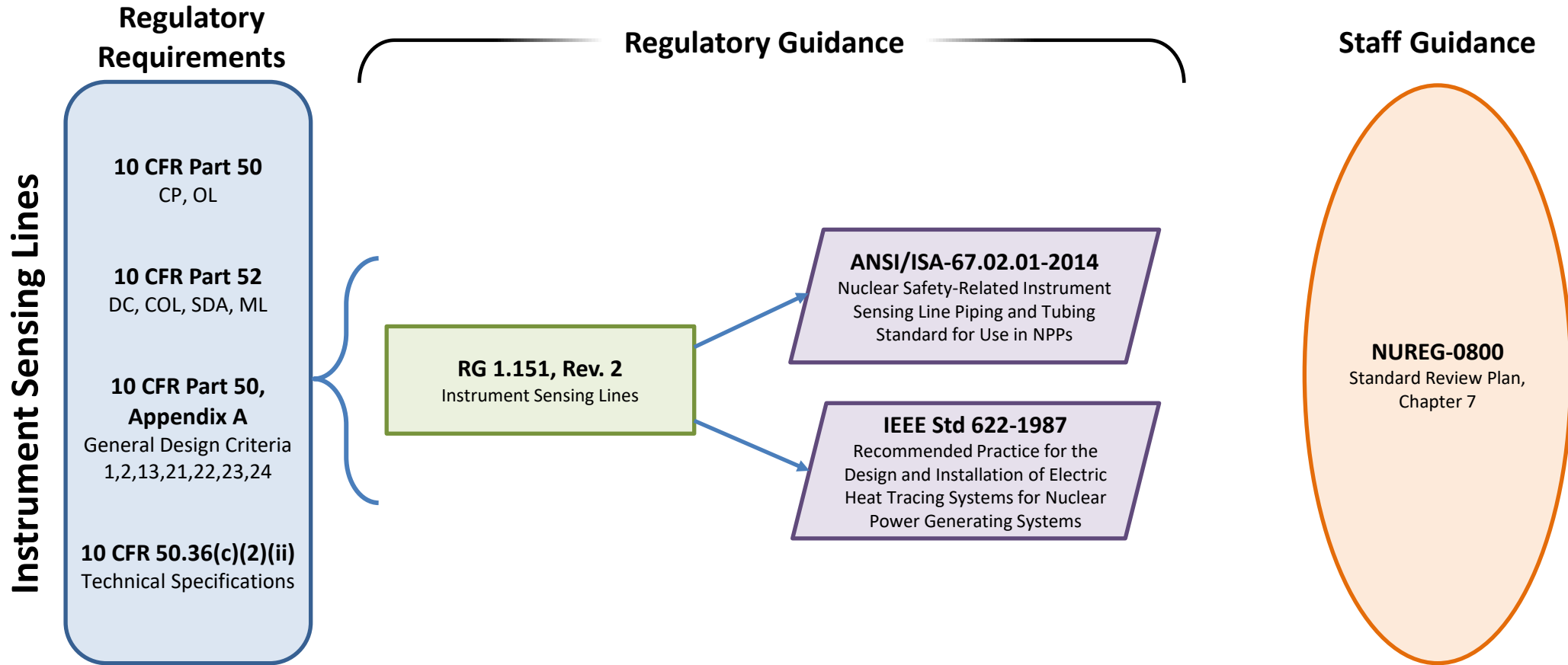
BTP 7-12
Guidance on Establishing
and Maintaining
Instrument Setpoints

ISG-06 *
Licensing Process
(D.7 – Technical
Specifications)

Setpoints Establishment
and Maintenance

*Digital-Specific

Instrument Sensing Lines



Cyber Security

Regulatory Requirements

10 CFR Part 50
OL

10 CFR Part 52
COL

10 CFR 73.1
Purpose and Scope

10 CFR 73.54
Protection of Digital
Computer and
Communication
Systems and Networks

10 CFR 73.77
Cyber Security Event
Notifications

Regulatory Guidance

RG 5.71, Rev. 1
Cyber Security Programs for
Nuclear Facilities

RG 5.83, Rev. 0
Cyber Security Event Notifications

Staff Guidance

NUREG-0800
Standard Review Plan,
Section 13.6.6

Cyber Security

Look Ahead

- SRP Modernization of Chapter 7
- Update digital development and reliability guidance
 - RG 1.168: V&V
- Take necessary steps to sunset ISG-04
- Follow Commission direction regarding SECY-22-0076
- Path forward for IEEE Std 603-2018

Closing Remarks

References

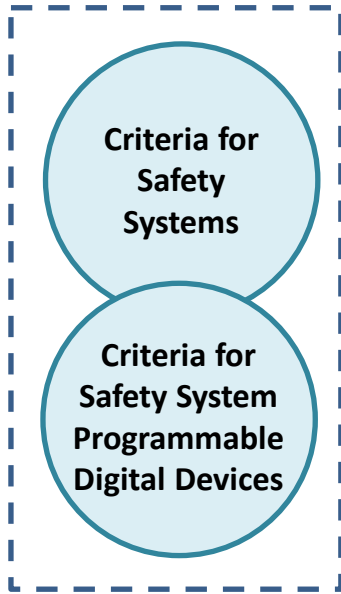
- Commission Papers (SECY) - <https://www.nrc.gov/reading-rm/doc-collections/commission/secys/index.html>
- Staff Requirements Memoranda - <https://www.nrc.gov/reading-rm/doc-collections/commission/srm/index.html>
- Regulatory Guides - <https://www.nrc.gov/reading-rm/doc-collections/reg-guides/power-reactors/rg/index.html>
- Interim Staff Guidance - <https://www.nrc.gov/reading-rm/doc-collections/isg/index.html>
- Review of EPRI TR-106439, Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety - <https://www.nrc.gov/docs/ML0921/ML092190664.pdf>
- Safety Evaluation of EPRI TR-107330, Generic Requirements Specification for Qualifying a Commercially Available PLC for Safety-Related Applications in NPPs - <https://www.nrc.gov/docs/ML1220/ML12205A265.pdf>
- IEEE Standards - <https://ieeexplore.ieee.org/Xplore/home.jsp>
- ACRS September 2021 DI&C Systems Meeting Transcript (ML21299A197) - <https://www.nrc.gov/reading-rm/doc-collections/acrs/agenda/2021/index.html>

Acronyms

Acronym	Description	Acronym	Description
ACRS	Advisory Committee on Reactor Safeguards	ISG	Interim Staff Guidance
ANSI	American National Standards Institute	LWR	Light-Water Reactor
ASME	American Society of Mechanical Engineers	ML	Manufacturing License
BTP	Branch Technical Position	NEI	Nuclear Energy Institute
CFR	Code of Federal Regulations	NPP	Nuclear Power Plant
COL	Combined Operating License	NPUFs	Non-power Production and Utilization Facilities
CP	Construction Permit	NRC	Nuclear Regulatory Commission
DC	Design Certification	OL	Operating License
DI&C	Digital Instrumentation and Controls	QA	Quality Assurance
DG	Draft Guide	PDD	Programmable Digital Device
DRG	Design Review Guide	PLC	Programmable Logic Controller
DSRS	Design Specific Review Standard	RG	Regulatory Guide
EPRI	Electric Power Research Institute	SDA	Standard Design Approval
IAP	Integrated Action Plan	SDOE	Secure Development and Operational Environment
I&C	Instrumentation and Controls	SIL	Safety Integrity Level
IEC	International Electrotechnical Commission	SRM	Staff Requirements Memorandum
IEEE	Institute of Electrical and Electronics Engineers	SRP	Standard Review Plan
ISA	International Society of Automation	V&V	Verification and Validation

Backup Slides

I&C Technical Areas & IEEE Std 7-4.3.2-2016 Clauses



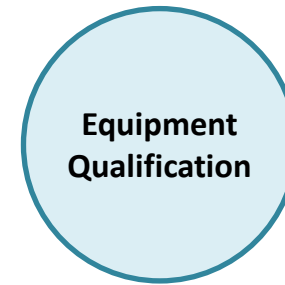
- 5.1 - Single-Failure Criterion
- 5.5 - System Integrity
 - 5.5.1 Design for PDD Integrity
 - 5.5.2 Design for Test and Calibration
 - 5.5.3 Fault Detection and Self-Diagnostics
 - 5.5.4 Prioritization of Functions
- 5.6 - Independence
- 5.7 - Capability for Testing and Calibration
- 5.8 - Information Displays
- 5.9 - Control of Access
- 5.11 - Identification
- 5.15 - Reliability
- 5.16 - Common Cause Failure Criteria
- 5.18 - Simplicity



- 5.3 - Quality
 - 5.3.1 Software Development
 - 5.3.2 Software Tools
 - 5.3.3 Verification and Validation
 - 5.3.4 Independent V&V Requirements
 - 5.3.5 Software Configuration Management
 - 5.3.6 Software Project Risk Management
- 5.9 - Control of Access

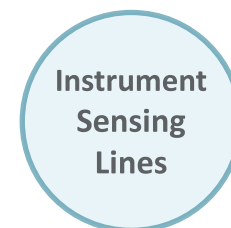


5.17 - Use of Commercial Digital Equipment



5.4 - Equipment Qualification

IEEE Std 7-4.3.2-2016 does not provide specific criteria for



Clauses 4, 5.2, 5.10, 5.12, 5.13, 5.14, 6, 7, 8 do not provide criteria beyond IEEE Std 603

I&C Technical Areas & ISG-06, “Licensing Process”

