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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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DIGITAL INSTRUMENTATION AND CONTROL SUBCOMMITTEE

+ + + + +

THURSDAY

NOVEMBER 17, 2022

+ + + + +

The Subcommittee met via hybrid in-person and Video Teleconference, at 8:30 a.m. EST, Charles Brown, Jr., Chairman, presiding.

COMMITTEE MEMBERS:

CHARLES H. BROWN, JR., Chair

RONALD G. BALLINGER, Member

VICKI BIER, Member

VESNA DIMITRIJEVIC, Member

GREGORY HALNON, Member

WALT KIRCHNER, Member

JOSE MARCH-LEUBA, Member

DAVID PETTI, Member

JOY L. REMPE, Member

MATTHEW SUNSERI, Member

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1 ACRS CONSULTANTS :

2 DENNIS BLEY

3 MYRON HECHT

4 STEPHEN SCHULTZ

5

6 DESIGNATED FEDERAL OFFICIAL :

7 CHRISTINA ANTONESCU

8

9 ALSO PRESENT :

10 ERIC BENNER, NRR

11 SAMIR DARBALI, NRR

12 MIKE EUDY, RES

13 GREG GALLETTI, NRR

14 KIM LAWSON-JENKINS, NSIR

15 KHOI NGUYEN, NRR

16 RICHARD STATTEL, NRR

17 DINESH TANEJA, NRR

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Adjourn

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

8:37 a.m.

CHAIR BROWN: Good morning, everyone.

This is a meeting of the Digital Instrumentation and Control Subcommittee. We are operating in person and virtually. The meeting will now come to order.

I'm Charles Brown, Chairman of the Subcommittee meeting. ACRS members in attendance are Matt Sunseri, Jose March-Leuba, Vesna Dimitrijevic, Ron Ballinger, Dave Petti, Walt Kirchner, Vicki Bier, Greg Halnon, and our Consultants Myron Hecht and Dennis Bley. Christina Antonescu of the ACRS staff is the Designated Federal Official for this meeting.

The purpose of this meeting is for the staff to brief the Subcommittee on Draft Guide 1374, proposed Revision 4 to Reg Guide 1.152, "Criteria for Programmable Digital Devices in Safety-Related Systems of Nuclear Power Plants."

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

Interested parties who wish to provide

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1 comments can contact our office requesting time. That  
2 said, we've set aside 15 minutes for comments from  
3 members of the public attending or listening to our  
4 meeting. Written comments are also welcomed.

5 And the meeting agenda for today's meeting  
6 was published on the NRC's public meeting notice  
7 website, as well as the ACRS meeting website.

8 On the agenda for this meeting and on the  
9 ACRS meeting website are instructions as to how the  
10 public may participate. No request for making a  
11 statement to the Subcommittee has been received from  
12 the public.

13 Due to COVID-19, we are conducting today's  
14 meeting as a hybrid meeting.

15 A transcript of the meeting is being kept  
16 and will be made available on our website. Therefore,  
17 we request that participants in this meeting should  
18 first identify themselves and speak with sufficient  
19 clarity and volume, so that they can be readily heard.

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

24 We have the MS Teams phone line, audio-  
25 only, established for the public to listen to the

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1 meeting.

2 Based on our experience from previous  
3 virtual and hybrid meetings, I would like to remind  
4 speakers to speak slowly.

5 We will take a short break after each  
6 presentation to allow time for screen-sharing, as well  
7 as at the Chairman's discretion during longer  
8 meetings. There's only one presentation today,  
9 correct? Okay.

10 Lastly, please do not use any virtual  
11 meeting features to conduct sidebar technical  
12 conversations, but rather contact the DFO, who is also  
13 connected, if you have any technical questions, so we  
14 can bring those to the floor. And the DFO, I'll  
15 repeat again, is Christina Antonescu of the Nuclear  
16 Regulatory Commission Advisory Committee staff.

17 We will now proceed with the meeting, and  
18 I guess Mr. Khoi Nguyen is going to be making the  
19 presentations. And he can share his screen, and it's  
20 obviously being shared. And Eric Benner will make  
21 some introductory remarks before we begin today's  
22 presentation.

23 Eric?

24 MR. BENNER: Thank you, Member Brown.

25 As you indicate, I'm Eric Benner. I'm the

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1 Director of the Division of Engineering and External  
2 Hazards in NRR, who has programmatic responsibility  
3 for this technical area.

4 I won't repeat much of what the Chair  
5 said. This is a collaboration between Research, our  
6 Office of Research, and NRR to update this Reg Guide.  
7 We continually look to endorse updated versions of  
8 standards to help us in conducting our work.

9 We also work extensively with standards-  
10 developing organizations for those areas where we feel  
11 the standard has a gap in it. We put what we call  
12 either a condition and clarification, so that it's  
13 complete for us when doing our reviews and groups of  
14 those standards-developing organizations, when we have  
15 those disconnects, to see if those issues can get  
16 resolved and incorporated into the standards.

17 So, I'm happy to report we have some of  
18 that, some of both of those things in today's  
19 presentation; that this is a newer version of a  
20 standard we had previously endorsed and we were able  
21 to remove some conditions from the Reg Guide because  
22 of our effective coordination with the standards-  
23 developing organizations.

24 So, not to take too much thunder away from  
25 the main presenter, I will turn it over to Khoi

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1       Nguyen.

2                       MR. NGUYEN: Thanks, Eric.

3                       Good morning. My name is Khoi Nguyen,  
4       Electrical Engineer from the Electrical Engineering  
5       Branch, from the Division of Engineering and External  
6       Hazards in NRR.

7                       I'm here to present Draft Guide 1374, the  
8       proposed Revision 4 of Regulatory Guide 1.152,  
9       "Criteria for Programmable Digital Devices in Safety-  
10      Related Systems of Nuclear Power Plants."

11                      Next slide, please.

12                      Today, you can see on the screen that we  
13      go over the introduction; the scope of the Reg Guide  
14      1.152; the Reg Guide applicability background; the  
15      purpose of the Reg Guide revision; regulatory basis;  
16      proposed changes, and finally, a summary.

17                      Next slide, on slide 3, please. I'm  
18      sorry, it's slide 4.

19                      I will start the introduction with the  
20      current revision, Revision 3 of the Reg Guide, which  
21      endorsed IEEE Standard 7-4.3.2, 2003 version, the  
22      "IEEE Standard Critical for Digital Computers in  
23      Safety Systems of Nuclear Power Generating Stations."

24                      The current revision of this Reg Guide  
25      includes the "Secure Development and Operational

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1 Environment, or SDOE, Guidance for Digital Computers  
2 in the Safety Systems of the Nuclear Power Plants."

3 Next slide, please.

4 The proposed Revision 4 of Reg Guide 1.152  
5 will endorse IEEE Standard 7-4.3.2, Revision 2016,  
6 "IEEE Standard Criteria for Programmable Digital  
7 Devices in Safety-Related Systems of the Nuclear Power  
8 Generation," with exceptions and clarifications.

9 The revision also includes the "Secure  
10 Development and Operational Environment Guidance for  
11 Digital Computers in the Safety Systems of Nuclear  
12 Power Plants."

13 MEMBER HALNON: Khoi, this is Greg Halnon.  
14 Just a quick question.

15 Several places I read that this is all  
16 being revised to keep up with the present digital  
17 technology, but we're endorsing a guide that's almost  
18 seven years old at this point. That IEEE standard, is  
19 that purely 2016 technology, not 2022 technology?

20 MR. NGUYEN: As we understand, that IEEE  
21 is in the process of updating the revision 2016 of the  
22 standard. And we have the staff in this room,  
23 actually, that is a working group that is responsible  
24 for revising the standard, and I consult with these  
25 staff. We are confident that there's not much changes

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1 from the 2016 version to the next version. So, we are  
2 confident, by endorsing this standard, we have the  
3 latest, you know, information.

4 MEMBER HALNON: Will it take another six  
5 years to endorse the next IEEE revision, or is it just  
6 lagging for other reasons?

7 MR. NGUYEN: Actually, normally, we have  
8 a 10-years cycle.

9 MEMBER HALNON: A 10-year cycle?

10 MR. NGUYEN: Yes. So, 2026, or maybe  
11 2027, the next revision --

12 MEMBER HALNON: So, the window will be a  
13 little tighter?

14 MR. NGUYEN: A little bit tighter, yes.

15 MEMBER HALNON: Thanks.

16 MR. BENNER: This is Eric Benner.

17 I would add that you're all aware that, in  
18 the middle of the past decade, we had some significant  
19 interactions with the Commission where we got some  
20 redirects on how the staff should be looking at  
21 digital I&C. So, we really focused on the high-  
22 profile issues that the Commission had raised to us.

23 But, as part of that activity, we had what  
24 we called strategic long-term modernization. And in  
25 that task, we talked about, hey, how are we going to

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1 revisit what people affectionately, or not  
2 affectionately, called "the spaghetti chart of  
3 guidance." So, that's sort of clean up the Reg  
4 Guides; how the Reg Guides fit together; how our  
5 internal guidance fits together. So, we're finally  
6 starting to get that cleanup activity.

7 So, I would hope that in the future, if  
8 we're able to manage our infrastructure in what I call  
9 a more routine fashion, that we would significantly  
10 shorten the time to keep the guidance in line with  
11 more modern standards.

12 MEMBER HALNON: Thank you.

13 MR. NGUYEN: So, for the purpose of this  
14 presentation, I will use the term "7-4.3.2" for short  
15 for the IEEE standard and, also, "SDOE" for the Secure  
16 Development and Operational Environment.

17 So, continue on slide 8.

18 The proposed Revision 4 of Reg Guide 1.152  
19 also implements the Commission directions, which were  
20 informed by the EDO letters to Commission, dated July  
21 14, 2021.

22 Next slide, please.

23 The scope of Reg Guide 1.152 is with  
24 regard to -- the proposed revision of Reg Guide 1.152  
25 scope is to remain unchanged, which endorsed 7-4.3.2

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1 as an acceptable approach to meet the regulatory  
2 requirements for promoting, first of all,  
3 reliability, design quality, and SDOE for the use of  
4 programmable digital devices in the safety-related  
5 systems of nuclear power generating stations.

6 Next slide, please.

7 MR. BENNER: I see a hand up. Walt?

8 MEMBER KIRCHNER: Yes, good morning. This  
9 is Walt Kirchner.

10 Could you spend a little more time on  
11 SDOE? And in particular, I'm interested to know about  
12 access control in an operational environment and how  
13 the guide provides for protecting the integrity of the  
14 device and its software.

15 MR. NGUYEN: Let me --

16 MEMBER KIRCHNER: The concern is cyber  
17 security, among others, since these are devices that  
18 would be used in a safety-related system.

19 MR. NGUYEN: Okay. Let me make sure I  
20 understand your question right. You want to make sure  
21 the guidance in IEEE standard, whether it covers the  
22 cyber security guidance on control of access?

23 MEMBER KIRCHNER: Well, no. What I want  
24 to -- not quite. Both in the secure development and  
25 the operational environment, how do you protect the

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1 integrity of the device and its software against  
2 intrusion, malware, whatever? What guidelines are  
3 there for a device that is deployed to support a  
4 safety-related function?

5           Could you, just for the record, say what  
6 this actually means? It's an acronym. We skip over  
7 it quickly in presentations, but could you explain for  
8 the record what does "SDOE" mean in terms of  
9 expectations for a digital device used in a safety-  
10 related system?

11           MR. NGUYEN: I would like to ask Samir  
12 Darbali to answer the question because he's the one  
13 who is directly working on the guidance of the SDOE.

14           MR. DARBALI: Thank you, Khoi.

15           Good morning. My name is Samir Darbali.

16           CHAIR BROWN: Samir, this is Charlie  
17 Brown.

18           MR. DARBALI: Yes?

19           CHAIR BROWN: I wanted to clarify, not  
20 clarify, but just -- Walt, to make it clear, the SDOE  
21 is the environment within the vendor's plant. So,  
22 control of access is an issue once you get out into  
23 the operational world where you've got equipment  
24 installed and it's operating. Is that the vision  
25 you're thinking about and the separation you're

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1 referring to.

2 MEMBER KIRCHNER: Well, both. No, both,  
3 actually, yes.

4 CHAIR BROWN: Okay, I understand that. I  
5 just wanted to make sure that the SDOE is not  
6 something -- that's something you build into it when  
7 you're designing it to make sure it's safe, comes out  
8 right, supposedly, and all that. You've asked that  
9 question.

10 MEMBER KIRCHNER: Yes.

11 CHAIR BROWN: You also are talking about  
12 the operational environment. I just wanted to make  
13 sure we separated the two things into two pieces.

14 MEMBER KIRCHNER: Yes. No. Thanks,  
15 Charlie. Yes, that clarifies it better.

16 CHAIR BROWN: That was it.

17 MR. DARBALI: Okay.

18 CHAIR BROWN: I just wanted to make sure  
19 we were on the right track.

20 MR. DARBALI: Thank you.

21 Again, my name is Samir Darbali, NRR/DEX.

22 So, a secure development and operational  
23 environment covers both the vendor side and the  
24 operations side. And it's somewhat related to cyber  
25 security. The nature of cyber security is that it's

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1 focused on security and Part 73. Secure development  
2 and operational environment is focused on safety and  
3 reliability, and it's on Part 50.

4 The secure development side is at the  
5 vendor's side, and it's those controls that the vendor  
6 has on their development environment, whether it's the  
7 use of firewalls by the computers that are used to  
8 develop the system and create the code, that they're  
9 not connected to the internet; that the software that  
10 they're using to develop the system, it's secure. And  
11 it does have some overlaps with formal cyber security.

12 The secure operational side includes  
13 activities done by the vendor and by the licensee.  
14 So, activities that the vendor does for a secure  
15 operational environment include: does the system  
16 allow for remote access? Does it have open physical  
17 ports? Is there code in the software that is not  
18 defined or that it provides functionality that's not  
19 desired?

20 So, the vendor, based on the requirements  
21 provided by the licensee, will ensure that the system  
22 doesn't allow access, does not intend it, during  
23 operations.

24 The licensee, on their part, ensures the  
25 secure operational environment by making sure that the

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1 hardware is secure. So, the hardware is going to be  
2 in a cabinet; that cabinet is going to be locked.  
3 Typically, you'll see that those cabinet doors have  
4 alarms. So, when somebody opens them, the operators  
5 know somebody's working on channel alpha or channel  
6 bravo.

7 Sometimes, also, some of those features  
8 include if there's going to be a change made to  
9 software, whether it is to make a change to a constant  
10 or a set point or a change to firmware, you have to in  
11 some cases use a key switch. So, that key is going to  
12 be controlled by the control room operators. Also,  
13 when you turn the key switch, operators would get an  
14 alert somebody's working on this cabinet.

15 So, those are layers of defense that are  
16 incorporated to ensure that nobody is making changes  
17 to the system that they're not supposed to. Again,  
18 this is somewhat different from cyber security  
19 perspective which has some overlapping, but separate  
20 requirements.

21 Hopefully, that made it clearer.

22 MR. NGUYEN: Thanks, Samir.

23 MEMBER MARCH-LEUBA: To follow up on that  
24 line of thought, it's good to have a secure  
25 development environment working close. But if you

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1 have been following developments in this area in the  
2 last couple of years, one has to become very familiar  
3 with the supply-side vulnerabilities.

4 MR. DARBALI: Right.

5 MEMBER MARCH-LEUBA: But more insidious  
6 are others which are really supply side, but you're  
7 young enough to know how programming is then. You  
8 don't program everything; you just go out there to the  
9 "GitHubs" and get yourself libraries. And some of  
10 those libraries are used very widely. Log4j is the  
11 most famous one that has happened recently that a Java  
12 student wrote in 1990. Theoretically, he left it  
13 needing rehab. And everybody and their mother uses it  
14 and nobody maintains it.

15 And it had a very serious flaw that I  
16 think that every single website in the world -- I  
17 mean, just because you use an open-source library, is  
18 there any guidance in the guide to warn you that just  
19 having a lock and key on the cabinet is not good  
20 enough?

21 Is there anything that you use in your  
22 software? Because you know the software. You  
23 actually program 10 percent of the lines of code, at  
24 most. How do you verify the other 90 percent?

25 MR. DARBALI: So, there's guidance on the

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1 use of pre-developed software or commercial off-the-  
2 shelf software to ensure that it doesn't contain any  
3 unintended code. But, again, this is from a safety  
4 reliability side; whereas, Reg Guide 5.71 covers the  
5 guidance on the supply chain for ensuring that secure  
6 supply chain.

7 MEMBER MARCH-LEUBA: Yes, but every single  
8 website in the world developed by the smartest people  
9 out there, IT techs, people that work on protecting  
10 and writing malware detection software had the log4j.  
11 That's L-O-G No. 4j. Everybody uses that guidance  
12 student library to create logs.

13 MR. DARBALI: Right.

14 MEMBER MARCH-LEUBA: So, I mean, there has  
15 to be some warning for use of that. You have to state  
16 in the documents (audio interference) --

17 MEMBER BIER: I would note, similar to  
18 what Jose commented, that for many, many years, and  
19 probably still, there was like a flawed random number  
20 generator that was randomly used in lots of Monte  
21 Carlo analysis. And it was well-known to be flawed,  
22 but if you weren't an expert, you just went and  
23 grabbed it and it looked good, so there you go.

24 MEMBER MARCH-LEUBA: I, myself, discovered  
25 a flaw in Excel; it was actually log base 10 in Excel

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1 1.0, and I reported it to Microsoft. I mean, things  
2 happen.

3 MS. ANTONESCU: Chairman Brown, there are  
4 two people --

5 MEMBER MARCH-LEUBA: There are some hands  
6 up.

7 MS. ANTONESCU: Hands, yes, both Dinesh  
8 and, also, Kim. Just call on them.

9 CHAIR BROWN: Yes, it says I'm plus 30.  
10 How do I know who to call on?

11 MEMBER MARCH-LEUBA: Well, Dennis was  
12 also --

13 MS. ANTONESCU: Well, Dinesh was first,  
14 then Kim, and then, Dennis Bley also.

15 CHAIR BROWN: Okay. Dinesh, since you  
16 were up first, do you want to comment?

17 MR. TANEJA: Yes. Good morning, everyone.  
18 This is Dinesh Taneja.

19 So, I just wanted to give our recent  
20 experience. I know that the Committee has heard that  
21 we audited the SHINE, you know, program logic  
22 development life cycle activities recently.

23 So, what we observed when it came to the  
24 secure development environment, that the vendor  
25 actually had a pretty tight, secure environment where

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1 they are doing the development activities. This is  
2 just saying that, you know, they were taking all the  
3 necessary steps to ensure the purity and the sanity of  
4 the work that they were developing has no infections  
5 of any type.

6 And they were building in features such  
7 as, you know, access during the operation is limited  
8 to only the authorized personnel by putting in  
9 password protections and different checks and  
10 balances. So, to even access any of these parameters  
11 for any kind of modification or set point changes  
12 required some necessary steps and procedures on the  
13 part of the operating staff.

14 So, that secure development environment  
15 was pretty tight; at least, that's what we observed at  
16 this specific one vendor that was doing the work.

17 And to Jose's point about the acquired  
18 softwares, so there is a requirement that we have --  
19 I think there is a Reg Guide we have on commercial  
20 rededication of all the acquired softwares. So, they  
21 are actually following that guidance on dedicating all  
22 the acquired softwares and taking it through the  
23 necessary due diligence of our regulatory requirements  
24 of assuring that they actually do, you know, the  
25 criticality analysis and checking everything before

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1 they use any of these off-the-shelf items or, you  
2 know, otherwise acquired software. So, we do have a  
3 regulatory framework in place to address all these  
4 concerns.

5 Also, I think Greg Galletti probably can  
6 add more to it in that area, because he is our Vendor  
7 Branch expert in this area. And I think he's online  
8 also.

9 I just wanted to share that. Thank you.

10 CHAIR BROWN: Thank you, Dinesh.

11 Before I go on to the next hand, correct  
12 me I don't state this correctly: SDOE is not in the  
13 Reg Guide and it's often 7-4.3.2, is that correct? I  
14 mean, and it looks like it's about the same as it was  
15 in the previous version 7 -- I'm trying to connect the  
16 dots here a little bit. There hasn't been a whole of  
17 changes in that over the last -- was that the way it's  
18 been applied; you all have been using that for a  
19 while?

20 MR. NGUYEN: You are correct, Member  
21 Brown. The 2016 version 7-4.3.2 incorporated the SDOE  
22 guidance in --

23 CHAIR BROWN: It was in Rev 3, correct?

24 MR. NGUYEN: In Rev 3, yes.

25 CHAIR BROWN: Yes. Okay. You all moved

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1 all that over. I mapped that over and it looked like  
2 you kind of just moved it --

3 MR. NGUYEN: Yes.

4 CHAIR BROWN: -- for the most part.

5 MR. NGUYEN: Yes. And we examined to see  
6 if the standard incorporated all of the principal  
7 guidance and the important stuff from the Reg Guide  
8 and Standard, and we confirmed that.

9 CHAIR BROWN: Okay. I don't know whether  
10 that answers anybody else's questions. I just wanted  
11 to make it clear that those particular guidances  
12 that's been out there has been out and it's utilized.  
13 And that's largely a facility-type operation as  
14 opposed to what we do when -- we obviously have to  
15 have some little piece of that when you're operating,  
16 but you're not developing code at the vendors -- I  
17 mean at the plant operators' location for the most  
18 part.

19 There were two more hands up, you said?

20 Kim?

21 MS. LAWSON-JENKINS: Thank you, Member  
22 Brown. I have a few very brief comments.

23 My name is Kim Lawson-Jenkins. I'm with  
24 the Cyber Security Branch at the Nuclear Regulatory  
25 Commission.

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1           There's one of the requirements in every  
2           licensee cyber security plan, when they receive  
3           software from a vendor, to verify that the vendor has  
4           acknowledged that there are known vulnerabilities in  
5           their software, or if there are, that they have  
6           provided mitigations for those.

7           So, some of the examples that were  
8           mentioned are very valid. They think there may be  
9           vulnerabilities that are there that haven't been  
10          exploited at that point, that later on have been, will  
11          become exploitable because people have gotten more  
12          sophisticated and smarter and figured out a way to  
13          attack the system. And at that point, if the device  
14          is operational in a system, the vendor contacts the  
15          licensees to let them know about this vulnerability,  
16          or they receive this information from a government  
17          agency such as CISA, and then, the licensee will take  
18          actions on it.

19          But there are, as was mentioned,  
20          vulnerabilities that exist today that may not have  
21          been exploited. So, those will have to be addressed.

22          Also, in the cyber security plans that are  
23          currently being used, it is possible to do  
24          vulnerability scans, but because of the safety-related  
25          devices, the guidance gives examples where you can do

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1 this not when the system is operational, but before.  
2 For example, a device becomes operational. They've  
3 received a new device. They can run scans which can  
4 verify whether there's something like Log4j or some  
5 software that is in there. And then, like I said,  
6 they can verify with the vendors that these, any known  
7 vulnerabilities found, have been addressed. And also,  
8 during system outages, they could run vulnerability  
9 scans.

10 And like I said, basically, the area that  
11 we're talking about now for secure development and  
12 operational environments, they have to do with supply  
13 chain. And it's very important because that's one of  
14 those attack vectors that we really feel that, going  
15 forward, we have to watch very carefully. And that's  
16 covered, as I say, quite well in the cyber security  
17 plans.

18 So, if you have any other questions, we  
19 can definitely discuss those. But --

20 CHAIR BROWN: I'll have some other  
21 questions later.

22 MS. LAWSON-JENKINS: Okay.

23 CHAIR BROWN: But I want to close this out  
24 and make it clear that, when the software is brought  
25 in -- say a vendor revises a software because he

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1 discovered something, and the applicant says, okay,  
2 we'll do that. They bring it in. They don't install  
3 it, and then, scan it. They scan that software before  
4 it gets installed. That's my understanding of the way  
5 the system -- based on the guidance you've got in  
6 here, they do all that. That's the smart thing to do.

7 So, I wanted to make sure that was clear  
8 in everybody else's mind before we go on.

9 MEMBER MARCH-LEUBA: Yes. With the goal  
10 in mind, I think we have been just fine, right?

11 CHAIR BROWN: We've got all day.

12 MEMBER MARCH-LEUBA: Yes. The problem is,  
13 there is a false sense of security. Because a cyber  
14 security plan exists, you say, "Aha, I'm covered."  
15 You cannot tell me that Google doesn't know about  
16 cyber security. This year, there have been seven CLA  
17 updates to Chrome -- seven. I can't even count how  
18 many Windows updates have been with similar internet  
19 navigators. And there are many more in series 1 that  
20 have not been found yet.

21 So, using a scan for the vulnerabilities  
22 for 2021 doesn't do you any good because there are new  
23 ones. You have to assume you have been penetrated and  
24 do something to protect you against it.

25 What the IT guys here in our building are

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1 doing, there's one guy already in a room monitoring  
2 all the traffic on the web, making sure that nobody is  
3 sending an evil viral vector where they're not  
4 supposed to -- and assuming we've been penetrated.

5 And I'm warning about false sense of  
6 security that having a plan gives you, because having  
7 a plan is good for the 2021 vulnerabilities, or some  
8 of those plans are 2008. There are new ones every  
9 day. And so, the best thing to do is to have a good  
10 architecture that segregates things as best as  
11 possible, single trust, and assume you're going to  
12 fail.

13 And when we're talking about this with  
14 cyber security plans, the other concern I have, which  
15 is a very serious concern, is that we concentrate  
16 exclusively in critical digital assets and ignore or  
17 kind of leave it to the student to work out with the  
18 rest of the components. And specific examples are the  
19 famous casino that got penetrated because somebody got  
20 into their aquarium.

21 God knows how many of you have an IoT  
22 device at home -- a thermostat, a smart TV, a router.  
23 How many of those are out already? I mean, you have  
24 those already inside your house and you don't know it.

25 The average time for a big company to find

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1 out it has been penetrated is nine months. By the  
2 time the payload is deployed and you know you've been  
3 attacked, the bad guys have been inside your network  
4 for nine months.

5 MR. BLEY: They're already there.

6 MEMBER MARCH-LEUBA: Yes, I mean, be  
7 scared. Be very scared. That's all I can say.

8 And this sense of security that we did an  
9 audit and everything looked good, I guarantee you it  
10 wasn't. And next year, you'll find out why. I don't  
11 know why. They don't know why; nobody does. But I  
12 guarantee you there are faults.

13 Thank you.

14 CHAIR BROWN: That's why I still have a  
15 mercury thermostat.

16 MS. ANTONESCU: Dennis Bley raised his  
17 hand, Member Brown.

18 CHAIR BROWN: Yes, I'm just about to go to  
19 him, when I finish saying something.

20 Dennis, are you still there?

21 MR. BLEY: Yes, Charlie, I'm still here.

22 CHAIR BROWN: Is your hand still up?

23 MR. BLEY: Yes. Let's see if I can  
24 remember what I was going to say.

25 (Laughter.)

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1           Two things right now. One is a comment;  
2 one is a question.

3           The comment goes back to Eric's discussion  
4 about the spaghetti of guidance. "Spaghetti" is a  
5 nice word; I can think of others. We've had BTPs and  
6 ISGs. We also point to standards which you need to  
7 do. I think what we would like is to see all of this  
8 eventually be in a NUREGs and Reg Guides, so you're  
9 looking in one place to find it all.

10           One day, if the staff could give us a kind  
11 of summary of how they're actually trying to clear up  
12 this rats' nest of spaghetti, that would be very  
13 helpful for me anyway. Dinesh brought up the  
14 dedication of commercial equipment, which now ties  
15 into these other things. So, understanding how we're  
16 going to try to clarify all that would be really nice.

17           Now, in the Draft Reg Guide -- and I was  
18 on the previous slide -- you point to IEEE Section 5.6  
19 and 5.9 -- 5.6 on independence; 5.9 on control of  
20 access to be of primary importance in protecting these  
21 systems. I didn't go back to look at the previous  
22 version of the Reg Guide. Were there any substantial  
23 changes in the Reg Guide? And actually, I mean  
24 substantial changes in the IEEE guidance in their  
25 Sections 5.6 and 5.9. Or is this pretty much what

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1 we've had before?

2 And that's for Khoi -- if he remembers he  
3 was giving the presentation.

4 (Laughter.)

5 MR. NGUYEN: Yes, 5.6, yes, there's a  
6 substantial change in Clause 5.6 and 5.9. And I call  
7 that later on slide 11. Can you hold on that?

8 MR. BLEY: Yes.

9 MR. NGUYEN: Can you hold the question?

10 MR. BLEY: I certainly can. I just didn't  
11 want it to get by until I knew you were going to talk  
12 about it. But thank you.

13 MR. NGUYEN: We will. Yes, I will, yes.

14 MR. BLEY: All right.

15 CHAIR BROWN: But the differences between  
16 7-4.3.2 -- the previous one is 2003.

17 MR. BLEY: Yes, I'm really looking for the  
18 staff on this.

19 CHAIR BROWN: No, I'm just saying there  
20 were two different IEEE standards. The older one was  
21 2003 and the new one is 2016. So, I think they're  
22 going to walk through some of the changes or  
23 differences between them on a later slide. That's all  
24 I was trying to make sure; that they've got that in  
25 the slide pack.

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1 MR. NGUYEN: Yes, I will go over the major  
2 changes in Revision 2016, 7-4.3.2, comparing with the  
3 2003 version. And for each change, I will explain  
4 what we reveal and how it is acceptable.

5 MR. BENNER: And this is Eric Benner  
6 again.

7 I think it's going to be illustrative,  
8 when we get there, of the migration. Because, as  
9 Member Brown said, the guidance hasn't changed  
10 significantly, but how it's packaged is. So, in  
11 previous versions of the standard, the NRC staff felt  
12 that there was more guidance that was necessary.

13 So, we put that in the surrounding  
14 guidance documents, whether it was the previous Reg  
15 Guide, whether it was from previous ISGs. But, as we  
16 work with the working group, the IEEE Working Group,  
17 we get them to ideally adopt what we think is the  
18 appropriate guidance, such that our endorsement of  
19 that guidance is a lot cleaner.

20 And as Khoi said, as we get into that  
21 section of the presentation, he'll have some more  
22 discrete mapping of how there was guidance in other  
23 NRC guidance documents that has now migrated into the  
24 underlying IEEE standard, such that we can just  
25 endorse that.

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1 CHAIR BROWN: Did that answer the question  
2 for you, Dennis?

3 MR. BLEY: I'm waiting for the information  
4 coming later, Charlie.

5 CHAIR BROWN: Okay. All right. I just  
6 wanted to make sure we were on track to go on.

7 MR. NGUYEN: So, for slide 7, Reg Guide  
8 1.152 is applicable to the applicant's and licensee's  
9 attention to 10 CFR Part 50 and Part 52.

10 During the development of the Draft Guide,  
11 the staff received the inquiry from many organizations  
12 whether this Reg Guide is applicable to Part 53. And  
13 the staff has concluded that, since Part 53 is  
14 currently under development, therefore, staff is  
15 unable to determine on the applicability of Part 53 to  
16 this Reg Guide.

17 Any question on this?

18 MEMBER HALNON: Yes. Khoi, I know that,  
19 I mean, you can't make something applicable to a  
20 regulation that's not in place yet. But why wouldn't  
21 it be able to be used for the advanced new reactor  
22 stuff? Is there something in here that is antiquated  
23 to where the new stuff can't be applicable? I mean,  
24 will it be applicable without much to-do? I guess is  
25 the question.

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1 MR. BENNER: I think I'll answer that.  
2 This is Eric Benner.

3 I would say, generically, that once the  
4 NRC has approved a method for use, that we'd be hard-  
5 pressed to say someone couldn't use that method. And  
6 that's happened for a number of these standards.  
7 These standards are all for power reactors, but when  
8 other types of licensees, say a fuel cycle facility,  
9 wants to use this, then we've kind of set the standard  
10 that is acceptable.

11 So, for us, we have to look at it the  
12 other way of -- and some of our applicants look at it  
13 the other way of -- is it necessary? And that's  
14 really where we're only going to go so far when we  
15 talk about Part 53. It's because, depending on the  
16 approaches that are adopted in Part 53, some of the  
17 things in the Standard or Reg Guide may or may not be  
18 necessary. But I feel pretty comfortable saying that,  
19 once the staff has determined that it's acceptable for  
20 meeting the technical requirements and regulations,  
21 that we're not going to pull that back for any class  
22 of licensee.

23 MEMBER HALNON: So, we're looking at  
24 administratively, and possibly some slight  
25 modifications in new technology and other things

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1 that --

2 MR. BENNER: Right, right.

3 MEMBER HALNON: -- might be more  
4 applicable? Yes, 53 may not be out for what, a couple  
5 of years --

6 MR. BENNER: Right.

7 MEMBER HALNON: -- at best. So, okay. I  
8 just wanted to make sure there were no showstoppers  
9 there that you saw.

10 MR. BENNER: No. We certainly, like I  
11 said, we find this technically acceptable. So, if a  
12 licensee came in under Part 53 and wanted to adhere to  
13 all of the attributes of this Reg Guide, we'd be hard-  
14 pressed to make any sort of, you know, technical or  
15 regulatory argument as to why that wouldn't be  
16 acceptable.

17 MEMBER HALNON: Got it. Thanks, Eric.

18 CHAIR BROWN: Relative to Greg's question,  
19 what Parts some of these clarifications are applicable  
20 to, and I don't want you to go into -- we can cover  
21 this later. I'm just making you aware because he  
22 brought it up.

23 In one of your clarifications, you stated  
24 that licensees or applicants are going to use a  
25 particular Reg Guide in preparing a certification

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1 under 10 CFR 52. Why not Part 50, which is already in  
2 place for people making changes?

3 MR. BENNER: Why? We can look at the  
4 language in --

5 CHAIR BROWN: I'm just telling you that  
6 it's in Section 3.

7 MR. BENNER: Yes.

8 CHAIR BROWN: It's 3.3 in the Reg Guide.

9 MR. BENNER: Yes, and that --

10 CHAIR BROWN: You only said Part 52,  
11 but --

12 MR. BENNER: Okay. Well, maybe for  
13 certifications, because there are no certifications in  
14 Part 50. But we can look at the particular language.

15 CHAIR BROWN: Could somebody come in with  
16 a certification under Part 50 --

17 MR. BENNER: No.

18 CHAIR BROWN: -- if they wanted to?

19 MR. BENNER: No.

20 CHAIR BROWN: They can't now?

21 MR. BENNER: No, they cannot. They never  
22 could.

23 CHAIR BROWN: That's our answer then.  
24 Thank you.

25 MR. BENNER: They never could. Right. In

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1 Part 50, there are Construction Permits and Operating  
2 Licenses.

3 CHAIR BROWN: And that's it?

4 MR. BENNER: And that's it.

5 CHAIR BROWN: Okay.

6 MR. BENNER: In Part 52, you have design  
7 certifications --

8 CHAIR BROWN: Okay.

9 MR. BENNER: -- and combined licenses.

10 CHAIR BROWN: Okay.

11 MR. BENNER: So, yes, I mean, we can look  
12 at the language to make sure we're good. It's good  
13 for all.

14 CHAIR BROWN: No, I'm glad you brought it  
15 up --

16 MR. BENNER: Okay.

17 CHAIR BROWN: -- because it's an issue.  
18 All right. Thank you.

19 MR. NGUYEN: Any question on this slide?

20 CHAIR BROWN: Just one overall question.  
21 I've got to find my right piece of paper, so I can say  
22 it right.

23 In the new Reg Guide, Rev 4, in your page  
24 4 discussion, you endorse 7-4.3.2-2016. And in that  
25 paragraph, you state that the rule is still 603-1991.

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1 That's where the rule is, 10 CFR 50.55a(h). But the  
2 references to IEEE X throughout it are to IEEE  
3 603-2009. And that was a little bit -- I mean, if  
4 something in 2009 conflicts with 1991, what rules?

5           There's no clarification of -- 2009 is not  
6 in the rule anywhere. And if something in there  
7 conflicts with the 1991 version, there's no  
8 clarification that, hey, fine, we have no problem with  
9 2009 because that's been there before. So, it was  
10 another date before; 2003 or 2004, or some other date  
11 was the previous IEEE standard. But that conflict was  
12 not identified as who would rule under those  
13 circumstances.

14           Just something to put in the hopper to  
15 think about. That's going to be one of my main points  
16 of issue to discuss later.

17           Go ahead, Khoi.

18           MR. NGUYEN: Thank you, Member Brown.  
19 That's a good question.

20           We spent a lot of time discussing this  
21 subject and reviewed 2009, the 1991 version, 2003  
22 IEEE, and 2009 version of IEEE, and made sure that  
23 there's no conflict like you mentioned. And we found  
24 that there's no conflict.

25           The 2009 cover of specific criteria in

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1 IEEE 1991 with some, you know, minor change in  
2 language, but not major changes --

3 CHAIR BROWN: So, there's also some  
4 expanded language in some circumstances --

5 MR. NGUYEN: Right.

6 CHAIR BROWN: -- when you go from 1991 to  
7 the subsequent ones. I didn't have any problem with  
8 that. It was just --

9 MR. NGUYEN: But there is no conflict.

10 CHAIR BROWN: So, you all have looked at  
11 that to make sure --

12 MR. NGUYEN: Right. And we --

13 CHAIR BROWN: You were very careful to say  
14 1991 is still in the rule. You were very clear in the  
15 Reg Guide.

16 MR. NGUYEN: And we also worked with OGC  
17 and made sure that when we referenced and endorsed  
18 this, and the Reg Guide we have paragraph explain that  
19 the second reference, like the 2009 version --

20 CHAIR BROWN: Yes.

21 MR. NGUYEN: -- and 7-4.3.2 is not what  
22 we're endorsing. Like the --

23 CHAIR BROWN: Well, you're endorsing  
24 7-4.3.2 --

25 MR. NGUYEN: Right.

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1 CHAIR BROWN: -- which says, See 2009,  
2 603, for information.

3 MR. NGUYEN: The second reference.

4 CHAIR BROWN: So, fundamentally, you've  
5 endorsed it by reference in a way via the later  
6 IEEE --

7 MR. NGUYEN: Unless we -- we, basically,  
8 say that. The second reference in the Standard, the  
9 Reg Guide is not endorsing that.

10 MR. BENNER: Yes, and we run -- this is  
11 Eric Benner again. And like Khoi said, we've had a  
12 lot of discussion with OGC, our legal counsel, on this  
13 because the rule is the 1991 version, 603, is  
14 incorporated by reference. So, there is no ambiguity  
15 that that is the requirement. Guidance is just a way  
16 to meet the rule.

17 So, it seems maybe unnecessary, but, in  
18 reviewing, in endorsing 7-4.3.2, we are endorsing a  
19 way that applicants can meet the requirements, which  
20 is the 1991 version in the regulation. And like Khoi  
21 said, we've done, because of this sort of awkwardness  
22 of 7-4.3.2 that aligns itself with a later version of  
23 IEEE 603, we did the exercise to make sure there was  
24 no conflict there.

25 We have a separate activity, which I'm

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1       sure we will be briefing the Committee on at the right  
2       time, of what we're doing about IEEE 603. Because, as  
3       you point out, not only is there a 2009 version,  
4       there's a more recent version that we've worked  
5       extensively with IEEE on, and we're looking for the  
6       best avenues for applicants to use that version of the  
7       standard, including maybe updating the rule to  
8       incorporate the --

9               CHAIR BROWN: We tried to update the rule  
10       about seven years ago --

11              MR. BENNER: Right.

12              CHAIR BROWN: -- and the Commission  
13       rejected that.

14              MR. BENNER: Yes, yes. And we, hopefully,  
15       have learned lessons from that activity. That is why  
16       we'll be engaging stakeholders on what's the right  
17       path for 603. And then, whatever plan we come up  
18       with, that will be something we'll offer to the  
19       Committee for your feedback on.

20              CHAIR BROWN: Well, I brought it up  
21       because, literally, it goes in, in the 2016 version of  
22       7-4.3.2, auxiliary features, multi-unit stations,  
23       repair, reliability. In various places, it says, no  
24       requirements beyond 2009 are necessary, which kind of  
25       says 2009 is -- as long as you can say that the stuff

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1 in there doesn't conflict -- I looked back in 1991,  
2 and sometimes it was pretty sparse and they just had  
3 a sentence, "Be careful," and there's a few more  
4 things in 2009. So, I presume that's the case for  
5 somebody --

6 MR. BENNER: Yes, I would say I don't  
7 think, as Khoi said, any of it conflicts. So that we  
8 have line of sight that, if you meet 7-4.3.2, or you  
9 meet a pointer in 7-4.3.2 to 2009 603, in our mind,  
10 that does meet the requirement, which is the 1991  
11 version of 603.

12 CHAIR BROWN: Okay. All right. Thank  
13 you.

14 Any other hands up? No.

15 Do you want to go on, Khoi?

16 MR. HECHT: This is Myron Hecht.

17 CHAIR BROWN: Oh, Myron, go ahead.

18 MR. HECHT: This is Myron. Yes.

19 So long as we're on the subject of  
20 obsolescent or obsolete references, I just wanted to  
21 point out that, on page 2 of the Draft Standard, under  
22 "Related Guidance," it makes a reference to  
23 SECY-93-087, which is being replaced by a standard  
24 coming out in 2022, a Draft SECY. So, you might want  
25 to replace -- or let me ask it as a question: should

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1 that reference to SECY-93-087 be replaced?

2 MR. NGUYEN: Yes, thank you for the  
3 question. The staff has thought about this subject  
4 also and I have been reaching out to OGC on the  
5 subject. And we got the reply that, similar to Part  
6 53, the expanded SECY paper is still a work-in-  
7 progress. There's no decision, you know, from the  
8 Commission what the expanded SECY looks like. So, we  
9 cannot reference the paper that is not final yet.

10 MR. BENNER: Yes, the reference to that is  
11 not SECY; it's the Staff Requirements Memorandum for  
12 that SECY. So, we do not have a Staff Requirements  
13 Memorandum in response to the modern SECY. Though, if  
14 we do, if the Commission makes a decision, then that  
15 would be an appropriate reference, but, right now, we  
16 have no guidance from the Commission. We just have a  
17 proposal to the Commission.

18 MR. BLEY: So, you're tracking that, and  
19 before this becomes final, if the SRM becomes final,  
20 you can update the reference?

21 MR. BENNER: Yes.

22 CHAIR BROWN: There was also feedback from  
23 the staff we got, Dennis, that I guess came from OGC,  
24 that if the new SECY didn't explicitly address 087,  
25 only those parts of 087 that were addressed in the new

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1       SECY are new, but anything in the old one still is in  
2       play. So, 087 would still have to be covered under  
3       this. That's the feedback we got relative to the  
4       last, the SECY, the -- what is it? -- 0076, 22-0076 on  
5       CCFs?

6                   MR. BENNER: Uh-hum.

7                   CHAIR BROWN: So, that right now is we're  
8       waiting. Everybody is waiting for a response from the  
9       Commission.

10                  MR. NGUYEN: That's correct.

11                  MR. BLEY: This gets kind of confusing.

12                  MR. HECHT: I just wanted to say --

13                  CHAIR BROWN: Are you still there?

14                  MR. HECHT: Yes. I just wanted to make  
15       the point that the new SECY, of course, does allow  
16       significant change with respect to CCFs and allowing  
17       this risk-based approach to be used for that, for less  
18       serious hazards. The diversity requirement would be  
19       somewhat relaxed. I'm not sure that has any bearing  
20       on 1.152, but it might, and so, particularly for those  
21       less hazardous, low-level hazards. So, that's really  
22       the question.

23                  MR. BLEY: This stuff gets kind of  
24       confusing. I'm curious -- because I don't remember --  
25       are there many places where specific revisions of, I

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1 mean versions of standards are called out in the  
2 rules?

3 MR. BENNER: This is Eric Benner.

4 That section of the rules has -- it is a  
5 limited set, and it's, basically, that as we --

6 (Unrelated comment from unknown  
7 participant.)

8 CHAIR BROWN: Has somebody else got their  
9 mic on? Ron? Eric?

10 MS. ANTONESCU: You're okay now, Member  
11 Brown.

12 CHAIR BROWN: Okay.

13 MR. BENNER: This is Eric Benner again.

14 It is a finite set, and if you go to 10  
15 CFR 50.55, it is a very finite set of codes that are  
16 truly incorporated by reference into the regulations.  
17 And it's, basically, in this technical domain, it's  
18 IEEE 603 and its predecessor, IEEE 279. The big usage  
19 of that area is for the various ASME standards that we  
20 have mandated for licensees.

21 So, we endorse a lot of different  
22 standards, organization standards, but it is a very  
23 small set that are truly incorporated by reference  
24 into the regulations.

25 MR. BLEY: Thanks, Eric. That's what I

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1 thought, but it creates problems, you know. Okay.

2 CHAIR BROWN: Okay, Khoi. Slides back up.

3 MR. NGUYEN: Okay. Let's move to the next  
4 slide, slide 8, please.

5 So, the 7-4.3.2 was developed in 1982 to  
6 provide supplemental guidance on how to meet the  
7 requirements in IEEE 2003 when using programmable  
8 digital devices in safety systems in nuclear power  
9 plants. Since then, the standard has been updated  
10 periodically to encompass the evolving technologies  
11 and to incorporate the NRC guidance, such as Reg Guide  
12 and Interim Staff Guidance. And I will speak of these  
13 guidances later.

14 Any questions on this slide?

15 (No response.)

16 On slide 9, the previous edition of  
17 standards, 7-4.3.2, on the computer-based digital  
18 system, by changing the term "computer" to  
19 "programmable digital device," Revision 2016 of  
20 7-4.3.2 expanded the coverage to programmable digital  
21 devices and to encompass the technologies of the  
22 field-programmable gate array, or FPGA.

23 The term "programmable digital device"  
24 envelopes any device that relies on software  
25 instruction or programmable logic to accomplish a

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1 function. Examples include computer programmable  
2 logic or hardware device, or any device with firmware.

3 Revision 2010 of IEEE Standard 7-4.3.2  
4 incorporated the data communication independence  
5 guidance from Interim Staff Guidance, or ISG-04, for  
6 evaluating the communication independence between the  
7 redundant portion of the safety system, the non-safety  
8 division, and between safety and no safety systems.  
9 I will talk more about the incorporation of the ISG-04  
10 later on in the next few slides.

11 Any questions on this slide?

12 (No response.)

13 The next slide, slide 10.

14 I will go over the major changes in IEEE  
15 Standard 7-4.3.2, 2016 version. The 2016 version of  
16 the standard changed the term "computer" to  
17 "programmable digital device," as I mentioned earlier.  
18 It also incorporated SDOE guidance from Reg Guide  
19 1.152, Revision 3 and providing the specific criteria  
20 on the use of software tools used for digital devices  
21 and the development of hardware, software, and  
22 firmware, and programmable

23 It's also revising Annex D,  
24 "Identification and Control of Hazards." And more on  
25 this will be covered later.

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1 MEMBER HALNON: Khoi, could you elaborate  
2 a little bit on the second bullet, "Incorporating the  
3 SDOE guidance through Reg Guide Revision 3"?

4 MR. NGUYEN: Yes.

5 MEMBER HALNON: It feels kind of  
6 incestuous that, you know, you're endorsing a document  
7 that uses criteria out of your document. It doesn't  
8 make a lot of sense.

9 MR. NGUYEN: As mentioned, though, by  
10 Eric, we are working closely with the IEEE Working  
11 Group and encourage them to adopt the NRC guidance,  
12 either in the Reg Guide or ISG or BTP. So, we have a  
13 clean endorsement.

14 MEMBER HALNON: Okay. So, then, the  
15 Revision 3 information was not in the previous  
16 versions of 7-4.3.2?

17 MR. NGUYEN: No.

18 MEMBER HALNON: So, that was an exception  
19 you all took in Revision --

20 MR. NGUYEN: Yes. Yes.

21 MEMBER HALNON: Okay. I didn't go back  
22 and look at Rev 3. Thanks. That makes sense.

23 MR. NGUYEN: Any other question?

24 (No response.)

25 We will move to slide 11.

1           This slide and the next slide will  
2 describe the major change in Revision 2016 of 7-4.2.3,  
3 comparing with 2003 of the standard. I will go over  
4 it one-by-one.

5           The first one is Clause 5.1. This clause  
6 was expanded to include the criteria for the  
7 programmable digital devices with respect to the  
8 failure of a single device and the spurious actuation.  
9 These criteria are consistent with criteria in Section  
10 3.1.5 of ISG-04, and therefore, acceptable.

11           I will pause here for any questions  
12 regarding to changing Clause 5.1.

13           (No response.)

14           MR. NGUYEN: Okay. The next one --

15           CHAIR BROWN: If we hear nothing, take  
16 advantage of that.

17           MR. NGUYEN: All right. Clause 5.3.2 was  
18 expanded to identify different software tools. The  
19 identification supports the requirement of IEEE  
20 Standard 828, the 2005 version, and should be the  
21 standard for software configuration management plans,  
22 which is endorsed by --

23           CHAIR BROWN: Which one are you on right  
24 now? Which of the little lines?

25           MR. NGUYEN: The second line, Clause --

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1 CHAIR BROWN: Oh, Clause 5.3.2?

2 MR. NGUYEN: Yes.

3 CHAIR BROWN: Oh, okay. All right.

4 MR. NGUYEN: Yes. So, IEEE Standard 828  
5 was endorsed by Reg Guide 1.169; therefore,  
6 configuration management plan for digital computer  
7 software used in the safety systems of nuclear power  
8 plants.

9 Clause 5.5.4 was added as a new clause.  
10 It was added to incorporate the ISG-04 guidance with  
11 regard to communication independence, as I mentioned  
12 earlier.

13 MR. BLEY: Khoi?

14 MR. NGUYEN: Yes?

15 MR. BLEY: This is Dennis Bley again.

16 I see a number of these are incorporating  
17 ISG-04 guidance. Is it sufficient that you'll be able  
18 to retire ISG-04 after this Reg Guide is final?

19 MR. NGUYEN: Yes, the staff has that  
20 intention. But that will be done under, you know, a  
21 different process. We may have to transfer or  
22 incorporate the ISG-04 guidance to either the SRP or  
23 BTP before we can retire ISG-04. But that's the  
24 staff's intention.

25 MR. BLEY: Okay.

1 MR. BENNER: Yes, Dennis, this is Eric  
2 Benner again.

3 MR. BLEY: Yes, Eric?

4 MR. BENNER: That's clearly our intention.  
5 Strictly speaking, Reg Guides are guidance to the  
6 applicants, and the Standard Review Plan is guidance  
7 to staff. But we are, as part of our overall plan,  
8 our hope is for any of this interim stuff that's been  
9 lying around to make sure it gets populated to both  
10 the guidance to industry and the guidance the staff,  
11 and then, sunset it.

12 MR. BLEY: So, Eric, for the poor guy out  
13 in the field who's not been doing this before and is  
14 now turning to your guidance, how does that person  
15 know not to use certain parts of ISG-04? Do you have  
16 a roadmap for them or something? Or is it just up to  
17 them to figure it out?

18 MR. BENNER: We don't have the best  
19 roadmap. That is something we've been working with  
20 industry on to make it clear how -- that's the term  
21 "the spaghetti chart" of how it all fits together.  
22 So, that's certainly a communications challenge that  
23 we have. I will admit there isn't the best roadmap as  
24 to how it all fits together.

25 MR. BLEY: I hope you can come up with

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1 one. We'd be interested in seeing it, but I don't  
2 think it's a big, high issue for us. But I do feel  
3 sorry for people who haven't been through the process  
4 with you as we got to this point.

5 MR. BENNER: Yes, at a minimum, we can  
6 talk about a dedicated discussion. We did have a  
7 meeting with industry where we outlined what we  
8 thought the appropriate to-be state was, and we got  
9 very positive feedback. So, I think the people doing  
10 this work kind of know the destination, but, then,  
11 awkwardness is to get to that destination there's a  
12 bunch of interim waypoints. So, it is going to be  
13 somewhat of a challenge for everyone to keep it  
14 straight for all those interim waypoints.

15 MR. BLEY: Okay.

16 MR. BENNER: Certainly, we can have a  
17 discussion. On a minimum, we should just be able to  
18 share the presentation materials we used in that  
19 workshop with the Committee.

20 MR. BLEY: Okay. Thanks.

21 MR. NGUYEN: Then, moving on to change in  
22 Clause 5.6, "Independence." Again, this clause was  
23 revised to incorporate the ISG-04 guidance, mainly  
24 data communication independence.

25 The next one is --

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1 CHAIR BROWN: No. No, stay right there  
2 for a minute.

3 MR. NGUYEN: Okay.

4 CHAIR BROWN: I've got this thing open  
5 right now. And there's some kind of conflicting  
6 statements that I wanted to -- not conflicting --  
7 absence of information.

8 MR. BLEY: Charlie, can you say the Reg  
9 Guide, Charlie, for us to follow you?

10 CHAIR BROWN: Pardon? Yes, I'm looking at  
11 the IEEE Standard 7-4.3.2, Section 5.6,  
12 "Independence," which is what he's referring to right  
13 now.

14 MR. BLEY: Okay. I just wanted to make  
15 sure where you were. Okay. Thank you.

16 CHAIR BROWN: Yes, absolutely. I'm sorry  
17 about that. I should have been more clear.

18 The very first sentence says, "In addition  
19 to the requirements of 2009, data communication  
20 between safety divisions" -- okay? -- "or between  
21 safety and non-safety divisions shall not inhibit the  
22 performance of the safety function."

23 Later on, it says, "The safety function of  
24 each safety channel shall be protected from adverse  
25 influence" -- this is in the third paragraph -- "from

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1 outside the division of which that channel is a  
2 member. Information outside the division shall not be  
3 able to inhibit or delay," whatever.

4 Then it goes on to say, "This protection  
5 shall be implemented within the affected division  
6 rather than sources outside the division" -- in other  
7 words, in a network farther away; you know where I'm  
8 going -- "and shall not itself be affected by any  
9 condition or information from outside the affected  
10 division," which effectively says our communications  
11 going anyplace else can be susceptible to being  
12 bypassed.

13 And yet, we don't ever address  
14 unidirectional communications. The word  
15 "unidirectional" is not used anywhere in any of these  
16 Reg Guides or the IEEE standard.

17 So, you have a large discussion which we  
18 haven't gotten to relative to the cyber security  
19 paragraph in the Reg Guide. I'm just saying there are  
20 some inconsistencies relative to being clear.

21 And I'll just go ahead and bring this:  
22 independence and control of access are virtually hand-  
23 in-glove when you really get down to it. I'm just  
24 making a comparison to our previous standard analog  
25 world. Physical security was all we had to worry

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1 about.

2           And, in fact, if you look at the physical  
3 security of a plant, it's multilayered. You've got  
4 a fence with guards and guns just to get onto the  
5 site. You can't get into the plant without going  
6 through more guards and guns. You can't get into the  
7 rooms where the I&C equipment is without keys, which  
8 you can't get from anyplace but the main control room  
9 or designated location with somebody -- you know, that  
10 you take it and sign for it and be authorized to do  
11 it. And then, on the cabinets, you have locks.

12           In other words, the system itself is its  
13 first line of defense and everything else is a layer  
14 outside to ensure you don't ever attack that very last  
15 part of the fence.

16           Once we introduce computer systems into  
17 these, we've now changed the metric. Physical  
18 security still exists, but now we keep -- well, you  
19 know where I'm going again -- we keep insisting that  
20 we can't do design stuff in the system to make it  
21 unidirectional, as its first line of defense. And  
22 yet, we insist on we'll address it programmatically  
23 when we do all the critical digital assets, networks.  
24 How does it get in the fence in the first place?

25           There's not even a part in the Reg Guide

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1 or IEEE standard. There's a big paragraph on physical  
2 security. There is none on external electronic access  
3 security.

4 There's a big disconnect, which, in my  
5 view, is a huge safety gap in terms of how we address  
6 this stuff. I'm not saying that the Reg Guide should  
7 be a source of cyber security programmatic issues.  
8 That's not the point. That would not be the right way  
9 to do anything.

10 But the security of our safety systems  
11 should be at least protected in the same manner, and  
12 allowance when you're designing it, as we do with the  
13 physical security and putting locks on the cabinets.  
14 They come from the vendor that way. It's not like  
15 they show up on the site and we weld padlocks onto the  
16 doors. It's just that's not the way it's done.

17 So, that's an inconsistency in terms of  
18 how we address that. And that's one of my concerns as  
19 to how do we bridge that gap in your -- if I get the  
20 right page here. Someplace in this mass of paperwork  
21 that you gave me, there's the discussion on -- oh,  
22 here it is, control of access in the Reg Guide, where  
23 you rightly say the Reg Guide is not intended to  
24 address cyber security, fundamentally. You know, that  
25 comes under 5.7.1.

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1           But you state it in a manner that is just  
2 inconsistent. You say it's not intended to address  
3 "protective features, such as communication  
4 independence and control of access to prevent  
5 malicious cyber attacks." So, I mean, effectively --  
6 but you have a little line at the end which says  
7 licensees and applicants should also consider the  
8 cyber security guidance in preparing a design  
9 certification under Part 52. But nowhere in here do  
10 we provide any guidance on what is an acceptable  
11 method -- without dictating -- but what's an  
12 acceptable method for providing this control of  
13 access.

14           With the watchdog timers, you did that.  
15 You did a good job of importing -- which is the first  
16 time I've seen in it any of these documents -- a good  
17 discussion on the watchdog timers. And I'm trying to  
18 remember whether it's in the Reg Guide or whether it's  
19 in the IEEE -

20           MEMBER HALNON: It's in the Reg Guide.  
21 It's in diagnostics.

22           CHAIR BROWN: Pardon?

23           MEMBER HALNON: It's in the self-  
24 diagnostics section.

25           CHAIR BROWN: Under "Clarifications"?

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1 MEMBER HALNON: Yes.

2 CHAIR BROWN: How come I can't find it?

3 MEMBER HALNON: I'll find it for you.

4 CHAIR BROWN: I've got it written down  
5 here somewhere.

6 MR. NGUYEN: The watchdog timer paragraph  
7 was purposely written for you, Mr. Brown.

8 CHAIR BROWN: For me? I know. Well, it's  
9 not for me.

10 MEMBER HALNON: It had "Charlie Brown"  
11 written all over it.

12 CHAIR BROWN: It was for the Committee.  
13 Nothing gets done without the Committee's agreement.

14 Where are the words -- did you find which  
15 Reg Guide it is?

16 MEMBER HALNON: I'm looking for it. Yes,  
17 I'm looking for it.

18 CHAIR BROWN: Oh, I found it. Okay. I  
19 found it. Never mind.

20 Section 1, it's Clarification 1.2.1, where  
21 you ended the discussion of watchdog timers, which was  
22 a good explanation. I wasn't going to contest that at  
23 all. But you ended it by saying, "One method the NRC  
24 finds acceptable for indicating" -- and you talk about  
25 other methods of doing -- you say they can do various

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1 methods. You don't dictate it. Obviously, anybody  
2 that uses a software timer in another little package  
3 of new software, that's got to be, why would you do  
4 that? It's kind of mindless. It's more software that  
5 you have to deal with.

6 But here, you say, "One method the staff  
7 agrees acceptable would be implementing a watchdog  
8 timer to use a hardware-based device to perform WDT  
9 counter reset timeout and failsafe functions." An  
10 acceptable method, you left that out of the control of  
11 access. The words were nice at the licensee, but it  
12 would have been -- I probably wouldn't be having this  
13 conversation if you had said, "A method that the staff  
14 considers acceptable would be the use of  
15 unidirectional, one-way, not configured, fast software  
16 communication devices for communications external to  
17 the safety systems."

18 And I don't mean just RPS. I mean, in  
19 reality, when you think about safety systems -- take  
20 your reactivity control system, for instance. You  
21 really don't want to have bidirectional communication.  
22 You want a guy to turn a switch and the rods go in or  
23 they go out. You want to send data back to the main  
24 control room to say, hey, this happened or this didn't  
25 happen, because it may have -- it probably has got

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1 software in the control system now, and you want to  
2 know what it's doing. But that ought to be  
3 unidirectional.

4 Under "Safety systems," those are not  
5 safety systems per se, I don't think. They're -- I  
6 don't know, how is, Greg, the reactivity control  
7 system referred to? Are they safety-related or are  
8 they --

9 MEMBER HALNON: Yes.

10 CHAIR BROWN: -- non-safety?

11 MEMBER HALNON: No, any reactivity control  
12 would be safety-related.

13 CHAIR BROWN: Well, in here, they talk  
14 about self-diagnostics for safety-related DI&C  
15 systems. To, to me, that applies to safety systems  
16 and things like rod control or other safeguard  
17 controls, you've got to assume.

18 MEMBER HALNON: Charlie, I want to make  
19 sure I'm clear on where you're going. This is Greg.

20 CHAIR BROWN: Okay, go ahead.

21 MEMBER HALNON: We started in  
22 independence --

23 CHAIR BROWN: Yes.

24 MEMBER HALNON: -- and we transferred over  
25 to controlled access, and then, went back to self-

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1 diagnostics. Can you, in a sentence or two, describe  
2 to me what -- I understand the relationship where it  
3 says independence, you want it, you know, low  
4 propagation of failure from safety to non-safety. And  
5 I think that's where you get to the communication  
6 piece, and you jumped to controlled access.

7 CHAIR BROWN: There are two separate  
8 pieces.

9 MEMBER HALNON: Okay.

10 CHAIR BROWN: And, one, I was saying the  
11 self-diagnostics and use of watchdog timers is in one  
12 section, and it provides guidance on what the staff  
13 would consider acceptable.

14 Now, we're out of that.

15 MEMBER HALNON: Okay.

16 CHAIR BROWN: Now, we go over to  
17 independence and control --

18 MEMBER HALNON: It's in controlled access  
19 they jump to 5.7.1, which, to me, is pretty  
20 comprehensive. It may be almost too comprehensive --

21 CHAIR BROWN: Well, it is.

22 MEMBER HALNON: -- to figure out where you  
23 need to go. But the basic, fundamental principles of  
24 5.7.1 are, to me, as applied to the control of access,  
25 which would bleed over into the independence

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1 automatically because of the way you have to design  
2 the control of access, which is -- or the cyber aspect  
3 of it.

4 So, I --

5 CHAIR BROWN: Go ahead.

6 MEMBER HALNON: What I'm trying to figure  
7 out, what is the deficient in the Reg that you're  
8 talking about it?

9 CHAIR BROWN: In the past prior to your  
10 arrival, we have frequently had many discussions in  
11 design applications, because there was not -- in fact,  
12 going back to 2009 and 2010, there was not -- they  
13 were bidirectional communications in the things. And  
14 we wrote our letters to say, no, they need to be  
15 unidirectional, hardware-based, et cetera.

16 The response back was: can't deal with  
17 that because that's cover programmatically under the  
18 application 7.5.1, which you do five or six years  
19 later. So, we'll come back and redesign the system  
20 because we identified that they don't have  
21 unidirectional. That's been going on now for years.

22 Now, it so happens that the applicants  
23 have figured out pretty quickly that they probably  
24 weren't going to get the Betty Crocker Good  
25 Housekeeping Stamp of Approval from the Committee

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1 without having unidirectional, one-way, hardware-  
2 based, and that's what they've done.

3 My point is, we can't dictate; we can't be  
4 prescriptive. And I was trying to make a comparison  
5 with the watchdog timer. We weren't prescriptive, but  
6 we said there's a method acceptable which is what we  
7 would like to see. It's not contained in the same  
8 place, similar place, under the control of access.

9 MEMBER HALNON: Okay.

10 CHAIR BROWN: So, that's how I was  
11 bouncing around, but not --

12 MEMBER HALNON: In your mind, you were  
13 succinct.

14 CHAIR BROWN: I was very clear. Well,  
15 it's a problem with my letters, as you all keep trying  
16 to tell me.

17 (Laughter.)

18 No, I accept that.

19 MEMBER HALNON: Okay. Got it.

20 CHAIR BROWN: Okay. Did I clear that up?

21 We've gotten here much earlier than I  
22 thought we would have gotten here. I wasn't --

23 MR. BENNER: Well, that's a first in the  
24 discussion today.

25 Member Brown, I think we understand what

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1 you're saying. I think we clearly can consider,  
2 right, adding something similar about where  
3 unidirectional communications can be one way of  
4 addressing, a differential --

5 CHAIR BROWN: Yes, and maybe --

6 MR. BENNER: We've done that in our  
7 guidance documents.

8 CHAIR BROWN: We ought to be kind of  
9 specific.

10 MR. BENNER: Yes.

11 CHAIR BROWN: We want to make sure there  
12 are hardware not configured by software. I mean, all  
13 communications devices, you've got to take data and  
14 you've got to format it and lay it out, so you can  
15 send it out through the device.

16 MR. BENNER: Yes.

17 CHAIR BROWN: That's software. There's no  
18 way you can get away from that. But configuring that  
19 communication device should not be able to be done by  
20 somebody coming into it and reformatting it, so now  
21 it's not --

22 MEMBER MARCH-LEUBA: Let's be specific.  
23 By "configuring," you mean changing the direction  
24 of --

25 CHAIR BROWN: From unidirectional to

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1 bidirectional. Because a lot of the devices out there  
2 have both methodologies them and they configure the  
3 software based on the operating system.

4 MEMBER MARCH-LEUBA: Yes. Yes, but there  
5 is an available configuration when you define the baud  
6 rate and the pulse rate --

7 CHAIR BROWN: Yes. Yes, that's all --

8 MEMBER MARCH-LEUBA: And that can be done  
9 by software.

10 CHAIR BROWN: That's right. Baud rate,  
11 but that's not directionality. So, that's why we --

12 MEMBER MARCH-LEUBA: In the second  
13 configuration, I'm always marking here a little bit  
14 because it's broader than what you --

15 CHAIR BROWN: The main point is  
16 unidirectional, data diode-type style stuff, whatever  
17 the words may be. And I just think that's a way, by  
18 putting that in along with the cyber part -- because  
19 I'm not trying to intrude into the cyber world.  
20 There's too much arguing about what CDAs you do, when,  
21 and where, and everything else.

22 But I'm just thinking about the layers of  
23 defense, and the equipment ought to be able to provide  
24 its own defense, and do that at the early stages  
25 during the design. And you talk about the design --

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1 I've forgotten where it was -- during the design  
2 application, though. Yes, during the design  
3 certification under Part 52.

4 So, when we had the back-and-forth -- this  
5 is just discussion, okay? -- relative to the letter to  
6 the Chairman and the responses --

7 MEMBER MARCH-LEUBA: Uh-hum.

8 CHAIR BROWN: -- and all that kind of  
9 stuff, I didn't take issue -- we did not write a  
10 letter in terms of the response. We waited because  
11 you said you were going to go revise 1.152, 5.7;  
12 BTP 7-19, on and on. So, talking about it in abstract  
13 -- it was much better to talk about it with the  
14 specific Reg Guides, and stuff.

15 But I view, as opposed to us saying it's  
16 not a safety doubt, a safety concern, I think it is,  
17 but there wasn't any sense in mounting a horse on the  
18 pike and driving down the thing and seeing who we  
19 could knock off the horse on the other end. It just  
20 didn't make any sense.

21 And I was just trying to point out there's  
22 a way to use your all's methodologies, get the point  
23 across, such that we're not inhibited during the  
24 design cert stage with this back-and-forth. Okay?

25 But, anyway, that's kind of covered that

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1 aspect.

2 MR. NGUYEN: I think Rich Stattel had  
3 something to say.

4 CHAIR BROWN: Yes, Rich, go ahead.

5 MR. STATTEL: Thank you.

6 I'm Richard Stattel. I work in NRR.

7 I also want to mention that I was the NRC  
8 representative on the working group that developed  
9 these standards over these years.

10 And I think it's worth noting that, in  
11 Annex E of the standard, there are sections that do  
12 provide acceptable methods that include unidirectional  
13 communication from safety to non-safety and between  
14 divisions.

15 CHAIR BROWN: You didn't endorse it,  
16 though.

17 MR. STATTEL: Yes, okay, I'll explain  
18 that.

19 CHAIR BROWN: Okay.

20 MR. STATTEL: So, in the IEEE Working  
21 Group, we did recognize those as acceptable ways to  
22 instantiate communications independent.

23 When we were developing the Reg Guide, the  
24 decision was made not to endorse Annex E. This was  
25 made in the previous revision as well, right? And the

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1 reason was because the Annex is informative and it  
2 doesn't provide the guidance. So, in other words, the  
3 criteria for independence is in the body of the  
4 standards. The Annex provides acceptable methods that  
5 the IEEE considered to be acceptable. So, we  
6 typically don't endorse methods; we endorse the  
7 criteria, the acceptance criteria. So, I'm just  
8 explaining that's the reasoning behind that.

9 CHAIR BROWN: Okay. No, I appreciate  
10 that. I understand that. Thank you. I understand  
11 that. Thank you, Rich.

12 MR. NGUYEN: I would like to add onto what  
13 Rich just said. The reason we didn't endorse Annex E,  
14 also, because the Annex is technology-focused and  
15 provides a few methods or examples, but there are some  
16 other examples out there for one-way communication.  
17 If we endorse this, then it may send a strong message  
18 that these are the only methods we accept.

19 So, I mean, for your comments on the  
20 acceptable method the NRC staff can consider, we can  
21 consider something like, but I wouldn't go far to go  
22 to specific hardware like, you know, diodes.

23 CHAIR BROWN: Well, data diodes are kind  
24 of a generic --

25 MR. NGUYEN: Right. Because, out there,

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1       there's a --

2                   CHAIR BROWN:    A diode is a hardware,  
3       fundamentally, a hardware-based device, and that's  
4       what we're really looking for.

5                   MR. NGUYEN:   Right.

6                   CHAIR BROWN:   Just we've got to find a way  
7       -- this Reg Guide is a critical Reg Guide.  This is  
8       the one I was waiting for to see what revisions would  
9       come through and how you all would address it.  And  
10      the Reg Guide actually came out pretty decent for the  
11      most part.  I've got some other questions, but they  
12      aren't on these high-level items.

13                   And the WDT methodology that you used is  
14      reasonable.  You need a few words to do that for the  
15      communication device because it does need to be clear  
16      that it's unidirectional -- okay? -- and it's  
17      hardware-based.  That way, you don't get into the  
18      software configured part of it.  If it's hardware,  
19      pretty much it's hardware.

20                   I'm not familiar with every design that's  
21      out there, but maybe hardware -- if I was a vendor, I  
22      would not even have two directions.  It would be one  
23      literal output which you can't reverse physically.  
24      You'd have to rewire it.  And that's technology-  
25      neutral.

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1           Anyway, the issue is out on the table.  
2           Obviously, that's something we will, I will be  
3           addressing somehow in our response on this.

4           Are there any other -- Jose, do you have  
5           anything else to say on that?

6           MEMBER MARCH-LEUBA: No, I think I would  
7           like to see in the guide acceptable ways of  
8           unidirectional. If you find a better one, please  
9           submit it to us; we'll review it.

10          It simplifies -- when I'm a designer or an  
11          applicant, I have to go to my boss and convince him to  
12          let me spend money on doing something. And if that  
13          something is in the guide, as an example, it's a lot  
14          easier to do it. Anyway, I think it would be  
15          worthwhile if it wasn't limited.

16          CHAIR BROWN: If you think unidirectional  
17          devices are going to exorbitantly increase the price  
18          and cost of building these systems, we're talking  
19          about a 1 penny part in a \$100 million operation.  
20          That's a slight exaggeration, but then it's relative  
21          to --

22          MR. NGUYEN: I don't think --

23          CHAIR BROWN: -- the line of resistance.

24          MR. NGUYEN: I'm sorry.

25          CHAIR BROWN: I'm sorry, go ahead, Khoi.

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1           MR. NGUYEN:    I don't think that's a  
2           concern from an applicant or a licensee. I think the  
3           most concern is they have, in order to implement the  
4           hardware for the communication, they have to revise a  
5           lot of procedures because, currently, the plan is  
6           using two-way communication for some specific tasks,  
7           like set point change, firmware/software updated, data  
8           connection. So, if you have the hardware device  
9           installed permanently without revising the procedure,  
10          that may be the problem.

11          CHAIR BROWN: I would disagree with that.  
12          The communication out to the main control room into  
13          all other safety systems are not the path you utilize  
14          to make software changes. You use your maintenance  
15          and test equipment. You reconnect a cable to go do  
16          that. You control the software that goes in, whatever  
17          you're going to do, and that's where you make your  
18          adjustments.

19          MR. NGUYEN: Yes, and --

20          CHAIR BROWN: So, I would disagree with  
21          that. Bidirectional communications to a main control  
22          or any other network should not be on the table  
23          anywhere. So, I would disagree with you. I would  
24          agree with Eric that there's a simple way to do this.  
25          It should be unidirectional or one-way, however you

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1 want to phrase it. But we ought to find a way to  
2 compromise and get our way -- not get our way -- but  
3 get our way through this conundrum time after time.

4 MEMBER MARCH-LEUBA: I think the --

5 CHAIR BROWN: Go ahead.

6 MEMBER MARCH-LEUBA: I think the way on  
7 this echo, saying a licensing review of reactor  
8 containing two-way communication between 60 computers,  
9 blah, blah, blah, would require much greater scrutiny.  
10 And you warn the applicant, if you want to go this  
11 way, you're going to pay your pound of flesh. Right?

12 CHAIR BROWN: We'll disagree with it when  
13 it comes in.

14 MEMBER MARCH-LEUBA: And you have inherent  
15 aversion to risk by saying it that way. But if you  
16 have a reason for doing it --

17 CHAIR BROWN: That's why utilizing similar  
18 words to the watchdog timer I think is a clear way of  
19 saying it.

20 MEMBER MARCH-LEUBA: Yes.

21 CHAIR BROWN: And then, if someone wants  
22 to take exception, they can.

23 MEMBER MARCH-LEUBA: No, but Appendix E,  
24 echo, says the watchdog timer language, and it says,  
25 if you don't do this, you guys be aware that it is

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1 going to take --

2 CHAIR BROWN: Where are you talking about  
3 it?

4 MEMBER MARCH-LEUBA: It's the Appendix E  
5 of 7-4.3.2.

6 CHAIR BROWN: Yes, but that's not  
7 endorsed. I don't know what they do with that.

8 MEMBER MARCH-LEUBA: I'm saying that that  
9 language is very valuable.

10 CHAIR BROWN: Yes, that's valuable in the  
11 context of at least saying something similar to what  
12 the watchdog timer words path is. And the words "it's  
13 an acceptable method" would be to do that, because  
14 that does not tell them they have to do it. It allows  
15 them to -- and they can use whatever language that's  
16 in the IEEE standard to get to where they want to go.

17 MEMBER PETTI: But you're talking about  
18 putting some words into the Reg Guide, not into the  
19 IEEE standard?

20 CHAIR BROWN: In the Reg Guide, oh, yes,  
21 absolutely, not the --

22 MEMBER PETTI: Yes, yes.

23 CHAIR BROWN: And it would be in the  
24 paragraph where, that exhaustive paragraph on  
25 licensees and applications, blah, blah, blah. "A

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1 suitable method for doing this would be the one-way,  
2 unidirectional communication device, et cetera.

3 That would be -- anyway, that's where  
4 we're ending. We can stop this. I think we've hit  
5 this hard enough, unless somebody from my Committee  
6 members would like to -- Steve, do you want to say  
7 something.

8 MR. SCHULTZ: I have one more comment, and  
9 it relates to -- this is Steve Schultz -- it relates  
10 to the Branch Technical Position that the Committee  
11 commented on --

12 CHAIR BROWN: 7-19?

13 MR. SCHULTZ: Yes, 7-19, that the  
14 Committee commented on in 2021. And the Commissioners  
15 were involved because our letter went to the  
16 Commission related to that and the use of  
17 unidirectional systems for defense-in-depth and  
18 diversity.

19 CHAIR BROWN: Yes.

20 MR. SCHULTZ: And as I understood it, the  
21 staff said that this would be addressed by doing back  
22 to the Branch Technical Position and incorporating an  
23 example; that unidirectional systems would be a way in  
24 which to improve the review or simplify the review as  
25 far as defense-in-depth opportunities were available.

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1 Is that something that's been done?

2 CHAIR BROWN: No, 7-19 has not been  
3 brought back up on the table. It's still --

4 MR. SCHULTZ: Okay.

5 CHAIR BROWN: This was the first olive out  
6 of the bottle.

7 MR. SCHULTZ: Coming back through it?

8 CHAIR BROWN: Yes.

9 MR. BENNER: Yes, this is Eric Benner  
10 again.

11 From a timing standpoint, we had already  
12 planned to update this Reg Guide. You're familiar  
13 that we were in the throes of updating Reg Guide 5.71.  
14 So, the direction we got from the EDO was for there to  
15 be several guidance documents that we updated to  
16 address this issue. So, it's timing issue.

17 CHAIR BROWN: Okay.

18 MR. BENNER: For the Branch Technical  
19 Position, our schedule for updating that is longer  
20 because we have two ongoing, major licensing reviews,  
21 and our objective was to not update the BTP again  
22 until we get pretty far through those reviews. So, we  
23 could also incorporate lessons learned from those  
24 reviews into that guidance document.

25 MR. SCHULTZ: So, all of the documentation

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1 that changed hands at that time will be addressed when  
2 that's revised later?

3 MR. BENNER: Uh-hum. Right.

4 MR. SCHULTZ: And is the same, then, true  
5 for Reg Guide 5.71?

6 MR. BENNER: 5.71 I believe did have  
7 changes made. That came to the -- I can't remember if  
8 that was before the Committee or not. But changes  
9 were made to that soon after we got the direction from  
10 the EDO.

11 And I believe Kim is on the line. She  
12 probably is much more knowledgeable than I am on that.

13 MR. SCHULTZ: That was going to,  
14 essentially, reconnect to this Reg Guide to  
15 demonstrate that there was a cross-reference, if you  
16 will, between the two.

17 MR. BLEY: Before you go to Kim, I guess  
18 I don't understand why all these wouldn't be  
19 consistent, and why you wouldn't have something of the  
20 language Charlie is talking about here if you're going  
21 to have it over there.

22 MEMBER HALNON: Yes, that's what I was  
23 hoping for.

24 MR. BENNER: Well, and for us, they are  
25 consistent, right? Some of the things we've done here

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1 were consistent with the other documents. So now,  
2 we're being asked to maybe add something else, and  
3 we're going to consider that, but I can't go back and,  
4 you know, make the things that have already gone  
5 through the chute consistent until their next review  
6 cycle.

7 CHAIR BROWN: I'm looking at the letter,  
8 the July 14th letter, right now that came back. And  
9 they said, the team recommended they would revise  
10 7-19, how the staff could reduce the scope of  
11 defend/diversity when a design includes  
12 unidirectional. So, they had the words that they were  
13 going to go do this, and then, also, at one point have  
14 1.152 and Reg Guide 5.71 --

15 MR. SCHULTZ: Exactly, and it says --

16 CHAIR BROWN: And their reference is to  
17 5.71 -- and they did incorporate into 1.152 references  
18 to 5.71. It's just absent a sentence that they need  
19 to put in.

20 MR. SCHULTZ: Yes, I understand that. And  
21 I agree with you. It says, "as soon as practicable."  
22 So, I'm sorry it's still coming; that's all.

23 MR. NGUYEN: So, what will come out on the  
24 final version of this Reg Guide, the subject tried to  
25 be consistent with all the guidance, BTP or all the

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1 Reg Guides.

2 CHAIR BROWN: The BTP is absent that right  
3 now. You all did not incorporate the stuff we've  
4 proposed. That's why we ended up writing the letter  
5 to the Chairman, because we've through this rabbit  
6 hole several times. Willing to wait. Okay?  
7 Hopefully, I won't die before then.

8 But this particular Reg Guide is a key Reg  
9 Guide defining how you use and communicate and  
10 maintain independence when you're using computer-based  
11 equipment. And they did a good job on the watchdog  
12 timer in terms of making sure processors work. That  
13 came out pretty decent, not dictatorial, but provided  
14 a thought process on what you all would consider.

15 Using that same thought process for that  
16 one particular paragraph in the Reg Guide, making it  
17 similar would, I think, go a long way to getting this  
18 issue out of our letters.

19 (Laughter.)

20 MR. NGUYEN: Okay. Thank you very much  
21 for your suggestion,

22 CHAIR BROWN: We can go on, if you would  
23 like.

24 MR. NGUYEN: And the staff will consider  
25 your suggestion.

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1 All right. The next one is Clause 5.7.  
2 This clause was expanded to include additional  
3 guidance for the measurement and test equipment for  
4 IT, which is consistent with current regulation and  
5 considered good practice to ensure the proper  
6 functionality of the safety system and the tests.

7 CHAIR BROWN: Before you leave 5.7, we  
8 might as well go ahead and get this copy out on the  
9 table as well. I thought I underlined all of -- I'll  
10 just pick the one place I know I had it, since I've  
11 marked it in red.

12 And it's referring to wireless  
13 communications.

14 MR. NGUYEN: Which section you are at?

15 CHAIR BROWN: I'm in 5.7, "Capability for  
16 Tests and Calibration."

17 MR. NGUYEN: Okay.

18 CHAIR BROWN: The third paragraph was the  
19 first, I think it's the first mention. I was going to  
20 call that up and see if I've got 7-4.3.2. And it's in  
21 the third paragraph, the last sentence.

22 MEMBER MARCH-LEUBA: Do you want me to  
23 read it?

24 It says, "Wireless receivers and  
25 transmitters on temporarily connected M&TEs shall be

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1 disabled prior to connecting to safety-related  
2 equipment."

3 CHAIR BROWN: Yes, and similar words,  
4 there's another set of words in 5.9.2. The last  
5 paragraph says, "All wireless capabilities shall be  
6 disabled on the workstations. All wireless  
7 capabilities on the M&TE equipment shall be disabled  
8 prior to connecting to safety-related equipment."

9 But if you read the whole thing through  
10 here, you get the thought process is that, not  
11 directly, but indirectly, it says the use of wireless  
12 is okay.

13 And just as an example, even with MT&E, it  
14 says make sure you've disconnected your wireless  
15 before you hook it up to your equipment to make  
16 changes in set points or software changes, or whatever  
17 you need to do. So, that's shutting the barn door  
18 after you've already opened it up, after you've  
19 downloaded from the vendor over the internet some  
20 software package for changing or fixing a problem, and  
21 now, it's in the M&TE. So, you disconnect it, and  
22 now, you connect it to your toast; the virus is  
23 planted. It doesn't compute. That's all I --

24 MEMBER MARCH-LEUBA: So, you want  
25 requirements on the measurement and testing equipment?

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1 CHAIR BROWN: It's just the issue is  
2 wireless communications. You don't want to build  
3 equipment that has wireless capability, and then, have  
4 the vendor send the stuff directly to the safety  
5 system via some wireless connection you have. The  
6 wireless issue should be addressed more succinctly, a  
7 little bit in more detail.

8 MEMBER MARCH-LEUBA: And wireless refers  
9 to a dead-end network.

10 CHAIR BROWN: I don't know whether that's  
11 the case or not.

12 MEMBER MARCH-LEUBA: I mean, you don't go  
13 wireless more than 100 feet?

14 CHAIR BROWN: I don't know. I'm not an  
15 expert on that. All I know is wireless says to me  
16 wireless. You're running around wireless with your  
17 cell phone all over the country and you're still  
18 getting information and your software just changed.

19 If you're driving a car that's computer-  
20 driven with wireless connections, they can download  
21 software while you're driving that stops your car.  
22 So, that's wireless. Okay? It's available.

23 So, something needs to be done to address  
24 the wireless issue. It's just these two side  
25 discussions on the wireless issue that stuck out at

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1 me.

2 MEMBER MARCH-LEUBA: For reference, the  
3 instrument technician would have an iPad that he takes  
4 to calibrate equipment in the safety system. And what  
5 this tells it is that, before you disconnect the USB  
6 to your safety-related system, you need to disable the  
7 wireless antenna.

8 CHAIR BROWN: That's right.

9 MEMBER MARCH-LEUBA: What you're saying  
10 is, five minutes before you disable the wireless  
11 antenna, somebody might have some malware.

12 CHAIR BROWN: That's right.

13 MEMBER MARCH-LEUBA: And now, you inject  
14 that via USB.

15 CHAIR BROWN: Exactly.

16 MEMBER MARCH-LEUBA: An issue.

17 MEMBER PETTI: You, basically, want those  
18 iPads to have never seen --

19 CHAIR BROWN: They should have no wireless  
20 connection. If they want to change the software,  
21 there ought to be a package delivered CD, thumb drive,  
22 whatever you do, you plug it into your iPad; you  
23 download the --

24 MEMBER MARCH-LEUBA: You're just moving  
25 the problem one more --

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1 CHAIR BROWN: Well, you've got your SDOE,  
2 theoretically, which covers the download on that thumb  
3 drive that you bring in. All I'm saying is there's  
4 got to be a way to not -- there are more secure ways  
5 to do things than with the wireless connections.  
6 You're right, if a guy brings his iPad in, that it  
7 could be a problem --

8 MEMBER MARCH-LEUBA: Uh-hum, I can see it.

9 CHAIR BROWN: -- what you do with it.

10 MEMBER MARCH-LEUBA: But it's difficult to  
11 -- I mean, if you a vendor is going to send me an  
12 update -- just a set point, for example, there must be  
13 an update in the systems, the set point values  
14 -- they're not going to send in paper anymore.

15 CHAIR BROWN: You don't actually do that.  
16 I didn't ask for paper.

17 (Laughter.)

18 MEMBER MARCH-LEUBA: Yes, consideration  
19 has to be given that the M&TE equipment is secure. It  
20 should be assumed it's not secure.

21 MR. BENNER: I think we understand the  
22 concern and the potential factor, because even -- you  
23 know, it's a different factor, but the reality is,  
24 like you say, if there's a software update for the  
25 M&TE, it's got to come through some mechanism, right,

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1 whether it's wireless, right, or whether it's -- on my  
2 car, I get an email and I can download it to a USB  
3 thumb drive and put it in. All those vectors are a  
4 way to get malware. And like you say, if you connect  
5 the M&TE to the safety system, that's a vector.

6 So, I think we understand the concern and  
7 we'll caucus --

8 CHAIR BROWN: You're going to connect.

9 MR. BENNER: Yes, by definition.

10 CHAIR BROWN: I mean, you've got to  
11 connect something to it.

12 MR. BENNER: Yes. By definition, there  
13 are multiple connections. There's a connection for  
14 M&TE. There's a connection to the equipment, and  
15 there's a connection to something to update --

16 CHAIR BROWN: To get the information  
17 for --

18 MR. BENNER: So, it is whether the  
19 appropriate controls for any vector, whether it's  
20 wireless or whether it's other vectors.

21 CHAIR BROWN: I do know that one of the  
22 design applications that we saw had a separate  
23 maintenance cabinet, but you had to hook up a cable.  
24 You know, you had to go open it up and connect a cable  
25 up to the safety systems in order to download it.

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1 Well, the downloads had to get into that maintenance  
2 cabinet somehow. It's just a matter that no system  
3 is 100 percent secure. No matter what you do in a  
4 safety development and operating environment, there is  
5 no 100 percent guarantee. It's just you don't make it  
6 easier.

7 I don't know, I faced that issue 20 years  
8 ago before I retired. Because the vendors, now that  
9 we had E-Squared PROM that you could erase, boot back  
10 up -- in the old days, we didn't have E-Squared PROM.  
11 It was read-only. Okay?

12 And once we got it, oh, God, this opens up  
13 a whole world. We can send a new software package  
14 down to you via the internet and you can just plug it  
15 into your stuff while it's in the ship. Bad idea.  
16 Really bad idea.

17 So, we ended up going to laptops. So,  
18 we'd get the information, put it on a thumb drive or  
19 a CD, or whatever we had back then, put it into the  
20 laptop. Take the laptop down and do it.

21 Now, did that mean it still could have a  
22 problem? It could still have a problem, but it was  
23 just what we had at the time.

24 MEMBER MARCH-LEUBA: No need to go into  
25 the solution there. The guys should point out the

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1 problem and they should say that it's up to the  
2 applicant to fix it.

3 CHAIR BROWN: Exactly. And this just  
4 leaves it hanging in the air; that's all.

5 MR. NGUYEN: Thank you for the comment,  
6 and the staff will consider the comment --

7 CHAIR BROWN: Okay.

8 MR. NGUYEN: -- and get back with you  
9 later.

10 CHAIR BROWN: Let me see if I've missed --  
11 the other suggestion I would make, since we're on the  
12 control bullet, even though we haven't gotten to it on  
13 your slide, when you introduce the -- what's it  
14 called? -- control of access section, you've got  
15 physical security as a 5.9.1, or something like that.  
16 There ought to be a 5.9.2 which talks about, with the  
17 introduction of software-based/computer-based systems,  
18 we've now introduced a new path for access to the  
19 systems, and talk about it in that context in terms of  
20 how you have to deal with it and the levels of  
21 security, the things you need to think about.

22 I'm not talking about just saying you've  
23 got to relate it back to cyber security. It's just  
24 it's a new path, and you've got to apply the same type  
25 of rules.

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1                   Now, if you're partway because 5.7.1 says  
2 I'm going to look at all the data coming into a plant  
3 or all the signals coming in or an internet, or what  
4 have you, I've got -- I don't know how many -- four  
5 levels or something like that in 5.7.1. You've got  
6 part of that covered. It's just the stuff right down  
7 at the equipment where we've right now been  
8 discussing.

9                   But it just ought to make it clear that,  
10 hey, we've now introduced another significant source  
11 of access that you have to think about at the  
12 equipment level. Okay? Not asking for solutions.  
13 Just you go through what are the issues involved with  
14 it, just like you do with physical security. You talk  
15 about the admin people physical security. Guys doing  
16 this; sign in, blah, blah, blah. Oh, there's all  
17 kinds of stuff you wrote down on physical security,  
18 like it's the least important item, right? It's much  
19 easier to do that than it is to do this other thing.

20                   So, that's just the other suggestion in  
21 terms of clarity in the Reg Guide, identifying this as  
22 a second big, serious path. And we've mentioned that  
23 in the letters. We've talked about that in our  
24 letters to you before, about introducing this new  
25 path, which you'll probably see again sooner or later.

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1           That was the only other point I had on the  
2 control-of-access stuff, I think, unless I remember  
3 something later.

4           MR. HECHT: Charlie, this is Myron.

5           CHAIR BROWN: Yes?

6           MR. HECHT: So, with regard to the  
7 previous point on downloads of software to M&TE for  
8 updates, either to M&TE itself or the actual computers  
9 in the safety system, or I should say programmable  
10 devices in the safety system, there are methods to  
11 ensure the integrity of the downloads. You know, hash  
12 codes for that. The software developers' computers,  
13 you can check as to whether they've been altered when  
14 they reach the destination.

15           And so that, if you can control what's  
16 being received by the M&TE -- for example, through  
17 only a specific wired connection to the laptop or  
18 whatever device you're using to transfer the material,  
19 the software to the safety system -- that, at the very  
20 least, you can ensure the integrity of the file.  
21 That's being done now.

22           CHAIR BROWN: Okay.

23           MR. HECHT: It's unlikely that malware  
24 could be introduced that way.

25           CHAIR BROWN: Like I say, I'm not trying

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1 to say how. I'm not a programmer and I'm not a hash-  
2 tagger. But there are methods that at least provide  
3 some levels of security, and we ought to just  
4 recognize that that needs to be done, now that we're  
5 in this software configuration and access. And we  
6 just don't discuss it. So, that's the suggestion.

7 Thank you, Myron.

8 MR. STATTEL: If I may, Charlie?

9 CHAIR BROWN: Yes.

10 MR. STATTEL: This is Richard Stattel  
11 again.

12 I just want to speak a little bit about  
13 the working group's perspective when we developed this  
14 particular clause. So, I do understand your point.  
15 The overriding requirement here is really in the first  
16 sentence of the paragraph.

17 CHAIR BROWN: Which one are you talking  
18 about?

19 MR. STATTEL: This is 5.7, in that third  
20 paragraph.

21 CHAIR BROWN: Yes.

22 MR. STATTEL: "The M&TE equipment used for  
23 safety systems shall not adversely affect the safety  
24 system functionality." And in our view, all vectors,  
25 all threat vectors that went through M&TE really

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1 should be addressed by that criteria there.

2 And it was brought to our attention while  
3 we were developing this, well, if the M&TE, if the  
4 laptop you're using to perform this -- you can have  
5 all the controls you want on the configuration of that  
6 laptop, but, then, if you have a wireless connection,  
7 that's creating a separate vector that's above and  
8 beyond that.

9 So, that is the reason why the working  
10 group added that clause at the end. We weren't  
11 intending it to be an allowance clause for wireless  
12 communications. We just wanted to address that one  
13 specific vector. We recognize there can be many other  
14 vectors into the M&TE, but our intention was that  
15 those would be addressed under the first criteria  
16 there.

17 CHAIR BROWN: I got that point, but when  
18 you start talking the use, that says, oh, well, if  
19 we've got to think about it in this context, that must  
20 mean it's okay --

21 MR. STATTEL: Right.

22 CHAIR BROWN: -- to apply it in some way,  
23 shape, or form.

24 MR. STATTEL: I understand that.

25 CHAIR BROWN: And I understand. I don't

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1 have any problem with the words you have there. I'm  
2 not following this. We're not expansive enough  
3 because it does give the implication that doing that  
4 just -- that's really okay. But without subsequent --  
5 we're kind of giving it a little bit of a stamp of  
6 approval that you can use those techniques.

7 I mean, if I was a designer, I wouldn't  
8 have anything be wireless, but that's my personal  
9 opinion. I'm a dictator on my own stuff.

10 So, anyway, you'll probably see this.  
11 Whatever the Committee comes out with, we're going to  
12 write a letter on this whole subject, and it will be  
13 whatever the Committee decides we want to put out. If  
14 I can remember some of this stuff long enough to even  
15 write a letter, it might be good. Hopefully, I get  
16 the transcript rapidly since we have to write a letter  
17 in another 14 days.

18 MR. BENNER: Yes, I was going to say, at  
19 least in this case, the full Committee meeting is  
20 pretty close to --

21 CHAIR BROWN: Yes, it's 12 days from now.  
22 So, I'm on a real track to try to get the letter  
23 written.

24 MR. NGUYEN: So, the staff will come up  
25 with something to clarify the wireless criteria.

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1 CHAIR BROWN: Yes. Well, the fact that  
2 the control of access is different, that's one thing.  
3 And then, the wireless is another thing. We ought to  
4 be a little bit more expansive. This is not intended  
5 to say you should have a wireless plant. I don't know  
6 what you do. I'm just thinking outside the box.

7 There was another package in here, while  
8 we're talking about that, if I can -- in 7-4.3.2.  
9 Where's the one on soft -- oh, it's 5.9.3, I think.  
10 That whole thing talks about implementing intrusion  
11 detection software, virus protection software, access  
12 control software into the operating systems. And you  
13 say it should be avoided.

14 MR. NGUYEN: That whole sections speaks to  
15 that whole Clause 5.9.4.3 -- it was from Revision 3.

16 CHAIR BROWN: That might well be Revision  
17 3. Then, I missed that. Okay. If I had seen this  
18 then, I would have probably thrown up all over it.

19 You say, "When implementing cyber security  
20 features" -- and this is in this operating system --  
21 "the following shall be addressed as a minimum. They  
22 shall be justified. Failure modes of the cyber  
23 security. The non-intrusive software features may be  
24 applied, but intrusive cyber security features shall  
25 only be executing when safety systems are out of

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1 service."

2 Well, what does that mean? That means a  
3 cyber security system is useless. The safety system  
4 is, theoretically, on all the time. Just the whole  
5 issue of incorporating virus software detection  
6 features into your operating system really compromises  
7 the ability for the control system to complete its  
8 operations, because it's got to be constantly updated.  
9 It's reactive. You've got to constantly update virus  
10 softwares.

11 MEMBER MARCH-LEUBA: The easiest, simplest  
12 implementation -- and I think this is what the people  
13 who wrote this were thinking about -- is that you  
14 continuously check for the integrity of your  
15 executable programs. They're encrypted and they have  
16 a signature within them before you run them. And you  
17 make sure they haven't been modified. That's a cyber  
18 security feature and that can be --

19 CHAIR BROWN: Yes, but that's fixed.  
20 Okay?

21 MEMBER MARCH-LEUBA: It's fixed, yes.

22 CHAIR BROWN: That's not intrusion  
23 detection per se. It says my code is still what it  
24 was before.

25 MEMBER MARCH-LEUBA: Well, that's

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1 intrusion. My code has not been modified.

2 CHAIR BROWN: Yes, they haven't broken  
3 into my house because the door lock is not broken.

4 MEMBER MARCH-LEUBA: Yes.

5 CHAIR BROWN: It's just somewhere in here  
6 it almost -- again, this is a little bit similar to  
7 the thought process on the other one. You don't want  
8 active virus detection software in the mainstream of  
9 your operating system.

10 And I agree with Jose, there are built-in  
11 things you don't have to constantly change. In other  
12 words, how do you verify your code at the beginning is  
13 the same as the one you started, you know, the same  
14 you started with? That type of verification, you do  
15 that with data checking when you send data -- with  
16 checksums, and what's the other --

17 MEMBER MARCH-LEUBA: CRC?

18 CHAIR BROWN: Cyclic redundancy checks.  
19 You do that all the time in terms of can you confirm  
20 data that you send in is the same data coming out.

21 MR. NGUYEN: Fixsum.

22 CHAIR BROWN: Fixsum, cyclic redundancy  
23 checks, et cetera, you use all the time for this type  
24 of stuff. Because this is not -- that's on a data  
25 transmission. That's a communication issue, not an

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1 operational software.

2 MR. NGUYEN: But could that go to the  
3 self-diagnostic detection?

4 CHAIR BROWN: I don't know. I'm just  
5 saying that issue -- I'm just questioning whether we  
6 ought to be a little bit more cautionary. That's in  
7 the IEEE standard. I don't remember us saying  
8 anything -- I don't remember 1.1.5.2 addressing virus,  
9 you know, your Rev 4 or anything. I just think we  
10 need some type of cautionary tale that incorporating  
11 virus detection software that's active-type software  
12 into the operating system, you should be careful.

13 MEMBER HALNON: But, Charlie, they use the  
14 word "non-intrusive/intrusive." Are you conflating  
15 the word "active" --

16 CHAIR BROWN: Active means something  
17 that's constantly reviewing, stopping -- virus on your  
18 computer --

19 MEMBER HALNON: Yes. No, I understand.

20 CHAIR BROWN: -- and it slows down.

21 MEMBER HALNON: I guess my question to you  
22 -- I mean, everything you just said, I'm looking at  
23 5.9.3 and I say it's there. So, I don't know. In my  
24 simple way of reading things, I see it's there, but if  
25 you feel like, you know, in your expertise, that it's

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1 not clear enough -- I mean, again, I'm in a learning  
2 mode.

3 CHAIR BROWN: I couldn't write virus  
4 protection software if you wanted me to.

5 MEMBER MARCH-LEUBA: Yes, but, if you read  
6 5.9.3, it clearly says, "Implementation of cyber  
7 security features directly in the safety system should  
8 be avoided." That's exactly what you're saying. And  
9 the previous sentence says you should do it outside on  
10 the envelope.

11 CHAIR BROWN: Well, it says,  
12 "peripherally."

13 MEMBER MARCH-LEUBA: Yes. So, before you  
14 inject anything, you have to make sure it has run  
15 cyber check. I think it is properly "implement."

16 CHAIR BROWN: So, you're all satisfied  
17 with that?

18 MEMBER MARCH-LEUBA: I am.

19 MEMBER HALNON: Right, and it also says  
20 that, when you mentioned that the intrusive cyber  
21 security features shall only be executing when safety  
22 systems are out of service, that emphasized the word  
23 "intrusive safety." Just the one before that says  
24 non-intrusive cyber security features can be applied,  
25 and that's the self-diagnostic, self-reporting, the

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1 checksums, all those types of things that you were  
2 talking about.

3 So, again, if there's some clarification  
4 of language for the digital practitioner, then that's  
5 one thing. But, at least from a descriptive mode, I  
6 was following what you were saying and I saw it there.

7 CHAIR BROWN: Well, virus scanning when  
8 the safety systems are out of service, but it's built  
9 into the software --

10 MEMBER HALNON: No, it can't be.

11 CHAIR BROWN: Well --

12 MEMBER HALNON: Because it says earlier,  
13 it says you can't have -- you shouldn't do that when  
14 implementing cyber security deployment -- I mean, the  
15 implementation of cyber security features directly in  
16 the safety system should be avoided.

17 MEMBER MARCH-LEUBA: Yes, but, then, the  
18 next paragraph says, if you really insist, you should  
19 follow these guidelines.

20 CHAIR BROWN: Yes, if you really insist;  
21 that's the next --

22 MEMBER HALNON: Again, that's --

23 MEMBER MARCH-LEUBA: And the staff is  
24 telling them --

25 CHAIR BROWN: And then, it says,

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1 "inclusive cyber security systems."

2 MEMBER MARCH-LEUBA: The staff is telling  
3 them don't do it.

4 CHAIR BROWN: So now, I've got intrusive  
5 virus detection scanning. For instance, virus  
6 scanning systems, for example, shall only be executed  
7 when it's out of service. Well, but it's sitting  
8 there and it's got to be updated at some point. That  
9 means you've got to consciously come through and re-  
10 update it --

11 MEMBER MARCH-LEUBA: Uh-hum.

12 CHAIR BROWN: -- because a week later that  
13 software is no good anymore. It's missed the last 15  
14 upgrades.

15 MEMBER HALNON: But it's outside of the  
16 safety system. So, it can't --

17 CHAIR BROWN: No, it's in the operating  
18 system. Yes, it's in the operating system.

19 MEMBER BIER: Greg, I'm wondering whether  
20 part of the kind of difference of opinion between you  
21 and Charlie can be addressed by providing more  
22 concrete examples in the places you're seeing.

23 MEMBER HALNON: Yes, I think you're right.  
24 I think it's in the nomenclature language.

25 MEMBER BIER: Yes, you know, they have

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1 some general terms that address it.

2 MEMBER HALNON: Yes.

3 MEMBER BIER: It's maybe not as specific  
4 as Charlie would like, but it could be added. You  
5 know, it could be supplemented with just "such as"  
6 blah, blah, blah, and that might make it --

7 MEMBER HALNON: Yes, I agree, my language  
8 is not precise to the digital world.

9 MEMBER BIER: Yes.

10 CHAIR BROWN: The non-intrusive one, it's  
11 just you want to provide data going out somewhere for  
12 diagnostic purposes? I didn't have any problem with  
13 that. Okay? It's not really a cyber security  
14 feature. It's really more of a monitoring what I've  
15 got in there. I'm sending it out. Just as long as  
16 it's one way, I'm happy with that.

17 But the intrusive features when you're  
18 going to do virus scanning, that means, you know, the  
19 next day whatever virus scanning codes you've got in  
20 there is no good anymore. It's being updated  
21 constantly.

22 I don't know about your computer, but I  
23 know on my home computer I'm constantly seeing a  
24 little flag comes up that says, "Hey, please download  
25 this," or what have you.

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1                   MEMBER HALNON: I have a Mac. It doesn't  
2 require that.

3                   (Laughter.)

4                   CHAIR BROWN: Yes, well, everybody loves  
5 the Mac.

6                   MEMBER HALNON: I guess I could see where  
7 you're going, but, again, I just want to emphasize  
8 that I'm looking at it from a descriptive point of  
9 view, and you're looking at it from a tacticianer,  
10 practitioner's point of view. So, this is why I just  
11 wanted a clarification of where you were going with  
12 it.

13                   CHAIR BROWN: Yes, again, how we deal with  
14 that, up to this point we had not had to face that in  
15 terms of intrusive virus detection software, because  
16 the only time you would really need it was when you  
17 would be downloading a new software package. If you  
18 do not allow any -- if your control of access does not  
19 allow stuff to come in from any other source other  
20 than your controlled source, then you've put another  
21 layer of protection there and you don't have to have  
22 virus intrusive stuff.

23                   If you have bidirectional communications  
24 going, you know, clear out to the internet for your  
25 safety system, then you've got a real problem. Okay?

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1 That would mean you would have to have intrusive cyber  
2 security features, and you don't want that.

3 That's another good reason for having your  
4 unidirectional communications, because your  
5 protection, basic protection systems, they take care  
6 of themselves. They trip on their own. They do  
7 everything on their own, and the manual controls are  
8 literally manual controls.

9 Anyway, again, that was one of the other  
10 issues relative to what's in 7-4.3.2. And both the  
11 cyber thing as well as -- that's all under control of  
12 access.

13 Oh, somebody reminded me we've been going  
14 at this now for two hours and 15 minutes, almost 15  
15 minutes.

16 And, oh-oh, did we just lose something?

17 MEMBER BIER: I think they just turned off  
18 the shared slides.

19 CHAIR BROWN: Oh, okay. All right.

20 MEMBER BIER: I think we're okay.

21 CHAIR BROWN: Is everybody interested in  
22 having a 15-minute break?

23 Okay. We will recess for 15 minutes and  
24 return at -- what time is it? I can't read that.  
25 10:49? Make it five after 11:00.

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1 Recessed.

2 (Whereupon, the above-entitled matter went  
3 off the record at 10:49 a.m. and resumed at 11:07  
4 a.m.)

5 CHAIR BROWN: Okay, we're back in session  
6 now, a couple of minutes late, but we're okay. Khoi,  
7 if you would like to go ahead and proceed.

8 MR. NGUYEN: Yes, I would.

9 So for clause 5.6, this one is the newest  
10 clause, was added in 2010 to provide the criteria of  
11 software testing to address common cause failures in  
12 program or digital devices. The staff reviewed these  
13 criteria and found that these criteria are consistent  
14 with the testing acceptance criteria described in  
15 Section 3.1.2.A of BTP 7-19, chap 8.

16 Clause 5.17 --

17 CHAIR BROWN: No, go back. Go back to 16  
18 for a minute.

19 MR. NGUYEN: Sure.

20 CHAIR BROWN: This -- I'm trying to figure  
21 out which way. I'm looking at the first sentence in  
22 5.16. Thought I had a note -- common cause failure  
23 that I cannot -- well. I didn't have any problem with  
24 the reg guide, I mean the IEEE standard. It was a  
25 matter of how it's emphasized.

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1                   MEMBER HALNON: Are you talking about the  
2 prevention --

3                   (Simultaneous speaking.)

4                   CHAIR BROWN: Yeah, well, it's like the  
5 use of systems has led to concerns that design errors  
6 have been caused. None of the stuff you talk about --  
7 design errors are going to happen. You're not going  
8 to get something right.

9                   How you design the software, how you write  
10 it is not a design error necessarily. How you do data  
11 checking is not going to fix your problem, whether you  
12 have an 8-bit or 16-bit work, it doesn't -- it's not  
13 going to change errors happen in analog systems. You  
14 do something wrong, you've got to go fix it.

15                   The issue is not design errors so much as  
16 software gets corrupted, or the most it can. And  
17 particularly in interrupt-driven systems it can get  
18 corrupted because you're moving around. You never  
19 know whether it's going to come back to the path you  
20 started with if the return doesn't necessarily lead  
21 you back.

22                   And wash-down timers fundamentally give  
23 you some help with that if a processor doesn't finish  
24 its sample period and you get reset. So it was a --  
25 it was software design errors that gave me a little

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1 bit of pause that it's kind of the -- not the message  
2 it leads to. And one of our -- one of our letters, I  
3 mean, I might -- I may even have that.

4 I think we used some words in one of our  
5 letters, I can't remember which one it was.

6 MEMBER HALNON: Charlie, can I ask a quick  
7 question while you're looking?

8 CHAIR BROWN: Yeah, go ahead.

9 MEMBER HALNON: In this section it talks  
10 about if the consequence of potential of CCF is  
11 unacceptable, a D3 analysis shall be prepared.

12 Isn't the D3 analysis part of the design  
13 in the system in the first place, so that you know how  
14 your defense-in-depth and diversity has to be built  
15 into the system? This is saying you take the system,  
16 you look for common cause failures, and then you do a  
17 D3 analysis if it's not acceptable. Am I getting this  
18 backwards, or is this a spaghetti thing?

19 MR. NGUYEN: That's the typical process.

20 MEMBER HALNON: That's a typical process.  
21 Okay, I took away from the previous subcommittee  
22 meetings that D3 analysis was part of the design of  
23 the system in the first place.

24 But I think for our designers, there was  
25 an iterative nature. Okay, it's certainly a

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1 consideration, so okay.

2 CHAIR BROWN: Okay, one of our letters, or  
3 at some point, I'm not remember exactly where, but  
4 we've mentioned this before. The use of software-  
5 based obviously provide a lot of benefits in terms of  
6 the operations. But the new modes of common cause  
7 failures, not design errors, but unused code.

8 I mean, you look at some of the platforms  
9 you used, there's a lot of code in there that does  
10 other things but you may not use it in your  
11 application when you program your application code  
12 into it.

13 Unintended or prohibited functions that  
14 can get buried in that type of code. Silent failures,  
15 lockup, it just doesn't come back on track. Failure  
16 to complete processing all your safety functions in  
17 the same -- with a software operating cycle.

18 All those -- all those things, they're not  
19 design errors, they're things that can occur just  
20 because the nature of the software and the software  
21 processing system. When your mouse stops moving, you  
22 know something's -- not -- you didn't do anything, all  
23 of a sudden it just didn't work. You clicked on  
24 something and it doesn't work.

25 And the primary protection against, is

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1 this my perspective, it's not the Committee  
2 perspective, this is my own perspective. In the  
3 safety systems, particularly protection and  
4 safeguards, are -- you have a robust, multi-division  
5 architecture. Architecture is not mentioned in any of  
6 these, either the reg guide or the other one.

7 In other words, redundancy, independence,  
8 how you process. Deterministic, you don't, but that's  
9 a better way to do it if you can. Defense-in-depth  
10 and diversity are all factors, as well as manual  
11 backup of controls for doing stuff.

12 And I just, to me, focusing common cause  
13 failures functionally looking at design -- design, you  
14 know, design issues, which is what's in the -- which  
15 is what's in the IEEE standard, is -- seems to be some  
16 amplification explaining that it's where you kind of  
17 counter the just thought-of design process.

18 I tried to look and see if the -- your  
19 writeup in 4.1 doesn't really cover all of that, that  
20 type of a water front. It's just a suggestion to  
21 think about in terms of emphasis. Do you send the  
22 wrong message that it's design errors that you're --  
23 that you're -- which is what the IEEE standards calls  
24 out in that -- in that particular section.

25 So haven't figured out how I'm going to

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1 address that yet, if I even do. But it's just  
2 something to put on the table. That's -- because the  
3 function is fundamentally focused on design errors.  
4 Anyway, that's just something to think about, I wanted  
5 to bring it up since we were on that section.

6 If you have any comment, you can go ahead  
7 and make it. You look like you're pondering  
8 something, Eric.

9 MR. NGUYEN: I have some something.

10 CHAIR BROWN: Okay, you're not pondering,  
11 that's fine.

12 MR. BENNER: I'm pondering, I'm hoping  
13 that one of the people more knowledgeable than I will  
14 jump in.

15 MR. STATTEL: I can speak a little bit to  
16 it. This is Rich Stattel again.

17 CHAIR BROWN: Yeah.

18 MR. STATTEL: So, again when we were  
19 developing this, the term software failure was brought  
20 up. And in our discussions we came to the realization  
21 the word failure implies that it worked one day and  
22 then something happened and then the software started  
23 behaving differently.

24 And the reality of it is for the people in  
25 the software industry, that's -- that's not how

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1 software works, right. It can't fail, it can't wear  
2 out, it can't just behave one way one day and then  
3 something happened and it doesn't behave that way.

4 But it can manifest itself in a failure,  
5 right. So we essentially, we create -- we coined this  
6 term design errors, right. And then in the second  
7 paragraph, we defined the latent software fault.

8 So we tried to explain how a software  
9 design error can be undetected, and it kind of leads  
10 into a scenario where it appears that the software is  
11 functioning correctly one minute and then later it  
12 doesn't.

13 But the reality of it is the conditions  
14 that basically led to that latent failure emerging and  
15 showing up as a system failure -- so we -- this is an  
16 attempt to explain the relationship between a software  
17 design error, because they're all -- software is  
18 designed, and it's always an error when something's  
19 wrong with it. And the actual system performance,  
20 which appears more like a failure.

21 CHAIR BROWN: So your view of software  
22 design error is not a functional operational system  
23 need, just have something -- but yet it's programmed  
24 -- not programmed incorrectly. Or it's programmed --  
25 that's the way --

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1 MR. STATTEL: It's always -- it's always  
2 programmed incorrectly, right.

3 CHAIR BROWN: Oh, yeah, if you want  
4 something to do X and it doesn't do X.

5 MR. STATTEL: Right, but we -- we  
6 recognize that you can't achieve perfect software,  
7 right. So there's always some potential, and it  
8 should be minimized, that's really our guidance here,  
9 there's always some potential that there are some  
10 latent scenarios or latent errors, we'll call them,  
11 that could -- could turn out to manifest themselves as  
12 system failures or system faults if the right  
13 conditions emerge, presented.

14 And again -- again, the guidance is to,  
15 you know, do the best you can to avoid those errors,  
16 those design errors.

17 CHAIR BROWN: Okay, but you're thinking  
18 more of how the software execute type design errors as  
19 opposed to software executing a design feature and the  
20 design feature is incorrect.

21 MR. STATTEL: So I'm thinking you're --  
22 you're referring to like a software requirements  
23 error.

24 CHAIR BROWN: Yeah.

25 MR. STATTEL: That just implemented the

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1 way it was called for in the requirements.

2 CHAIR BROWN: Yeah, or a functional  
3 operational thing you want to have happened and it's  
4 confusing. It can come out one or the other, but you  
5 don't know it.

6 MR. STATTEL: But in the design  
7 engineering world, that's also a design error, so. So  
8 you --

9 CHAIR BROWN: So you're all-encompassing  
10 in your role.

11 MR. STATTEL: It was just the view that we  
12 took on that. We did not want to use the term  
13 software failure because that implied --

14 CHAIR BROWN: Software doesn't fail, I  
15 understand.

16 MR. STATTEL: Right, it doesn't really  
17 fail.

18 CHAIR BROWN: I never liked that  
19 terminology. Okay.

20 MEMBER BIER: It didn't fail because it  
21 never worked in the first place, right?

22 MR. STATTEL: Correct, correct.

23 CHAIR BROWN: All right, I'd like to be so  
24 confident. All right, go ahead. Where we going --

25 MR. BLEY: Charlie, before you leave that

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1 one.

2 CHAIR BROWN: Yeah, Dennis. Go ahead.

3 MR. BLEY: I like what they're saying a  
4 lot. It's kind of akin to, and the first ideas on  
5 this I think came out of the Athena approach for  
6 human-involved failures, which means when the  
7 situation turns out wrong for you, people can act  
8 funny.

9 People have pursued this in software. I  
10 was involved with some who did, Eric Hollnagel and  
11 Steve Epstein pursued it a bit.

12 And our former consultant, Sergio Guarro,  
13 did provide some really nice examples in this area.  
14 He was a former consultant to NRC on this, and that  
15 work got dropped along the way. I'm not sure what  
16 happened there, but there's a pretty interesting  
17 history behind those ideas and it might be worth going  
18 back and looking at that one of these days.

19 CHAIR BROWN: Well, I don't have those.

20 MR. BLEY: You did once. I can provide it  
21 to you.

22 MR. STATTEL: This is also a similar  
23 perspective that Nancy Leveson, Dr. Leveson, put into  
24 her book. And essentially dispelling the notion that  
25 -- of a -- that a software can actually fail.

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1 MR. HECHT: Software is a list of  
2 instructions. This is Myron. It doesn't fail any  
3 more than a recipe or a sheet of music fails. It's in  
4 the performance or in the implementation that failures  
5 occur. And that happens at the system level. That  
6 happens when a microprocessor or a digital device  
7 executes that software and puts out stuff that you  
8 don't expect it to.

9 So strictly speaking, no, software doesn't  
10 fail because it -- any more than a bad magazine  
11 article fails. But people use the term software  
12 failure to really mean system failures caused by  
13 software defects.

14 MR. BLEY: Well, Myron, that's -- I think  
15 that's really true today. But 20, 30 years ago,  
16 people kind of had it embedded that there was such a  
17 thing, and that, you know, you would have one failure  
18 per thousand lines of code or something like that.  
19 And but I think I agree with you.

20 MR. HECHT: That was one -- that was one  
21 defect, a thousand lines of codes, that's how thing  
22 used to be measured. And they're still measured that  
23 way. The defect density, but defect density you hope  
24 is correlated with software -- system reliability, the  
25 software component thereof. I won't use the term

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1 software reliability.

2 But you know, earlier work (inaudible),  
3 they came up with a full taxonomy of how to deal with  
4 software failures. And basically there was a defect,  
5 a triggering event leading to a processor failure.  
6 And then it leading to the execution failure. Then  
7 leading to effects on the outside.

8 MR. BLEY: And there's a real difference  
9 between that point of view, which kind of assumes that  
10 that defect density is proportional to system failure,  
11 and to the idea that what really happens is one of  
12 those defects is buried in a place that never gets  
13 exercised by the test program by normal operations  
14 until one day the right set of incoming conditions  
15 occurs and then you execute it and find it. Which is  
16 substantially different in likelihood.

17 Anyway, this is a diversion, so we  
18 probably ought to get back to the present.

19 MR. HECHT: Okay, I agree. But I agree  
20 with you, Dennis.

21 CHAIR BROWN: You all do have some words  
22 on that in the reg guide, in 4.1. I think you just  
23 add it up, so. If you -- uh, oh, we just lost him?

24 MR. NGUYEN: No, I think he's changing his  
25 screen.

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1 CHAIR BROWN: That's not a slide.

2 MR. BENNER: Yeah, no, my -- I think Mike  
3 Eudy is trying to read all our minds and say which  
4 document we're looking at --

5 MR. EUDY: Yeah, I'm sorry.

6 MR. BENNER: Whether it's the reg guide or  
7 the presentation. I think he's done a great job. If  
8 you're okay, we can move back to the presentation.

9 CHAIR BROWN: We can move back to the  
10 slide. I think we'll --.

11 MR. NGUYEN: Okay, move on to clause 9.17.  
12 This one is a new clause, was added to provide  
13 guidance for the use of commercial digital equipment.  
14 The staff collaborated with the Division of Reactor  
15 Oversight to evaluate the discourse and concluded that  
16 the guidance in this clause is consistent with both  
17 Appendix B of 10 CFR Part 50 and 10 CFR Part 21.

18 These items are also consistent with the  
19 NRC-endorsed ASME NQA S-1 2015, subparts 2.7 and 2.14.  
20 Also consistent with the Electrical Power Researchers,  
21 or EPRI, Technical Report 106439, EPRI Technical  
22 Report 3002002982, which is endorsed by Reg Guide  
23 1.164.

24 MEMBER HALNON: I just got to -- I think  
25 it's an administration issue. In item 3 where you say

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1 you don't -- you don't endorse Annex C but you do  
2 endorse 5.17. You go to 5.17 and it says, the first  
3 thing in there says no, go to Appendix C.

4 And then Appendix C further has the  
5 concept of digital delta, which is not endorsed but  
6 it's used in Appendix D, which is endorsed.

7 Do you see the confusion I get in the  
8 circular conversation that we're having about what's  
9 endorsed, what's not endorsed, what can I use, what I  
10 can't use? I just think that, you know, to me it was  
11 confusing to when I went through that chain of  
12 administrative ties to different sections.

13 So this is all in the reg guide.

14 MR. NGUYEN: Can you repeat the section in  
15 the reg --

16 MEMBER HALNON: Yeah, so in the Reg Guide  
17 No. 3 under the background, it says that Annex C has  
18 not received NRC endorsement. This reg guide endorses  
19 5.17. So you go to 5.17 of the IEEE document, and it  
20 says, no, see Annex C. Well, you didn't endorse that.

21 And then you go to Annex D, which you did  
22 endorse, and it talks about the digital delta, which  
23 says go to Appendix C to figure out what that is. So  
24 --

25 MR. NGUYEN: Let me try this way.

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1           MEMBER HALNON: There's not -- it's not a  
2 technical issue, it's more just administration and how  
3 confusing it is when you bring in, you know, you're  
4 either going to have to clarify that Appendix C  
5 digital delta applies to what we're talking about in  
6 Appendix D or Annex D, I'm sorry. And that 5.17 is  
7 all-inclusive, but it says go to Annex C, which you  
8 say you don't endorse.

9           So somehow you got to tighten that up a  
10 little bit, in my mind. Maybe I'm not reading it  
11 correctly, but that's the way I read it.

12           CHAIR BROWN: I would amplify that. I had  
13 -- yeah, in spades, because my notes were how can you  
14 endorse 5.17 when we've now got 1.164 and 1.250, all  
15 the commercial dedication stuff is tied up in the NEI  
16 documents and those topical reports. And how does  
17 that merge with the stuff in Annex C, which we're not  
18 endorsing for the COD stuff.

19           It just seems to me we've just gone  
20 through the drill of a commercial dedication process.  
21 And why even endorse 5.17? You really ought to just  
22 endorse for commercial dedication the reg guides and  
23 documentation that we already have in place and not  
24 refer to Annex C.

25           MEMBER HALNON: Which it does list. The

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1 endorsement of 5.17 adds in this circular conversation  
2 about --

3 CHAIR BROWN: Yeah, but the stuff we've  
4 endorsed, the reg guides we've put out -- exactly.  
5 They come -- it says further guidance for commercial  
6 is in all these documents. Well, why bother with  
7 5.17? It just confuses things.

8 MEMBER HALNON: And --

9 CHAIR BROWN: The circular references back  
10 to Annex C.

11 MEMBER HALNON: The majority of Annex C is  
12 verbiage out of a reg -- I mean a generic letter. So  
13 it's you don't endorse their generic letter on. It's  
14 just a --

15 CHAIR BROWN: Well, did you read all of --  
16 did you read all of 5.17? There's four -- there's  
17 four, five, six, six pages all tied up under use of  
18 commercial equipment.

19 MEMBER HALNON: Yeah.

20 CHAIR BROWN: In 5.17. Well, do those  
21 apply, or is it the topical reports and 1.164 and  
22 1.250? I got -- there was no way in the time to go  
23 back --

24 MEMBER HALNON: Well, it gets to the  
25 spaghetti thing that we talked about earlier.

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1 CHAIR BROWN: Yeah.

2 MEMBER HALNON: That's getting worked out.

3 CHAIR BROWN: This isn't spaghetti, this  
4 is a humongous lasagna of spaghetti.

5 MR. NGUYEN: Yeah, we recognize the  
6 spaghetti problem. We have many guidance on the same  
7 topics. However, we look at the -- in the different  
8 angle to see whether this guidance is endorsable or if  
9 it doesn't, we'll, you know, make the exception.

10 In this case, we say it's not perfect but  
11 it's one way, one approach acceptable for staff to  
12 review. But does, you know, applicant or licensee to  
13 use or Reg Guide 1.250 and Reg Guide 1.164 you  
14 mentioned as another method.

15 CHAIR BROWN: Why go to all the effort of  
16 having 1.164 and -- we spent humongous amounts of time  
17 doing -- going back through those topical reports and  
18 the NEI guidance and 1.250. And now we say, oh, well,  
19 here's another thing. IEEE put out this thing, and  
20 that looks okay also. I just, this is just  
21 incongruent to me.

22 And I hadn't -- I know what I would be  
23 recommending, but I'm not going to say it here in the  
24 meeting. But it seems to me that that whole thing  
25 ought to be just canned and just say we're not

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1 endorsing Annex C and we're -- 5.17 is not endorsed  
2 either.

3 MEMBER HALNON: It would suffice to me if  
4 you just eliminate my confusion, however that may be.

5 CHAIR BROWN: Well, I hated to do all that  
6 work and review all that stuff just to come back and  
7 say hey, there's this -- why didn't you all just  
8 instead of going through 1.250, why didn't we just  
9 come off here with IEEE 7-4.3.2 5.17. If that's good  
10 enough, why not? We shouldn't have two ways of doing  
11 it, that's all I'm saying.

12 MR. NGUYEN: For your information also,  
13 when this reg guide was developed, Reg Guide 1.250  
14 still under development. So --

15 CHAIR BROWN: Well, we'll give you a  
16 suggestion then.

17 MR. NGUYEN: So just for the information,  
18 I'm not saying that what you're saying is wrong, but  
19 --

20 CHAIR BROWN: I got that. I'm not  
21 accusing anybody of malfeasance. It's probably the  
22 case since we just wrote the letter on that several  
23 months ago.

24 MEMBER BIER: I wonder if part of the  
25 problem with the spaghetti of referring to different

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1 reg guides is the desire to keep options open for  
2 industry if, you know, in year X we said a certain  
3 method was endorsed, that somebody may have gone  
4 forward with that and we don't want to now change and  
5 say hey, somebody else came out with a better way, no,  
6 just got to do that.

7 Is that part of what's driving the  
8 complication, or just not having the time and budget  
9 to go through and clean up all the different reg  
10 guides?

11 MR. BENNER: Well, this Eric Benner. So  
12 I think that's an element of it. Member Brown said  
13 there shouldn't be two ways, and I would push back on  
14 that. There should be as many as there -- that are  
15 acceptable. So we, you know, we did a heavy lift on  
16 the Reg Guide 1.250 to -- for a new way.

17 We're not -- we're not removing this way,  
18 so I mean, it's as simple as that. I think we can  
19 certainly go back, and regarding the clarification to  
20 make sure, you know, to the reader that we don't --  
21 we're not creating confusion by, like you say,  
22 endorsing 5.17, explicitly saying we're not endorsing  
23 Annex C.

24 I can see how, well, what's that mean,  
25 right. So we'll go back and look at that.

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1 CHAIR BROWN: Well, we had a  
2 recommendation in our letter that said, hey, if you're  
3 going to go endorse commercial equipment and this to  
4 certify with, that you have to make sure whatever  
5 you're going to be certifying is capable of  
6 incorporating. And you all -- requirements that are  
7 in the other reg guides that deal we with when we're  
8 doing it.

9 And you all did that. You prepared a  
10 paragraph, it came out just fine, okay. That's not in  
11 here. So do we need to now modify your reg guide to  
12 go put that information in, along with your statement  
13 on 5.17?

14 Because it's another caveat relative to --  
15 because we were -- we were pretty focused on trying to  
16 make sure that whatever commercial stuff gets out,  
17 it's going to be able to be functionally utilized by  
18 the applicants for -- and meet the other requirements  
19 that we have.

20 This doesn't address that issue. It's  
21 just hey, we'll dedicate this stuff and find out it  
22 works and do some hazard analysis and everybody's  
23 going to walk away happy.

24 And the confusion is the spaghetti  
25 approach, we don't endorse the Annex, 5.17 we do

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1 endorse. But then we throw all the other stuff in,  
2 here's some more information to allow you to go  
3 dedicate. Well, is it a mish-mash, do they have to  
4 blend them? It's just --

5 MR. BENNER: And they certainly don't have  
6 to blend it with Reg Guide 1.250, because that was a  
7 discrete way for using civil certifications in your  
8 commercial grade dedication programs. Now, the  
9 interface between this and just the overall reg guide  
10 on commercial grade dedication programs, there clearly  
11 is overlap between those two.

12 CHAIR BROWN: This did not get as much  
13 overview on the commercial dedication.

14 MR. NGUYEN: Also -- sorry.

15 CHAIR BROWN: Go ahead, no, go ahead,  
16 Khoi.

17 MR. NGUYEN: So I would like to point out  
18 that when Reg Guide 1.250 applied to both analog and  
19 digital. This clause specifically prepared for our  
20 program for digital device and had some good criteria  
21 for the digital devices. So, and we couldn't find  
22 anything that not acceptable to endorse.

23 And again, we are not trying to say that  
24 this, you know, the endorsement of this have to be  
25 working in conjunction with all the reg guides. No,

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1 this is one way to -- one approach to meet the  
2 regulation for a programmable digital device.

3 And we also reference to Reg Guide 1.250  
4 for commercial grade dedication for more information.  
5 But I don't know. We may need to clarify the  
6 reference.

7 And I see in clause 5.17 to the -- not  
8 make, you know, the confusion that why we're not  
9 endorsing. And I see endorsed -- and we endorse cross  
10 and the cross-reference. And I see -- so we will make  
11 that clarification.

12 CHAIR BROWN: Well, I'm not sure how our  
13 phraseology is going to come out in the letter, so  
14 we'll see if we -- how we deal with that.

15 MR. BENNER: I think we understand the  
16 concern expressed by the members.

17 MR. NGUYEN: Think we move on?

18 CHAIR BROWN: Yes.

19 MS. ANTONESCU: Member Brown, we have --  
20 we have Greg Galletti from the Reactor Oversight and  
21 Quality Assurance and Vendor Inspection. He had his  
22 hand up.

23 CHAIR BROWN: Oh, I didn't see the -- I  
24 didn't see the hand up.

25 MR. GALLETTI: No problem. Greg Galletti

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1 with the Quality Assurance Vendor Inspection Branch.  
2 Actually, during the discussions, my thought had been  
3 captured, so I actually put my hand down. But I do  
4 understand the conversation that you've provided and  
5 will certainly take a look into that.

6 CHAIR BROWN: This is on 5.17?

7 MR. GALLETTI: Yes.

8 CHAIR BROWN: Annex to the discussion we  
9 just had, right?

10 MR. GALLETTI: Yes, correct.

11 CHAIR BROWN: Okay, all right, thank you.

12 MR. NGUYEN: All right, clause 5.18. This  
13 clause was added to clarify the concept of the  
14 simplicity and complexity. It doesn't provide any  
15 guidance except for the clarification for those two  
16 terms. Any question on this slide?

17 CHAIR BROWN: The simpler the better,  
18 right? Pardon.

19 MEMBER HALNON: Thus the ALARA of the  
20 digital world.

21 CHAIR BROWN: There's no such thing as  
22 simple in the digital world.

23 MEMBER HALNON: As simple as reasonably  
24 achievable.

25 MR. NGUYEN: Now we move to next slide,

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1 slide 13. This slide and the next slide that cover,  
2 you know, what we already discussed while the meeting,  
3 you know, the direction from the Commission to revise  
4 two reg guides, 1.152 and 5.71.

5 So if you're not opposing, I can skip  
6 these two slides. Okay.

7 CHAIR BROWN: Go to the next slide.

8 MR. NGUYEN: Yeah, that's a paragraph into  
9 the -- into the reg guide, and you --

10 CHAIR BROWN: This is the one I suggested  
11 that we add some --

12 MR. NGUYEN: Right, and we're already  
13 talking about.

14 CHAIR BROWN: Some words similar to the  
15 wash-down timer words for application.

16 MR. NGUYEN: So we can skip to slide 15.  
17 This slide provides the mapping between the regulation  
18 and the guidance. 10 CFR 50, Part 50.55(A)(h)  
19 requires that the protection system for nuclear power  
20 plants meet the requirement of IEEE Standard 279 and  
21 603 and the correction sheet depending the licensing  
22 basis of the plant for safety systems using digital  
23 programmable computers, 603, 1991 reference 742, 1982  
24 for guidance for meeting the requirements.

25 So the mapping between the regulation from

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1 the top to on the left was a guidance that endorsing  
2 the IEEE. So this is very straightforward.

3 Any question on this?

4 CHAIR BROWN: I'll tell you in a minute.  
5 I've lost the page. Oh, no, that's, yeah. Anybody  
6 else have any comment on this particular slide? No?  
7 I don't.

8 MR. NGUYEN: All right, we're on slide 16.  
9 We already discussed about the incorporation of the  
10 SEO, the guidance from EPRI of the reg guide to 2016  
11 version of 742. So for this proposed revision of the  
12 reg guide, we removed -- that's SDOE guidance.

13 CHAIR BROWN: Now go -- this reminded me  
14 of one. Go back to slide -- no, that one, go ahead.  
15 I just meant I might have gotten lost here. Slide 16  
16 is what I'm -- that's different than the slide 16.  
17 Somewhere I called up -- they called up the wrong set  
18 of slides. How many total slides do you have?

19 MR. NGUYEN: Twenty, twenty-two.

20 CHAIR BROWN: I got 28.

21 MEMBER HALNON: Did you make your own  
22 slides, Charlie?

23 CHAIR BROWN: No, it was an earlier  
24 version, and there was another set that came out. And  
25 obviously open for the purpose of this discussion.

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1 MEMBER HALNON: On our SharePoint there's  
2 this one I opened up.

3 CHAIR BROWN: Yeah, I downloaded it, it's  
4 just a matter of whether I deleted the other one.  
5 Bear with me while I struggle here.

6 MR. NGUYEN: Is that the same slides we  
7 sent you on Monday?

8 CHAIR BROWN: I think I got a set earlier.

9 MR. NGUYEN: I don't know if we ever send  
10 you earlier. I don't know.

11 MS. ANTONESCU: Yeah, I don't remember  
12 sending an earlier version.

13 CHAIR BROWN: No, I'm looking at a set of  
14 slides that had 28 in that says for this meeting.

15 MEMBER HALNON: Go to the SharePoint and  
16 pull up the new one.

17 CHAIR BROWN: All I got to do is find my  
18 file. I downloaded, I'm just going back to my file  
19 right now, from the Subcommittee meeting. Going to  
20 SharePoint I'll lose everything.

21 I had a draft from 11/3, it opened this  
22 other one up. This one is 22 slides. Is that the  
23 right one? I'll close the other one. Not going to  
24 change what I need to do. Accept.

25 I'm glad I had the other slides up because

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1 (inaudible) had a large discussion that was pretty  
2 decent on diversity, which was deleted completely.  
3 And I've moved to Rev 4, that rev be open right now.

4 MR. NGUYEN: Which section on Rev 3 are  
5 you talking?

6 CHAIR BROWN: It was in the discussion.  
7 I think it was in the discussion.

8 MR. NGUYEN: When we developed this new  
9 revision, we structured the discussion section to  
10 what, you know, basically what the change we  
11 incorporated in the new revision. We're not go back  
12 to the previous version discussion to copy it over.  
13 I thought you were talking a guidance, but.

14 CHAIR BROWN: I'm in the -- I'm in the  
15 guidance.

16 MR. NGUYEN: Yeah, but you're talking  
17 about Section B, right, discussion?

18 CHAIR BROWN: I think I'm in the  
19 background section. You kept one part of it and then  
20 you deleted the rest.

21 MR. NGUYEN: We typically -- normally we  
22 don't copy the discussion from one revision to the  
23 other. We structure to matching the content of the  
24 new revision.

25 CHAIR BROWN: There was a section in there

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1 that talked about with the introduction of digital  
2 systems, concerns have emerged about the possibility  
3 of design errors, etc., etc. The design techniques of  
4 functional diversity, design diversity, diversity in  
5 operation within the four echelons of defense, etc.  
6 Actuation control, on and on and on.

7 Then it went on to the justification for  
8 equipment diversity or the diversity related to  
9 software such as real-time systems, etc., etc. All  
10 that was deleted from Rev -- it wasn't deleted. Rev  
11 3 had it, you did not move it to Rev 4. That was on  
12 page 3 of the reg guide.

13 So that -- I looked through the rest just  
14 to see where there was a discussion, it was almost  
15 like diversity disappeared from the realm of  
16 usefulness on the common cause failure world. That  
17 was the -- that was the problem I had. It didn't seem  
18 like to be a good idea to me to throw diversity out  
19 with the baby or the bathwater.

20 I'm not hearing anything.

21 MR. NGUYEN: I already told you that we're  
22 not copying you know the --

23 CHAIR BROWN: I know you don't, but  
24 there's -- well, you copied a lot of it. A lot of Rev  
25 3, I mapped Rev 3 into Rev 4, and you duplicated a lot

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1 of the stuff from Rev into Rev 4. So the point that  
2 you don't copy stuff over is not correct. You  
3 reworded some of the stuff, but fundamentally the idea  
4 was there. So that was --

5 MR. NGUYEN: If the discussion support the  
6 guidance we provide, then yes, we will have it. But  
7 for common cause failure, we basically referenced to  
8 BTP 7-19. So if we are talking about some diversity  
9 in the discussion section and --

10 CHAIR BROWN: I'm sorry, it was on page 2,  
11 2 and 3, 2 and 3.

12 MR. NGUYEN: Yeah, and the last section on  
13 the common cause failure we don't say a thing about  
14 diversity. I think that is awkward.

15 CHAIR BROWN: I'm trying to remember  
16 whether -- where diversity's even used in the reg  
17 guide. I don't remember. I thought I key worded that  
18 at one time in Rev 4. Am I correct?

19 MR. STATTEL: There's an annex problem.

20 CHAIR BROWN: Pardon?

21 MR. STATTEL: There's an annex.

22 CHAIR BROWN: But it wasn't endorsed.

23 MR. STATTEL: Correct.

24 CHAIR BROWN: That part I didn't  
25 understand. Diversity seems to have -- it's not

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1 endorsed. It's not even discussed. And I, it just  
2 seems to me that that doesn't go in the direction that  
3 we ought to be going. So completely divorce ourselves  
4 is almost like the way to help on common cause stuff  
5 is not diversity. It's anything else you can think  
6 about but not diversity.

7 And I know we've got thoughts in the mill  
8 people would like to not have as much diversity. It's  
9 a different issue. But the reg guide, it's -- that  
10 should be settled in a different way rather than just  
11 have it disappear from the reg guide.

12 MR. NGUYEN: No, no, you're talking about  
13 the spaghetti. The purpose of this reg guide is not  
14 provide the specific guidance on the common cause  
15 failure because we have BTP 7-19 address it. So if  
16 you must see the guidance by including the discussion  
17 of diversity for common cause failure and not  
18 providing the actual guidance, I don't think that's a  
19 good idea.

20 CHAIR BROWN: Well, we had BTP 7-19 before  
21 and we had Rev 3 before. It didn't seem to cause a  
22 difficulty to -- because that -- I mean, you've got  
23 the -- you've got common cause failures all wrapped up  
24 in this IEEE standard.

25 You've got common cause failures mentioned

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1 in your reg guide. And there is, with that -- what  
2 you're telling me is you ought not even bother to have  
3 a section on common cause failures in here because  
4 we'll address it under BTP 7-19. And that doesn't seem  
5 to compute.

6 MR. NGUYEN: Yeah, that BTP 7-19 is eight  
7 levers compared to the previous version that, you  
8 know.

9 CHAIR BROWN: I know, we reviewed that.

10 MR. NGUYEN: Right. I'm talking about Rev  
11 3, and the Rev 3 BTP 7-19 is a different animal. And  
12 I'm sorry, I didn't prepare the Revision 3 of the reg  
13 guides. And I don't have to, you know, repeat what I  
14 don't agree on.

15 MEMBER PETTI: Doesn't this sort of agree  
16 with your idea if you keep all aspects of digital I&C  
17 in all the reg guides, it's a huge problem to try to  
18 make sure it's always consistent.

19 The fact that it sits over in another  
20 document, it seems to me it unravels the spaghetti  
21 somewhat, if you will. It makes it cleaner and helps  
22 as you're going to -- as you're trying to align  
23 everything.

24 CHAIR BROWN: I'm sorry, Steve. Go ahead.

25 MR. STATTEL: Well, it can if it's clear,

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1 but that's what we were talking about earlier. If  
2 it's properly cross-referenced. In the Rev 4 here, it  
3 appears in the Section 4.2 and it does mention common  
4 cause failure and diversity and refers to the branch  
5 technical position. But that's the -- that's the  
6 extent of it.

7 As Charlie's saying, there was a much,  
8 much larger discussion in Rev 3. Now it just appears  
9 as reference to the other documents, which is a good  
10 thing. But it has to be clear in both places.

11 MEMBER HALNON: It repeats that same  
12 reference in Item 2, you know, where it's talking  
13 about Annex A, Annex B endorsement, that Annex B is  
14 not endorsed but go to BTP 7-19. And it also  
15 references NUREG 800 for defense-in-depth and  
16 diversity. So --

17 CHAIR BROWN: It references what?

18 MEMBER HALNON: NUREG 0800.

19 CHAIR BROWN: Oh, NUREG.

20 MEMBER HALNON: Which is, again, repeats  
21 BTP 7-19. So I didn't have an issue with it. And I  
22 mean, I went through and just searched on diversity  
23 and it seems to show up appropriately throughout. But  
24 I did not go back to Rev 3, Charlie, and read to see  
25 it everything I expected was in diversity. Hit that

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1 pretty hard under that last Subcommittee meeting.

2 CHAIR BROWN: Yeah. You said it's -- you  
3 see it in Rev 4, where?

4 MEMBER HALNON: Page 2.

5 CHAIR BROWN: The only place I saw was on  
6 page 2 where they --

7 MEMBER HALNON: Page 2.

8 (Simultaneous speaking.)

9 CHAIR BROWN: -- related guidance.

10 MEMBER HALNON: Page 5. Under number 2 on  
11 page 5. And on page 11.

12 CHAIR BROWN: Again that's under -- it's  
13 not endorsed.

14 MEMBER HALNON: It goes on --

15 MEMBER MARCH-LEUBA: I think V is not  
16 endorsed but criticality --

17 MEMBER HALNON: It goes on into the  
18 reference.

19 MR. NGUYEN: Yeah, he's talking about BTP  
20 7-19.

21 MEMBER HALNON: Right. And then I'm --

22 CHAIR BROWN: I guess my difficulty with  
23 that is we discussed the annexes, which aren't  
24 endorsed. And then we say oh, by the way --

25 MEMBER HALNON: Well, look page 11, 10 and

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1 11.

2 CHAIR BROWN: That's where I'm going next.  
3 That's where the --

4 MEMBER HALNON: Common cause failure is  
5 listed and it talks about 4.2 is specifically on  
6 diversity.

7 CHAIR BROWN: Okay, all right. I yield.  
8 My eyeballs started falling apart after trying to  
9 collate four different documents.

10 MEMBER HALNON: I don't blame you, yeah.  
11 It's a lot of stuff.

12 MR. NGUYEN: So are we on?

13 CHAIR BROWN: Yeah, you're okay on that.  
14 Let me make sure I make a note of that so I don't spin  
15 my wheels. Okay, go ahead then.

16 MR. NGUYEN: We continue on slide 16. So  
17 the endorsement, including additional guidance for  
18 protection and seal diagnostics if used in the digital  
19 I&C system. The guidance and clarification for  
20 control access, we already talk about this. And  
21 endorsement of Annex D, which I will cover more -- in  
22 more detail later. Next slide, slide 17.

23 So the first stop decision, 1.B(1), we're  
24 talking about the endorsement of Annex D. So the NRC  
25 has worked closely with the IEEE working groups to

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1 enhance the hazard analysis guidance in Annex D. And  
2 the 2016 version of the 742 updated Annex D in part to  
3 implement the NRC staff feedback related to the IEEE  
4 hazard analysis guidance.

5 The NRR staff collaborated with the Office  
6 of Research via the research -- a system request to  
7 assess whether Annex D support an adequate technical  
8 basis for establishing consistently all of the written  
9 guidance for licensee and applicant in the use of the  
10 new hazard analysis technique as an additional means  
11 for demonstrating set date.

12 So this draft guide endorse Annex D with  
13 clarification to provide technical basis for applying  
14 and evaluating the hazard analysis in supporting the  
15 set date demonstration. Next slide, slide 18.

16 For system interpret the criteria, this  
17 draft guide clarify my -- I think the guidance for  
18 seal diagnostic if used in the digital I&C system.  
19 This guidance is consistent with BTP 7-17 guidance for  
20 -- guidance on seal test and surveillance test  
21 provision.

22 Also this proposed revision of this reg  
23 guide for the first time officially consider crediting  
24 seal diagnostic to either reduce or eliminate the  
25 channel operability test, provided certain criteria

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1 are met. Currently, crediting seal diagnostic for  
2 surveillance requirement review and approve on the  
3 case-by-case basis.

4 The NRC staff worked closely with IEEE  
5 working group to enhance the IEEE seal diagnostic  
6 guidance with the industry enhanced guidance. And the  
7 staff reviews licensing successes in approving these  
8 type of request. Considering the credit for seal  
9 diagnostic would enhance efficiency and effectiveness  
10 of the staff licensing reviews.

11 The staff also clarified clause 5.6 by  
12 including the SE-4 guidance. That has not been  
13 incorporated by 742, including software instruction,  
14 error checking, point-to-point data communication and  
15 data capacity.

16 Any question on this slide?

17 CHAIR BROWN: Yes. Now I can't find where  
18 I -- I don't disagree necessarily. One place I read  
19 this and whether it was is this -- it might have been  
20 in the IEEE standard. They listed a bunch of stuff  
21 that said in addition to what you listed for not  
22 having to do operability test. One of the line items  
23 was you do 100% testing. And is that in the IEE  
24 standard?

25 MR. NGUYEN: No, but we decided not to

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1 include that as a clarification --

2 (Simultaneous speaking.)

3 CHAIR BROWN: Yes, I noticed, I noticed  
4 that. And, I don't, I'm not disagreeing with that.

5 MR. NGUYEN: Yes, I.

6 CHAIR BROWN: There was a list of four or  
7 five items in order to be able to discredit. Now I'm  
8 trying to, I read all of them.

9 MR. NGUYEN: Yes, there are few item I  
10 didn't describe that we didn't, we didn't include it  
11 because either it's not necessary, or it's not  
12 practical.

13 Unnecessary like the 10 CFR 50.49  
14 environment requirements that we don't need to include  
15 it into.

16 I mean the IC 4 has it, but the standard  
17 didn't, and I don't think we, that we need to because  
18 safety related equipment automatically required to  
19 meet 10 CFR 50.49. So it's a redundant thing to list  
20 it in there.

21 For the 100 percent testing requirement,  
22 there's no way you can test the software 100 percent  
23 unless you only have two or three IOs. That's doable.

24 CHAIR BROWN: No, I'm not disagreeing, it's  
25 just that, oh, here it is. Yes, it's in section 5.16

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1 of the 7-4.3.2, which is --

2 MR. NGUYEN: I'm sorry, it's 5.16?

3 CHAIR BROWN: Yes, common cause failures,  
4 and it says PPDD is not considered susceptible to CDF,  
5 if the PDD is shown to be deterministic in performance  
6 documentation of all functional states, and all  
7 transitions between states in its testable base,  
8 testing every possible combination of inputs.

9 So that, is that still in play? You don't  
10 take that away in the Reg Guide? It's just this was  
11 inconsistent to me with the, what number are we on?  
12 Which point? System integrity?

13 MR. NGUYEN: You mean independent, right?

14 CHAIR BROWN: Yes, it's 1.2.3 about self-  
15 diagnostics should be credited. Or operational tests.

16 This says it can be discounted that be  
17 susceptible to CCF. I presume this is still in play,  
18 then? You didn't negate that in the Reg Guide? Page  
19 36, 5.16.

20 And it says, testing every possible  
21 combination for PDDs that include analogue testing of  
22 every combination of input. Testing every possible  
23 executable logic path, including non-sequential.

24 This is a huge, huge leap to do that. And  
25 yet over here we talk about self-diagnostics being

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1 able to be credited to not perform periodic tests.

2 MR. NGUYEN: I think we talking about two  
3 different tests here.

4 CHAIR BROWN: Maybe we are. I just --  
5 (Simultaneous speaking.)

6 MR. NGUYEN: Right.

7 CHAIR BROWN: -- one it seems is targeted  
8 at can't, you can't prove you're not susceptible to a  
9 CCF, which is virtually impossible to meet.

10 The other one has a set of categories, it  
11 says if you, you're self-diagnostics test gets you  
12 enough information, then you don't have to come  
13 through and do manual operational tests.

14 So I presume that means manual operational  
15 tests to make sure you're working correctly.

16 MR. NGUYEN: Right. That's a different  
17 test than the one that you talking about that's  
18 section 5.16. That's what the test, software testing  
19 for the design face.

20 CHAIR BROWN: I did. The channel  
21 operability test the way you, that means manual?

22 MR. NGUYEN: Manual, yes. That applies to  
23 --

24 (Simultaneous speaking.)

25 CHAIR BROWN: You really ought to say

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1 manual. It's not clear what that means. With my old  
2 job, that doesn't necessarily have to be manual,  
3 depending on what you're doing.

4           Anyway, all right, is they're different.  
5 I was conflating the two.

6           MR. NGUYEN: Yes, they are two different --  
7           (Simultaneous speaking.)

8           CHAIR BROWN: All right.

9           MR. NGUYEN: -- type of test. Not the  
10 same.

11           CHAIR BROWN: Back to the slide.

12           MR. NGUYEN: Okay, we now on slide 19. No  
13 further control access.

14           We already talk about this, so I don't  
15 want to, you know.

16           CHAIR BROWN: Go back to 16 again, or 18  
17 again. Just I want to make sure I understand the  
18 second one.

19           Staff position 1(b)(2) is independence.

20           MR. NGUYEN: Yes, we already talk about  
21 this and --

22           (Simultaneous speaking.)

23           CHAIR BROWN: Let me finish.

24           MR. NGUYEN: Okay.

25           CHAIR BROWN: That includes the self, and

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1 the self-diagnostics is also covered under that? No,  
2 that's under --

3 (Simultaneous speaking.)

4 MR. NGUYEN: No, no.

5 CHAIR BROWN: -- that's 1(b)(1)?

6 MR. NGUYEN: Right. That's a different  
7 section.

8 CHAIR BROWN: Oh, okay. No, no, that's  
9 fine. All right, I've got okay's written all the way  
10 down the page. Just getting my pages in order again.

11 Okay, go ahead.

12 MR. NGUYEN: So, on slide 19 we already  
13 discuss the extensively on the control access so I'm  
14 not going to cover it.

15 On the contrary, also we talk about this.  
16 We, the proposed revision of this Reg Guide simply is  
17 this reference to BTP 7-19 for common cause failure  
18 guidance.

19 CHAIR BROWN: That's 1(b)(4), right?

20 (No audible response.)

21 CHAIR BROWN: Five pages back. Got it.

22 MR. NGUYEN: Any question on this one, this  
23 slide?

24 CHAIR BROWN: Anybody else?

25 (No audible response.)

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1 CHAIR BROWN: Okay.

2 MR. NGUYEN: All right.

3 So for summary, Reg Guide 1152 is one of  
4 the primary Reg Guides used by applicants and the  
5 licensee manners in the development of digital ANC  
6 license application. Reactor certification, and this  
7 is the ANC topical reports.

8 Updating this Reg Guide is considered a  
9 high priority based on recent, recent licensing  
10 experience.

11 And, in direction with the stakeholders  
12 that contributed to the update of the 2016 version of  
13 742.

14 Next slide.

15 So the staff proposed the revision of the  
16 Reg Guide 1152, to update information and guidance in  
17 the area of the functionality, reliability, desired  
18 quality, and SDOE for programmable digital devices in  
19 the safety-related systems of a nuclear power plant,  
20 to support NRC guidance and review of practices to  
21 ensure that the guidance in these areas is current,  
22 and consistent with the staff position.

23 First, it has the efficiency and  
24 effectiveness of the licensee review.

25 That will conclude my presentation.

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1 CHAIR BROWN: Any other?

2 MEMBER MARCH-LEUBA: Overall, my concerns  
3 earlier.

4 CHAIR BROWN: Okay. Okay, Eric did you  
5 have any notes about what you think you're walking  
6 away with, or do you just want me to surprise you?

7 MR. BENNER: I think Khoi was taking better  
8 notes as to the things we're, we're going to look at.

9 So we can either listen to your list, or  
10 we can just go through our list.

11 CHAIR BROWN: It's not extensive. It's  
12 just --

13 (Simultaneous speaking.)

14 MR. BENNER: Yes.

15 CHAIR BROWN: -- I'm trying to integrate  
16 a lot of stuff we resolved in the conversation.

17 MR. BENNER: Uh huh.

18 CHAIR BROWN: I may not remember that for  
19 long, but I can also go back in the transcript and  
20 figure out that --

21 (Simultaneous speaking.)

22 MR. BENNER: No, I think Khoi can just list  
23 the issues that we said we were going to go back and  
24 --

25 (Simultaneous speaking.)

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1 CHAIR BROWN: Well, I'll give you what --

2 MR. BENNER: Okay, okay.

3 CHAIR BROWN: -- I've got.

4 MR. BENNER: Okay.

5 CHAIR BROWN: No, go ahead and give me what  
6 you've got, and then that way --

7 MR. BENNER: You'll correct the record.

8 CHAIR BROWN: Well, you might say that. I  
9 wasn't going to phrase it quite that way.

10 MR. NGUYEN: All right, let me try.

11 So in Section 3.3, there's reference to  
12 the design specification for --

13 (Simultaneous speaking.)

14 CHAIR BROWN: A mention watch dog,  
15 something similar to the watch dog.

16 MR. NGUYEN: Yes, we will consider to  
17 include the language similar to the watch dog.

18 CHAIR BROWN: Yes.

19 MR. NGUYEN: For example --

20 (Simultaneous speaking.)

21 CHAIR BROWN: Make it positive language.  
22 So not, don't --

23 MR. BENNER: Yes, an example regarding --

24 CHAIR BROWN: Yes --

25 MR. BENNER: -- unidirectional

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1 communications.

2 CHAIR BROWN: -- this is a method we would  
3 consider acceptable. Kind of the same words. It  
4 ought to be a positive, not a if you try to slip it by  
5 us we may accept it type language.

6 MR. NGUYEN: So how you read this concern  
7 from 1 to 10?

8 CHAIR BROWN: What, which one?

9 MR. NGUYEN: The first one.

10 MR. BENNER: Eleven, Khoi. It's an 11 on  
11 a scale of 1 to 10.

12 MR. NGUYEN: No, yes, so I would do that  
13 first, you know? Which one is the most important I  
14 will do it first.

15 MEMBER HALNON: If 1 is important, 10 is  
16 not, and everything's a 5.

17 MR. NGUYEN: Okay.

18 So the next one, I don't know if this a  
19 concern but there were question on roadmap of ICO-4,  
20 for the end user, how the user, the guidance for it.  
21 But that probably is in a question --

22 (Simultaneous speaking.)

23 CHAIR BROWN: I don't remember talking  
24 about that one.

25 MR. NGUYEN: Oh, then forget about it.

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1 CHAIR BROWN: Somebody brought that up.

2 MR. BENNER: Yes, I think that was Danner.  
3 I wouldn't call that an issue for this Reg Guide, but  
4 at some point, a communication between the staff and  
5 the committee about how all this fits together --

6 (Simultaneous speaking.)

7 CHAIR BROWN: When are you going to retire,  
8 is kind of his question.

9 Did we get all, are we going to be able to  
10 retire ISG-4 because you've captured everything.

11 MR. BENNER: Yes, and the short answer is  
12 no, because it also has to populate to the staff  
13 guidance and the standard review plan.

14 CHAIR BROWN: Yes.

15 MEMBER HALNON: Eric, we had similar  
16 conversations with the Source Term Group, you know,  
17 and they effectively built the roadmap on a website  
18 and some documents so that you might look at what they  
19 did, and that could be, you know, inform what you do  
20 first.

21 MR. BENNER: Okay, thank you.

22 MR. NGUYEN: But that wouldn't be the  
23 action item for this right?

24 CHAIR BROWN: No.

25 MR. NGUYEN: This is the --

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1 (Simultaneous speaking.)

2 MR. BENNER: No, this was just we need to  
3 understand the roadmap of how you get from, you know,  
4 a blank sheet of paper to a design.

5 And, understand where you guys as a staff  
6 review, and what guidance is being given and that sort  
7 of thing.

8 The whole, you know, aspect of it so that  
9 we understand how we get from A to B.

10 MR. NGUYEN: Okay, thank you.

11 So the next item would be the concern on  
12 the wireless capable device.

13 So we need to clarify the wireless capable  
14 device use for NTE must be controlled by some process  
15 that makes sure that the device is not caught, not  
16 become the pathway for virus, blah blah blah.

17 CHAIR BROWN: Yes. I'm not trying to  
18 dictate that it's just we ought to, right now it just  
19 kind of implies abstract but if you --

20 (Simultaneous speaking.)

21 MR. BENNER: Yes, we'll look at that factor  
22 in the language.

23 CHAIR BROWN: Yes.

24 MR. BENNER: And I definitely want to --

25 (Simultaneous speaking.)

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1 CHAIR BROWN: I understand definitely what  
2 Rich was talking about why it's there. I don't  
3 disagree with the comments.

4 MR. BENNER: We'll want to look at the  
5 whole body of the language in there, to see what maybe  
6 there are changes versus integration, so.

7 CHAIR BROWN: Okay, next one?

8 MR. NGUYEN: The next one the same language  
9 used for Section 3.3, you want to incorporate in  
10 Section 5.9 control access.

11 CHAIR BROWN: Well, you already mentioned  
12 that one.

13 MR. NGUYEN: Yes, but you say in two  
14 places.

15 CHAIR BROWN: Yes, well it's taken from 3.3  
16 something similar in whatever the paragraph. But what  
17 was it, 3, no take it from the watch dog time repair  
18 graph and put it in 3.3, something similar.

19 I don't know where that was. That was  
20 back in --

21 (Simultaneous speaking.)

22 MR. NGUYEN: 5.9.

23 CHAIR BROWN: 5.9. Was that in the --

24 MR. NGUYEN: In the --

25 (Simultaneous speaking.)

1 CHAIR BROWN: That's in the Reg Guide?

2 MR. NGUYEN: -- the Reg Guide.

3 CHAIR BROWN: Yes.

4 MEMBER MARCH-LEUBA: 5.9 is controlled by  
5 the, I'm sorry, Section --

6 (Simultaneous speaking.)

7 MR. NGUYEN: 3.1.3.1.

8 CHAIR BROWN: Yes, 1.2.1. That's where the  
9 watch dog timer words were. That's back, that's the  
10 same issue you mentioned before, okay?

11 Do you have another one written down, or  
12 is that it?

13 MS. LAWSON-JENKINS: You wanted a new  
14 section 5. --

15 (Simultaneous speaking.)

16 MR. NGUYEN: You don't have any more as I  
17 was talking.

18 CHAIR BROWN: Oh, yes, the 5.9 trying to  
19 get into --

20 (Simultaneous speaking.)

21 CHAIR BROWN: -- try to highlight that in  
22 7-4.3.2 just the physical security, and then it has a  
23 whole bunch of stuff.

24 The real point now when you've introduced  
25 computers and it is now not just physical, it's

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1 electronic access.

2 So there ought to be something, change, I  
3 don't care whether you change the title whatever you  
4 write up in here that says hey, to clarify this means  
5 electronic control.

6 Because you can't change the IEEE  
7 standard. That's the way it is. But just a  
8 clarification that 5.9 --

9 (Simultaneous speaking.)

10 MR. NGUYEN: Should be supplement with.

11 CHAIR BROWN: -- 1.2.1 or something, and  
12 make it physical security.

13 And now it introduces electronic control,  
14 electronic access, which is a vulnerability due to the  
15 computer systems.

16 Just to highlight it, and then to have  
17 some discussion about what that means. That's all.  
18 Doesn't have to be extensive, just how you deal with  
19 it, okay?

20 And, then is that it or you've got another  
21 one?

22 MR. NGUYEN: One more. We will clarify  
23 clause 5.17.

24 MR. BENNER: Yes, all things commercial  
25 grade dedication, I think.

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1 CHAIR BROWN: That's the --

2 (Simultaneous speaking.)

3 MR. BENNER: I think we'll take a fresh  
4 look at.

5 (Simultaneous speaking.)

6 MR. NGUYEN: That's incorporated by  
7 reference.

8 MR. BENNER: Annex C, Annex D.

9 MR. NGUYEN: Yes, Annex C, and so that's  
10 the last one I have.

11 MEMBER HALNON: I just had one other thing  
12 I feel compelled to ask Charlie to just mention, that  
13 you guys said you're going to try and tighten the  
14 window between revisions.

15 Not a recommendation or anything, just a  
16 statement that we recognize that this was seven years  
17 and, you know, the present process looks like it will  
18 tighten that to be more contemporary, or something to  
19 that effect.

20 But just didn't want you to, I didn't want  
21 to lose that point because I think it's in the  
22 regulatory world, seven years doesn't seem long, but  
23 it actually is.

24 In a digital world, there's a lot of  
25 developments between now and then.

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1 CHAIR BROWN: That would be good to go up  
2 if you did anything, up in the purpose of the Reg  
3 Guide would be a good place to say that.

4 I was just trying to think about --

5 (Simultaneous speaking.)

6 MEMBER HALNON: I just wanted to  
7 acknowledge in letter that we talked about it.

8 CHAIR BROWN: If you want to give me  
9 something?

10 MEMBER HALNON: Yes, I'll give it to you.  
11 Staff recognizes it and then, you know, agrees that  
12 it's going to get, going to get better.

13 MR. BENNER: Yes, the committee's going to  
14 do what it's going to do. I don't know if we would  
15 put that in the Reg Guide itself because that's, the  
16 Reg Guide is the product.

17 MEMBER HALNON: I agree.

18 MR. BENNER: But the comment is about the  
19 overall process and framework.

20 MEMBER HALNON: Yes.

21 CHAIR BROWN: We'll try to take --

22 (Simultaneous speaking.)

23 MEMBER HALNON: I'll just give you a  
24 sentence or two.

25 CHAIR BROWN: Okay, something to try to

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1 reflect what his thought process is.

2 I had one other item. The way I've got it  
3 written is Annex C you've got that covered, the 5.17  
4 the wireless points.

5 Hopefully we can get the transcript to you  
6 so you, we went through a lot of discussions.

7 The 3.3 with the watch dog timer words  
8 similar to and the 1.2.1 where you pull them out of  
9 there, and then something similar for the cyber  
10 paragraph, which was back I think in 3.3.

11 And the last item I had is that, and a  
12 good place to do this in the Reg Guide. I'm big on  
13 preambles and highlighting what you're trying to do,  
14 like the background type stuff.

15 You go from the regulation paragraph in  
16 the beginning where you cite every regulation in the  
17 world in the 10, 279 this, that and the other thing in  
18 the 10 CFR stuff.

19 Then you talk about the working group  
20 integrating that stuff in. Then you get leap right  
21 into INC that use PDDs, adopt advanced technology, et  
22 cetera, et cetera, et cetera.

23 A lead in to this, that paragraph to me is  
24 we don't talk about architectures. The application of  
25 these devices and then architecture that is, meets the

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1 fundamental design principles, is what's critical in  
2 all of this stuff. We keep doing it every time.

3 This is an ideal place because this is the  
4 devices that you're using, and how they're  
5 incorporated and integrated into an architecture that  
6 is, you know, robust, multi-divisional meets the  
7 design independence redundancy determinant, whatever,  
8 whatever the words are.

9 I'll probably say something in the letter  
10 relative to that, and then leads in to that paragraph,  
11 and that how that provides protection in this world  
12 from a lot of different problems that you can cover in  
13 CCF world.

14 And then all the rest of it flows because  
15 now it's sort of categorized hey, we've got a new  
16 world. Computers, they do things. Introduce new  
17 problems. Robust system takes cares of some of those,  
18 a lot of those, not all but a lot of them.

19 In my opinion, it takes care of a huge  
20 amount of them if you maintain independence strictly,  
21 asynchronous operation not just within the devices  
22 internally to each channel, but also between  
23 divisions, that, that robust architecture is valuable.

24 And we really need to, you know, I'm  
25 looking for the right word. Propagate that into the

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1 standard so that people understand what's going on, is  
2 a good reference.

3 So I'll probably ask, I'll try to provide  
4 something as an example, but you guys can point you on  
5 whatever you want to do.

6 Other than that, any other opinions  
7 relative to the, that you want to voice? I haven't  
8 gone out to public comment yet.

9 MEMBER BIER: I just want to express that  
10 I thought this was a super constructive meeting on all  
11 sides.

12 That you know, you guys seem to have  
13 understood where we were coming from, and we  
14 understood what you're constraints were.

15 And it's really nice to see such a  
16 contentious issue suddenly, you know, kind of I don't  
17 know what you're going to end up writing of course,  
18 but you know, the idea that it could be resolved to  
19 like everybody's satisfaction is just really nice.

20 And I appreciate the process and the pain  
21 and suffering it took to get to this point. So.

22 CHAIR BROWN: I appreciate that reflection.  
23 And just to communicate, one of the problems that we  
24 have is when we review stuff, we have to look at it in  
25 a complex system, from a top level down.

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1           There's no way when we, and we have to  
2           come away satisfied that major concerns and potential  
3           problems are addressed.

4           Without digging down into infinite weeds  
5           like those reflected in spades in the IEEE standard.

6           I mean I did go through it. I compared it  
7           with the 2000 or whatever the last one was that was  
8           referenced, which I think was 2003 in the Reg Guide,  
9           Rev. 3.

10          So I did a mapping back and forth. The  
11          new one is a lot better than the old one. Okay,  
12          there, it was definitely Rich, you guys did a good  
13          job. Did you hear me? Wake up.

14          You guys did a good job on the 16 version.  
15          There's a lot of good stuff. The working, however  
16          they came out of this with the working group, it came  
17          out I think, pretty, pretty good.

18          MR. STATTEL: Thank you.

19          CHAIR BROWN: And, I think you guys should  
20          get some kudos for that. That was not an easy task,  
21          particularly in an international. Was that  
22          international, or was that just U.S.-based?

23          MR. STATTEL: We did have some  
24          international representatives.

25          CHAIR BROWN: You did, okay.

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1 I'm just we're just trying to get to the  
2 point where we make these reviews easy, and we make,  
3 and ensure that the applicant get on with his business  
4 and get this stuff included, incorporated into the  
5 plans.

6 Because it's a significant improvement in  
7 overall performance with these systems, IC analogue  
8 systems.

9 So, you know where our focus, you know  
10 where my focus is by now after 14 years, and that's  
11 managed to work with the committee. They've accepted  
12 my conclusions if I say it looks okay, they kind of  
13 say it's okay.

14 And so and if you look at the last SHINE,  
15 if you look at NuScale, if you look at APR 1400, we  
16 blitzed through those.

17 ESPWR 14 years ago was like sucking blood  
18 out of rocks, because it was bottom up if you need  
19 your positions. You don't need to review this  
20 anymore, sorry.

21 We had an architect that looked like a  
22 stick man that I drew in the first grade.

23 AP 1000 was better. They ended up having  
24 to fire the INC manager because he didn't want to do  
25 what we wanted the next guys thought it was a good

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1 idea to do what we thought was good, and they, then it  
2 flew through.

3 We didn't get everything because we didn't  
4 understand as much as we do now. It's evolved some,  
5 but trying to make it easy for both us, you all, and  
6 the applicants.

7 That's the purpose of going through this  
8 stuff and winnowing out the comments. So I hope, I  
9 hope you all take it that way.

10 This is not meant to be a for bows and  
11 arrows approach to doing business. How do we get to  
12 the same place.

13 How do I open this up for public comment,  
14 Dave?

15 MR. HECHT: Charlie? Charlie, this is  
16 Myron Hecht. There was just one other point that  
17 Vicki made. I don't know if Vicki wants to make this  
18 into an action item.

19 But in the discussion about intrusive  
20 cyber security measures versus non-intrusive versus  
21 not doing them because you were convinced that you are  
22 protected, Vicki had suggested, and this is in Section  
23 5.9, or clause 5.9.

24 Vicki had suggested perhaps adding some  
25 concrete examples in the Reg Guide would help.

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1 CHAIR BROWN: Okay, I missed that. Can you  
2 pencil something up a little bit? Doesn't have to be  
3 extensive.

4 You understand what her comment was, Eric,  
5 Khoi?

6 MR. NGUYEN: Not really. And, can you  
7 elaborate, please?

8 CHAIR BROWN: Was that in the Reg Guide or  
9 in the IEEE Standard? I don't remember.

10 MEMBER BIER: I think it was in the Reg  
11 Guide, but I would have to go back and look. Thank  
12 you for the reminder, Myron.

13 Greg, what do you think? Is that  
14 something that's important enough to push? You were  
15 the one who kind of said it looked okay as is.

16 MEMBER HALNON: I thought it looked okay as  
17 is.

18 CHAIR BROWN: Do you remember what section  
19 that was? Myron said 5.9.

20 MEMBER HALNON: It's 5.9.3.

21 CHAIR BROWN: Oh, yes.

22 MEMBER HALNON: It had to do with the, you  
23 know, the system being out of service if you're going  
24 to be intrusive on the virus software.

25 And, it made a lot of sense to me. I

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1 didn't see any holes in it.

2 CHAIR BROWN: It would be difficult I  
3 think, to put together examples.

4 MEMBER HALNON: I'm afraid, I worry about  
5 examples only because people key in on the example as  
6 the requirement.

7 CHAIR BROWN: Yes.

8 MEMBER HALNON: And they.

9 MEMBER BIER: And, then they don't do the  
10 ones that you didn't give as examples.

11 MEMBER HALNON: Exactly.

12 MEMBER BIER: So.

13 MEMBER HALNON: Exactly. But I thought it  
14 was clear to me starting from a design when I had to  
15 --

16 (Simultaneous speaking.)

17 CHAIR BROWN: Are you happy with that,  
18 Vicki?

19 MEMBER BIER: Yes, I'm happy to let that go  
20 and say okay as is.

21 CHAIR BROWN: All right, so before I go to  
22 public, the ones I've got is the confusion on the  
23 annex thing, 5.17.

24 3.3, 1.21 the words, architecture in the  
25 intro that sub-wireless. I'm not sure how I'm going

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1 to phrase that.

2 I'm going to try to make it so we, I'm  
3 sure I'll have plenty of help from them since I've got  
4 some, a lot of people here are listening. They'll  
5 make sure I phrase this in a proper manner.

6 And, that was probably the three or four  
7 or so areas that I would be thinking about addressing  
8 in some way in the letter.

9 The architecture thing, I mentioned the  
10 architecture part for the intro, or the background  
11 paragraph, whatever.

12 Other than that, is there anybody on the  
13 public line that would like to make a comment?

14 MS. ANTONESCU: Member Brown, there was one  
15 more item on the agenda regarding staff next steps for  
16 completion of proposed Reg Guides. Rev. 4.

17 CHAIR BROWN: There was one more item on  
18 the agenda?

19 MS. ANTONESCU: Yes, just for the staff to  
20 let us know what the next steps will be on completion  
21 of the Rev. 4 to Reg Guide 1.5.

22 CHAIR BROWN: Oh, okay.

23 MEMBER HALNON: Has it gone for public  
24 comment yet?

25 CHAIR BROWN: No.

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1 MS. ANTONESCU: This is before public  
2 comment.

3 MEMBER HALNON: I don't mean the committee,  
4 I meant the actual document.

5 CHAIR BROWN: No, they have not sent it out  
6 yet.

7 MR. BENNER: No. Mike, did you, I mean  
8 you're list, and I think I can give a high level  
9 summary, but you're the name on the agenda. Do you  
10 want to discuss the next steps, or do you want me to?

11 MR. EUDY: You talking to me, Eric, Mike  
12 Eudy?

13 MR. BENNER: Yes.

14 MR. EUDY: Yes, well I guess the next steps  
15 would be, you know, to get the letter so we know what,  
16 you know, what we would want to consider modifications  
17 to the draft Guide before we issue it for public  
18 comment.

19 And, it sounds like that meeting is on  
20 November 29th and we would be --

21 (Simultaneous speaking.)

22 CHAIR BROWN: Yes, full committee meeting  
23 is I think we're first on the agenda on the 29th,  
24 that's what Christina, is that correct, Christina?

25 MS. ANTONESCU: Yes, 29th.

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1 CHAIR BROWN: Okay.

2 So we're first up, then we'll be doing our  
3 letter you know, a day or two later after we finish  
4 the other items.

5 And I have now 12 days to build a letter  
6 that's coherent, which is going to be a challenge.  
7 But I will get there.

8 MEMBER MARCH-LEUBA: Keep it short. This  
9 is usually short.

10 CHAIR BROWN: I, you know how I write  
11 letters.

12 MEMBER MARCH-LEUBA: I know, this is why I  
13 offer advice.

14 CHAIR BROWN: They have to stand on their  
15 own. In this case, I think I can make it clear  
16 without getting overwhelmingly verbose.

17 So from our standpoint, we did this  
18 quickly so we could try to get it to you because we  
19 didn't have an opportunity to do this earlier because  
20 of all kinds of others.

21 We couldn't get it scheduled as well. So  
22 our opportunity is to try to get this done so you all  
23 can get it out to the public comment.

24 I just wanted to make sure we covered  
25 highlights, and not have to do it after the public

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1 comment.

2 And you all felt that was better to have  
3 us all internally on kind of the same page before you  
4 went out, in this circumstance.

5 Doesn't have to be all the time, it's just  
6 in this particular circumstance based on the nature of  
7 this particular Reg Guide.

8 Okay? Now, any public comment? Anybody  
9 out there that would like to say something, or provide  
10 information or comment?

11 MR. SCAROLA: Yes, this is Ken Scarola from  
12 Nuclear Automation Engineering. Can you hear me okay?

13 CHAIR BROWN: Not very well. Can I do  
14 that?

15 MR. SCAROLA: Probably because I'm  
16 traveling in my car.

17 CHAIR BROWN: Oh.

18 MR. SCAROLA: I have to apologize. I just  
19 joined the meeting about 20 minutes ago. I was tied  
20 up this morning.

21 But if you can hear me, my comment  
22 pertains to Section 2.1.1. You may have already  
23 talked about this and if you have, please stop me and  
24 I will just relinquish and not comment.

25 But I have a concern about this section

1 because it's as written and it may just be ambiguity,  
2 but as written, it seems to negate what the industry  
3 has been trying to accomplish with (telephonic  
4 interruption) workstations.

5 And the reason I say that is as written,  
6 it says that on non-safe, or on inter-divisional  
7 communications, and that would be a non-safe work  
8 station, can't send any software instructions to a  
9 safety system while the safety system is in service.

10 But that's exactly what we are trying to  
11 do with non-safe work stations. We want the operators  
12 to work at the same work stations for controlling both  
13 safety and non-safe systems during all modes of  
14 operation. Including when the safety system is in  
15 service.

16 So an operator can use a non-safe work  
17 station to open and close a safety related valve.  
18 Start and stop a safety related pump.

19 And that would happen while the safe  
20 system is in service, but there would certainly be  
21 priority logic in the safety system such that if the  
22 safe system demands a safe of those components, then  
23 it's different than what the non-safe work station is  
24 requesting. Then the safety function commands would  
25 have priority.

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1           So that section 2.1.1 for me is a real  
2 problem. Because it negates things that have already  
3 been approved on APR 1400, US-APWR, and I believe even  
4 on AP 1000.

5           CHAIR BROWN: Section --

6           (Simultaneous speaking.)

7           MR. SCAROLA: It's the words software  
8 instructions that give me a problem. Because software  
9 instructions could encompass those normal control  
10 commands.

11          CHAIR BROWN: I thank you for your comment.

12          MEMBER MARCH-LEUBA: Can I make a comment?

13          CHAIR BROWN: Yes, go ahead.

14          MEMBER MARCH-LEUBA: I didn't get your name  
15 the previous member of the public. This is Jose  
16 March-Leuba.

17                 If you could write down what you said and  
18 send it to us, to the TFO, we would put your comments  
19 property in the record.

20                 Because we couldn't understand half of  
21 what you said. So if you could write it down and send  
22 it to Christina, it will be good.

23                 Thank you.

24          MR. SCAROLA: I will be happy to do that.

25                 Now let me just summarize by saying I

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1 recommend changing the words software instructions to  
2 instructions that could alter the software of the  
3 safety function processor.

4 We need to distinguish those. Normal  
5 control functions are different than functions that  
6 could alter the safety functions of the processor.

7 I'll put my comments in writing. Thank  
8 you.

9 CHAIR BROWN: Thank you.

10 I didn't get the name. Oh, it's Ken,  
11 okay.

12 Are there any other public comments?

13 (No audible response.)

14 CHAIR BROWN: Hearing none, if there is no  
15 other comments from the members, we can close this  
16 meeting.

17 Anybody object? I don't think they're  
18 going to object.

19 (No audible response.)

20 CHAIR BROWN: Okay, meeting is adjourned.

21 (Chorus of thank you.)

22 (Whereupon, the above-entitled matter went  
23 off the record at 12:42 p.m.)

24

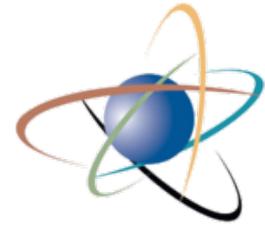
25

Here is the comment offered verbally and also in writing by Ken Scarola at the ACRS DI&C subcommittee meeting on November, 17, 2022:

Section 2.1.1 has an ambiguity problem:

2.1.1 Provisions for interdivisional communication should be included to prevent the ability to send software instructions to a safety function processor unless all safety functions associated with that processor are either bypassed or not in service.

“Software instructions” could mean a control command from a non-safety control and display workstation to open a valve or start a pump, which is exactly what we want to use multidivisional workstations for, while the safety system is in normal operation. This functionality for non-safety workstations to safety system communication was approved by the staff for APR1400, USAPWR (maybe also AP1000). Therefore, I recommend changing "software instructions" to "instructions that could alter the software of the safety function processor".



**U.S. NRC**

United States Nuclear Regulatory Commission

*Protecting People and the Environment*

**Draft Guide 1374 - Proposed RG 1.152, Revision 4  
Criteria for Programmable Digital Devices in Safety-related  
Systems of Nuclear Power Plants**

**Advisory Committee on Reactor Safeguards  
Digital Instrumentation & Controls Systems Subcommittee Briefing  
November 17, 2022**

# Working Group

- **NRR/DEX**
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  - Khoi Nguyen
  - David Rahn
  - Richard Stattel
- **NRR/DORL**
  - Bhagwat Jain
  - Michael Marshall
- **NRR/DRO**
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- **NRR/DSS**
  - Khadijah West
- **RES/DE**
  - Michael Eudy
  - Paul Rebstock
- **NSIR/DPCP**
  - Ismael Garcia
  - Kim Lawson-Jenkins

# Presentation Outline

- Introduction
- Scope of RG 1.152
- RG 1.152 Applicability
- Background
- Purpose of RG Revision
- Regulatory Basis
- Proposed Changes
- Summary
- Q&A

# Introduction

- Current Regulatory Guide (RG) 1.152, Revision 3
  - Endorses IEEE Std 7-4.3.2-2003, “IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations.”
  - Includes secure development and operational environment (SDOE) guidance for digital computers in the safety systems of nuclear power plants.

## Introduction (Cont.)

- Proposed RG 1.152, Revision 4
  - Endorses IEEE Std 7-4.3.2-2016, “IEEE Standard Criteria for Programmable Digital Devices in Safety Systems of Nuclear Power Generating Stations” with exceptions and clarification.
  - Includes additional guidance for fault detection and self-diagnostics, if used, in digital instrumentation and control (DI&C) systems.
  - Implements the Commission’s direction, which was informed by the OEDO letter to the Commission dated July 14, 2021 ([ML21187A293](#)).

## Scope of RG 1.152

This RG endorses IEEE Std. 7-4.3.2 as an acceptable approach to meet regulatory requirements for promoting high functional reliability, design quality, and a SDOE for the use of programmable digital devices in the safety-related systems of nuclear power generating stations.

# RG 1.152 Applicability

- Title 10 of the Code of Federal Regulations (10 CFR), Part 50, “Domestic Licensing of Production and Utilization Facilities”
- 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants”

# Background

- IEEE Std 7-4.3.2 was developed in 1982 to supplement IEEE Std 603 with criteria for programmable digital computer systems in safety systems of nuclear power generating stations.
- Since then, IEEE Std 7-4.3.2 has been updated periodically to encompass the evolving digital technologies.

## Background (Cont.)

- The previous editions of IEEE Std 7-4.3.2 covers only computer-based digital systems. Revision 2016 of IEEE Std 7-4.3.2 expands the coverage to programmable digital devices and to encompass technologies that were not covered in the previous editions.
- The previous version (Revision 2010) of IEEE Std 7-4.3.2 incorporated the data communication independence guidance from Digital I&C Interim Staff Guidance (ISG)-04, “Highly Integrated Control Rooms – Communications Issues,” for evaluating communication independence.

## Background (Cont.)

- Major Changes in IEEE Std 7-4.3.2 – 2016:
  - Changing the term "computer" to "programmable digital devices" to encompass technologies such as Field Programmable Gate Arrays (FPGAs).
  - Incorporating SDOE guidance from RG 1.152, revision 3.
  - Providing specific criteria on the use of software tools used for digital devices and development of hardware, software, firmware, and programmable logic.
  - Revising Annex D, "Identification and Control of Hazards."

# Background (Cont.)

Delta Between 2003 and 2016 Versions of IEEE Std 7-4.3.2	
Clauses with Major Changes	7-4.3.2 - 2016
5.1 – Single Failure Criterion	Additional criteria for programmable digital devices (PDDs)
5.3.2 – Software Tools	Expanded to define software tools for PDDs
5.5.4 – Prioritization of Functions	New – Incorporated ISG-04 guidance
5.6 - Independence	Incorporated ISG-04 guidance
5.7 – Capability for Test and Calibration	Included additional guidance for the measurement and test equipment (M&TE)
5.8 – Information Displays	Incorporated ISG-04 guidance
5.9 – Control of Access	Incorporated secure development and operational environment guidance from RG 1.152, R3

# Background (Cont.)

Delta Between 2003 and 2016 Versions of IEEE Std 7-4.3.2	
<b>Clauses with Major Changes</b>	
<b>5.16 – Common Cause Failure Criteria</b>	New - Included new guidance with respect to testing for addressing potential CCFs in PDDs
<b>5.17 – Use of Commercial Digital Equipment</b>	New - Included new guidance for the use of commercial digital equipment
<b>5-18 – Simplicity</b>	New – clarifies simplicity concept
<b>Annex D – Identification and Control of Hazards</b>	Restructured the format and added a section to describe a process of performing hazard analysis (HA) activities in conjunction with software development processes.

# Purpose of RG 1.152, Revision 4

- Enhances efficiency and effectiveness of licensing reviews.
- To implement the Commission's direction (SRM-CTH210414-3), which was informed by the OEDO memorandum to the Commission dated July 14, 2021, ([ML21187A293](#)) that addressed the ACRS' concern pertaining to Uni-directional communications from high safety to lower safety systems and internal plant to external systems connected to the internet.

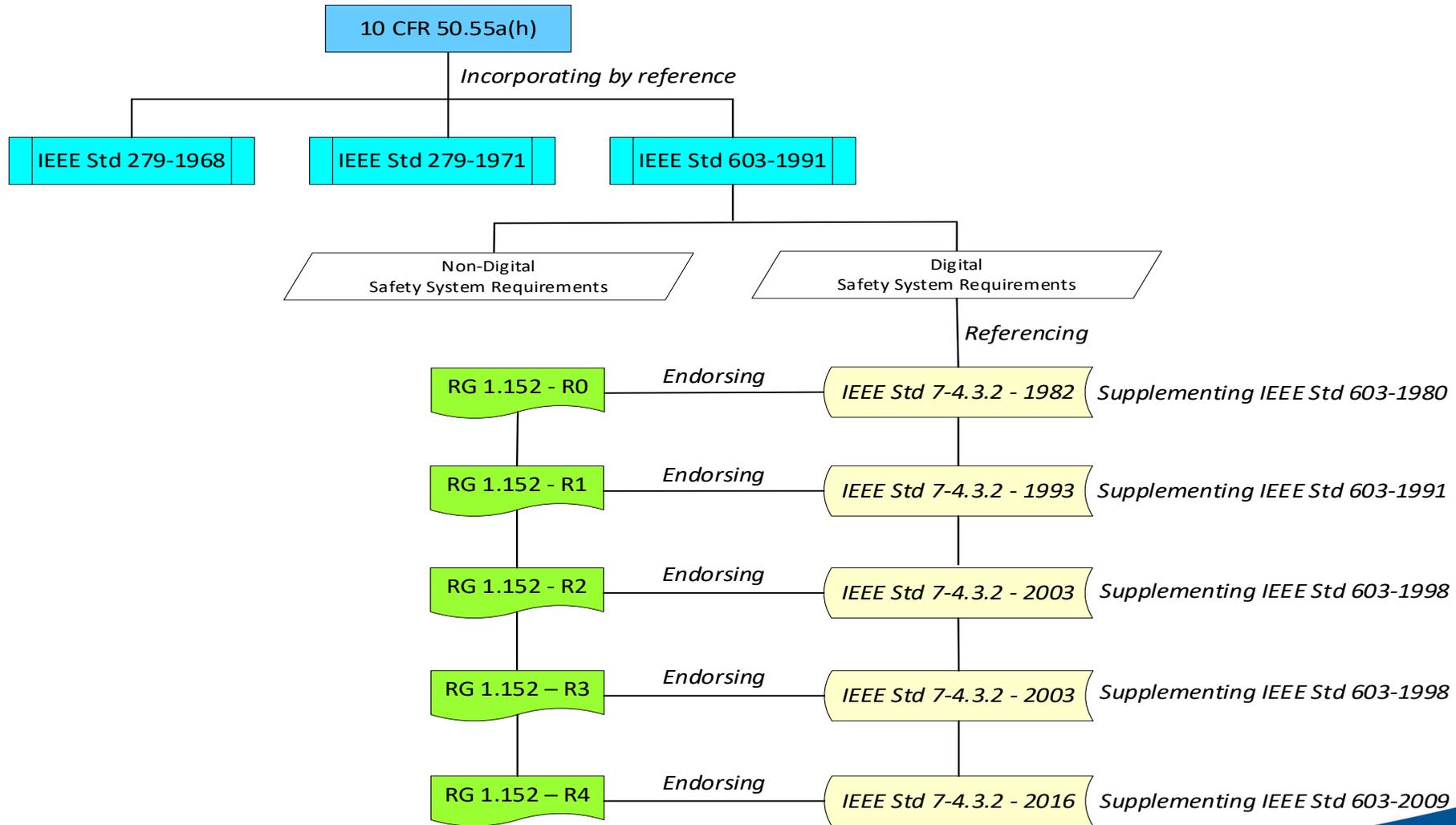
*“Revise RG 1.152 to reference RG 5.71 and include information to make applicants for Design Certifications aware of cyber security requirements that apply to an operating license or combined license, and how these requirements could be considered during design phase and inform Commission.”*

## Purpose of RG 1.152, Revision 4 (Cont.)

A statement has been added:

*“RG 5.71 provides an acceptable approach to meet the requirements of 10 CFR 73.54. For licensees that choose to provide, as part of their license submittal, descriptions of cybersecurity design features intended to address the guidance of RG 5.71, the extent of the staff’s review of these features is limited to ensuring that these features do not adversely affect or degrade the system’s reliability or its capability to perform its safety functions. Licensees and applicants should also consider the cybersecurity guidance in RG 5.71 in preparing a design certification under 10 CFR Part 52.”*

# Regulatory Basis



# Proposed Changes

- Remove SDOE guidance
- Endorse Revision 2016 of IEEE Std 7-4.3.2 with exceptions and clarifications, including:
  - Additional guidance for fault detection and self-diagnostics, if used, in DI&C systems.
  - Guidance and clarification for control of access.
  - Endorsement of Annex D, ““Identification and Control of Hazards.””

# Proposed Changes (Cont.)

## ➤ **System Integrity (Staff Position 1.b(1))**

- Endorsement of Annex D, “Identification and Control of Hazards.”
  - Annex D was updated, in part, to implement the NRC staff’s feedback related to the IEEE hazard analysis (HA) guidance.
  - The Office of Research, via a research assistance request, assessed whether the updated Annex D supports an adequate technical basis for establishing consistent regulatory guidance.
  - This draft guide endorses Annex D with clarifications to provide technical basis for applying and evaluating HA in support of safety demonstrations.

# Proposed Changes (Cont.)

## ➤ System Integrity (Cont.)

- Include additional guidance for fault detection and self-diagnostics, if used, in DI&C systems.
  - Self-diagnostics, if integrated into the safety-related DI&C systems, could be credited, on an application-specific basis, to either reduce or eliminate the channel operability tests, provided certain criteria are met.

## ➤ Independence (Staff Position 1.b(2))

- Include applicable ISG-04 guidance that has not been incorporated into IEEE Std 7-4.3.2-2016.

# Proposed Changes (Cont.)

## ➤ **Control of Access (Staff Position 1.b(3))**

- Include guidance for providing safeguards to safety-related PDDs before installation.
- Clarify the applicability of the control of access guidance for safety-related programmable digital devices and including a reference to RG 5.71 as directed by the Commission.

## ➤ **Common Cause Failures (CCFs) (Staff Position 1.b(4))**

- Include a note in which the NRC staff uses the guidance in BTP 7-19 to evaluate the applicants' defense-in-depth and diversity assessment as a means to address CCFs.

# Summary

- RG 1.152 is one of the primary RGs used by applicants and licensees in the development of digital I&C license applications, reactor certifications, and digital I&C topical reports.
- The update to RG 1.152 is a high priority based on recent licensing experience and interactions with stakeholders that contributed to the update to IEEE Std 7-4.3.2 in 2016.

## Summary (Cont.)

The staff proposes the revision of RG 1.152 to

- Update information and guidance in the areas of functional reliability, design quality, and a SDOE for programmable digital devices in the safety-related systems of nuclear power plants.
- Support NRC guidance and review practices.
- Ensure that the guidance in these areas is current and consistent with the staff's position.

Thus, enhancing the efficiency and effectiveness of licensing review.

# Questions?