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 Digital Instrumentation and Control Systems
 Subcommittee

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UNITED STATES NUCLEAR REGULATORY COMMISSION'S ADVISORY
COMMITTEE ON REACTOR SAFEGUARDS

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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

5 (ACRS)

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7 SUBCOMMITTEE ON DIGITAL INSTRUMENTATION

8 AND CONTROL SYSTEMS

9 + + + + +

10 FRIDAY

11 AUGUST 21, 2009

12 + + + + +

13 ROCKVILLE, MARYLAND

14 + + + + +

15
16 The Subcommittee convened at the Nuclear
17 Regulatory Commission, Two White Flint North, Room
18 T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. George
19 Apostolakis, Chairman, presiding.

20 SUBCOMMITTEE MEMBERS:

21 GEORGE APOSTOLAKIS, Chairman

22 DENNIS C. BLEY, Member

23 CHARLES H. BROWN, JR., Member

24 JOHN D. SIEBER, Member

25

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CONSULTANT TO THE SUBCOMMITTEE:

MYRON HECHT

NRC STAFF PRESENT:

CHRISTINA ANTONESCU, Cognizant Staff Engineer and
Designated Federal Official

SHAKUR WALKER

BILL KEMPER

PATRICK HILAND

ED MILLER

TOM BERGMAN

DAVID RAHN, SR.

PATRICIA SILVA

MARISSA BAILEY

ALSO PRESENT:

GORDON CLEFTON

P R O C E E D I N G S

(8:30:02 a.m.)

1
2
3 CHAIR APOSTOLAKIS: The meeting will now
4 come to order. Today we are reviewing the Digital I&
5 C Steering Committee activities. Guys, please. And
6 we'll start with you, Mr. Kemper.

7 MR. WALKER: Start with me.

8 CHAIR APOSTOLAKIS: Mr. Walker.

9 MR. WALKER: Good morning. My name is
10 Shakur Walker. I'm Project Manager for Digital I&C
11 activities in NRR, and for the Digital I&C Steering
12 Committee. I want to thank you for the opportunity to
13 provide you an update for an overview of the Digital
14 I&C Steering Committee activities, and the activities
15 that are related to the Task Working Groups out of the
16 Digital I&C Project Plan.

17 It's Friday, the last day of the ACRS
18 meeting, and the fun is coming to an end, but,
19 hopefully -

20 CHAIR APOSTOLAKIS: So, it's the first
21 time, I think, that you have come before this
22 Subcommittee. What is your role in the Steering
23 Committee?

24 MR. WALKER: I'm Project Manager for the
25 Steering Committee. I'm on a rotational assignment

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1 from Region II.

2 CHAIR APOSTOLAKIS: So, what, you're going
3 to stay there for two and a half weeks?

4 MR. WALKER: I've been here since the end
5 of May.

6 CHAIR APOSTOLAKIS: Well, how many -

7 MR. WALKER: I came here the day after
8 Memorial Day, and I won't leave until the end of
9 September. So, loads of fun since then, Commission
10 meetings, ACRS meetings.

11 CHAIR APOSTOLAKIS: Okay.

12 MR. WALKER: I've been well -

13 MEMBER SIEBER: You really like it here.

14 MR. WALKER: It's been too much fun to
15 even put into words.

16 (Laughter.)

17 CHAIR APOSTOLAKIS: Why don't you stay
18 longer?

19 MR. WALKER: Actually, they miss me in the
20 Region, so -- but I know I'll be communicating -

21 CHAIR APOSTOLAKIS: Okay. Thank you. So,
22 you came from what Region you said?

23 MR. WALKER: Yes, Region II in Atlanta.

24 CHAIR APOSTOLAKIS: And you are going back
25 there?

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1 MR. WALKER: Yes. That's the plan.

2 CHAIR APOSTOLAKIS: Okay.

3 MR. WALKER: Well, we all know what the
4 Steering Committee was initially created to do. It
5 was created to provide management focus across NRC's
6 organizational boundaries to develop a more
7 predictable and efficient runatory process. And to
8 interface with the industry, and to facilitate
9 resolution of issues related to Digital I&C.

10 With that being said, the near term goal
11 of the Steering Committee is to compete the objectives
12 of the Digital I&C Project Plan, and each respective
13 TWG, the Task Working Groups. So, they'll maintain
14 oversight of the Task Working Groups. Right now, we
15 have two remaining Task Working Groups, six and seven,
16 and you'll hear from both of them following my
17 presentation. Also, the eventual goal is to dissolve
18 the TWGs, the Task Working Groups, and integrate
19 Digital I&C issues into the line organization.

20 With that being said, the Steering
21 Committee still wants to maintain awareness of Digital
22 I&C activities that aren't under the project plan, so
23 we'll discuss some of those issues today. They'll
24 also remain functional for the completion of long-term
25 deliverables; meaning, the Standard Review Plan

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1 updates, and those that will be integrated into the
2 Branch Technical Positions, and then the SRP. And,
3 finally, they will continue to hold internal and
4 public meetings to update activities with regards to
5 the Steering Committee.

6 As I stated, the ISGs that are to be
7 completed are ISG-6 and ISG-7. ISG-6 covers the
8 licensing process. Right now, the draft is scheduled
9 to be completed by the end of the year, and, as I
10 stated, Bill Kemper and Ed Miller will be giving an
11 update on that ISG.

12 ISG-7 is Digital Instrumentation and
13 Controls for fuel facilities, and is currently issued
14 for public comment, and scheduled to be complete by
15 the end of the year. And you'll be hearing from David
16 Rahn later on today on the update and status of that
17 ISG.

18 In light of what we discussed about the
19 overall mission of the Steering Committee, there are a
20 few areas that are being monitored by the Steering
21 Committee that are related to Digital I&C that are
22 outside of the project plan, and that's Digital I&C
23 operational issues, cyber security, and research
24 activities.

25 CHAIR APOSTOLAKIS: Why are they

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1 considered outside? I mean, especially cyber security
2 seems to me is -

3 MR. WALKER: Well, the cyber security
4 issues that are going on, that NRC is involved in
5 right now aren't directly related to what the initial
6 mission of the Task Working Groups under the project
7 plan are related to, and we'll discuss those. I have
8 a later slide to discuss that; but things like the ISG
9 - there's an ISG being developed in coordination with
10 NRR and NRO. And this ISG is working to clarify
11 positions that were documented in Reg Guide 1.152.
12 And it's different from what the initial ISG was
13 written to do. That was written to compare Reg Guide
14 152 with what was in the NEI guidance. So, it's a
15 different mission that the ISG wants to develop.

16 MR. KEMPER: Actually, it was more a
17 management decision more so than anything else,
18 because we concluded -- at the conclusion of TWG-1, we
19 always intended, or we took a take-away from that to
20 produce this interim staff guidance and attach it with
21 ISG-6. And then, more recently, we all met
22 internally, and a decision was made, now, let's go
23 ahead and serve that up as a separate entity in and of
24 itself, and then we'll reference that, we'll point to
25 that in ISG-6. So, that's the reason for this.

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1 MR. WALKER: For Digital I&C operational
2 issues, we're going to continue to evaluate treatment
3 of different Digital I&C operational issues, such as
4 50.59 modifications, the (a)(4) Maintenance Rule,
5 which is the Risk Assessments, Significance
6 Determination Process, and Licensee Event Report.

7 It's critical for us to continue to work
8 with industry on the treatment of these issues. There
9 was a public meeting held back on May 1st, May 7th,
10 excuse me, with NEI regarding some issues that the
11 industry had brought up, and these are a subset of
12 those issues. So, we're going to continue to work
13 with them and see if there's any improvements through
14 lessons learned and so forth, for these operational
15 issues. And we had some discussion yesterday, as Mr.
16 Brown brought up things with LERs. Is there some
17 improvement for the LER process that can be done? So,
18 that's what we're planning to do, and continue to work
19 with NEI. In fact, we discussed with Gordon the other
20 day about try to schedule and coordinate a subsequent
21 meeting to discuss with industry to see where the
22 future of that will go.

23 As we talked about earlier, cyber
24 security, there are different activities, as we stated
25 before, occurring related to cyber security, including

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1 the cyber security ISG that we mentioned previously.
2 Again, this is to clarify guidance that was documented
3 in Reg Guide 1.152, Regulatory Positions 2.1 through
4 2.9.

5 This is -- you'll have further -- I guess
6 you'll be further informed about cyber security issues
7 in a meeting I believe that's been scheduled for
8 October 23rd with the ACRS, so you'll hear more
9 development on the different cyber security issues
10 that are related to -- that the Agency is involved in
11 right now.

12 And as far as Digital I&C research
13 activities, we heard about the research plan
14 yesterday, and the Steering Committee wants to be
15 involved in tracking development and implementation of
16 the five-year research plan. And you heard from Dan
17 Santos and the others in Research yesterday about the
18 involvement, and the cohesiveness and communication
19 with the Steering Committee. We're going to continue
20 to insure the research activities encompass the higher
21 priority Program Office issues related to Digital I&C.

22 So -- yes?

23 MR. HECHT: Excuse me. I'm a little bit
24 confused. In February, we discussed Reg Guide 5.71.
25 And wasn't there ISG guidance on cyber security, as

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1 well, like ISG-3 or something?

2 MR. WALKER: ISG-1.

3 MR. HECHT: And now you're saying that
4 it's not?

5 MR. WALKER: Well, ISG-1 was initially
6 written to clarify NRC guidance as requested by
7 industry, and compare that guidance with regard to
8 implementation of cyber security measures. And it was
9 compared to NEI 04-04, and what was in the Reg Guide.
10 And that was what was asked of industry of the TWG,
11 so that ISG did that. And they found that there
12 weren't too many -- they were comparable.

13 This new ISG is going to clarify the
14 guidance that's written in the Reg Guide. It's not
15 going to change any of the guidance that's already
16 been documented, or change any regulatory positions.
17 But it wants to clarify the guidance in 2.1, those Reg
18 Positions in that Reg Guide.

19 MR. HECHT: Thank you.

20 MR. KEMPER: These regulatory positions
21 describe what needs to be done in a license
22 application, and this interim staff guidance is
23 intended to provide the methodology for how to execute
24 those parameters.

25 MR. HECHT: Well, that I understood, but I

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1 guess the point is, is that you're writing a new Reg
2 Guide now to implement -

3 MR. WALKER: It's a new ISG, Interim Staff
4 Guidance, to clarify what those positions are that are
5 in the Reg Guide.

6 MR. HECHT: So, you're replacing ISG-1?

7 MR. WALKER: Not necessarily replacing it.
8 There are two different goals, though, two different
9 objectives. That first one -- the first ISG, ISG-1,
10 was just there to compare NEI 04-04 and the Reg Guide.

11 This new ISG is going to clarify those positions that
12 are in the Reg Guide. Now that we know that NEI 04-04
13 and Reg Guide 1.152 are comparable, they're the same,
14 we're just going to clarify our regulatory position in
15 that Reg Guide.

16 MR. KEMPER: And that can be confusing, I
17 realize, because Reg Guide 5.71, of course, as you
18 just mentioned, is due to be issued here soon, in the
19 next couple of months.

20 MEMBER BROWN: What's 5.71 again?

21 MR. KEMPER: 5.71 is designed specifically
22 to provide staff guidance on the new rule that was
23 issued, Part 73.54.

24 MR. HECHT: The title is Cyber Security
25 Programs for Nuclear Facilities.

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1 MEMBER BROWN: Okay.

2 MR. KEMPER: Exactly. It's very
3 confusing, I realize that. But 5.71 is intended to
4 provide the Programmatic, in other words, a site's
5 built in in situ cyber security program, if you will.

6 Whereas, Reg Guide 1.152 provides guidance on
7 licensing actions; in other words, new or revised
8 Digital Safety Systems that are submitted to the staff
9 for review. It is confusing, but it has to -

10 MEMBER BROWN: Is there a roadmap
11 somewhere on that? Isn't there an ISG-1 or someplace
12 where you can easily find it?

13 MR. WALKER: We do have a roadmap. And,
14 like I said, during -- this roadmap.

15 MR. KEMPER: Oh, yes.

16 MR. WALKER: But on the -- I believe
17 during the October 23rd meeting with the ACRS,
18 specifically focused on cyber security, this will be
19 further explained in detail about how everything
20 interconnects.

21 MEMBER BLEY: This coming October?

22 MR. WALKER: This coming October.

23 MEMBER BROWN: When is that one?

24 MR. WALKER: October 23rd, I believe it's
25 scheduled for.

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1 MEMBER BROWN: And I'll be in the air
2 coming back from Tokyo.

3 MR. WALKER: We'll have to teleconference
4 you in then.

5 (Laughter.)

6 MEMBER SIEBER: Either that, or you could
7 skip that trip.

8 MEMBER BROWN: They have the technology.

9 MEMBER BLEY: You are pointing to -

10 MEMBER BROWN: What document is that in?

11 MR. WALKER: This was just something
12 internally developed.

13 MEMBER BROWN: Okay.

14 MR. WALKER: That was used as a visual
15 reference to -

16 MR. KEMPER: Visual aid.

17 MR. WALKER: Visual aid to help understand
18 where all these documents fall into place. This is a
19 very -- inter-offices across sectional project.
20 There's Research, there's NSIR, NRR, NRO, so there are
21 a lot of offices involved that we're streamlining.
22 And I know that's why we -

23 MEMBER BLEY: Since this has been
24 broached, is that just on cyber security, or is there
25 one that ties together all these things? I mean, in

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1 the next couple of sessions this morning we're going
2 to look at ISG-6 and 7. We've already looked at ISG-
3 1, 2, 3, and 5, I think. And somebody yesterday kind
4 of raised the question, gee, if somebody makes a
5 submittal and refers to one of these, do the other
6 ones apply? And they're not wholly consistent
7 everywhere. Is there a roadmap to how all of these
8 are supposed to be used, or is somebody working on
9 that?

10 MR. WALKER: Other than what's outlined in
11 the project plan, as far as how each ISG is related to
12 the initial objective. But, again, the Interim Staff
13 Guidance was written, and the plan of the project plan
14 is to incorporate the guidance that was documented in
15 the Interim Staff Guidance into Branch Technical
16 Position, and then to SRP, or other regulatory
17 documents, like the Reg Guide, NUREGs, or what have
18 you.

19 MR. KEMPER: Right now, this is the only
20 thing that exists in terms of -- I think that you
21 could dub as a roadmap.

22 MEMBER BLEY: It's only cyber security.

23 MR. KEMPER: It's only cyber security.
24 Right. And this will be embedded, I think, in all
25 likelihood in the Interim Staff Guidance, so that it's

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1 clear to the reader how what they're doing in
2 following that guidance fits into the overall cyber
3 picture. I'm sorry we don't have a slide for this
4 now.

5 MEMBER BLEY: So, is this going to be ISG-
6 8?

7 MR. KEMPER: This will be ISG, on cyber
8 security. There's no number because it's not under
9 the purview of the Digital I&C -

10 MEMBER BROWN: Okay. So, the Project
11 Plan.

12 MR. KEMPER: It will be produced like any
13 other Interim Staff Guidance that we produce
14 routinely.

15 MEMBER BROWN: So it will have funny
16 numbers.

17 MR. WALKER: Or it could just be called
18 just Cyber Security Interim Staff Guidance.

19 CHAIR APOSTOLAKIS: Okay. Are we done?

20 MR. WALKER: If there are no other
21 questions, then we can -- I think I'll go ahead and -

22 CHAIR APOSTOLAKIS: That's ISG-6. Right?
23 Bill?

24 MR. KEMPER: Right. ISG-6. Next, I'd
25 like to ask Ed Miller to come up. Lois James,

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1 unfortunately, is not feeling well today, so Ed is
2 going to pinch hit for her. We've been here before,
3 and talked about this, so this is really an update. I
4 wish that I could report that more progress has been
5 made than has been, but, unfortunately, it's a
6 resource-intensive issue, and resources are an issues
7 these days, but we have made progress.

8 MEMBER BROWN: If you haven't made all
9 your -- are you going to come back? I mean, you went
10 through the thing, and is there -- before you do
11 anything else, do you plan on coming back again? You
12 say it's not -- you wish you had made more progress.
13 Is this not considered a completed -

14 MR. KEMPER: No, not at all. No, there's
15 still -- no, we're here because we thought that you
16 asked us to come and talk to you. That's the reason
17 we're here. So, that's fine. We're prepared to talk
18 about it, and be glad to give you an update. But,
19 yes, we do intend to bring this back before we issue
20 it in final. That's what -

21 CHAIR APOSTOLAKIS: And that will be to
22 the Full Committee, I suppose. We don't need another
23 Subcommittee. Do we need another Subcommittee?

24 MEMBER BLEY: Well, I don't know. Let me
25 raise the question, because it fits in with what I

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1 just asked you. And we read through ISG-6, we find
2 some statements in there on operator actions, and less
3 than 30-minute business. And now we have a new
4 revision of ISG-2, and we have ISG-5. And all three
5 of those are -- well, 2 and 5 have now become
6 reasonably consistent. And 2 talks about a 30-minute
7 window time available to time required, and 5 talks
8 about you have to do analysis for any of them, even if
9 it's longer than that, to show that it's fine. Six
10 still has kind of the old notion of, if the time it
11 takes to do it is greater than 30 minutes, you don't
12 have to do anything. I hope these all get pulled into
13 a consistent framework. And that's kind of where I
14 was going. We were talking, what if somebody sent
15 something in to you guys, and it comes in under the
16 licensing one, under six, it refers to ISG-6. When
17 the reviewer picks that up, he might not get the
18 connection that ISG-2 and ISG-5 aren't quite saying
19 the same thing as this. Which one actually applies
20 when something comes in? That's why I was hoping
21 there would be some kind of a roadmap for your people
22 to say hey, if you get something here, you need to go
23 to more than one of these to get your guidance.

24 MR. KEMPER: Well, this, primarily, is
25 what this document is going to provide.

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1 MEMBER BLEY: Okay.

2 MR. KEMPER: This ISG-6 is going to be the
3 roadmap for the industry on the path that you should
4 pursue to obtain a license amendment.

5 MEMBER BLEY: So, that is the one -

6 MR. KEMPER: This is the roadmap.

7 MEMBER BLEY: This will be maybe what the
8 Reg Guide would look like eventually.

9 MR. KEMPER: Yes, this is for all the
10 criteria.

11 MEMBER BLEY: All the criteria. Okay.

12 MR. KEMPER: This is every piece of it,
13 Reg Guide -- and we're going to talk about that in
14 detail, some of the aspects of it.

15 MEMBER BLEY: Well, then at least on this
16 one area, it's got a little ways to go to be
17 consistent with what you've already got. Okay.

18 MR. KEMPER: That's why I say, it's a work
19 in progress, but we're happy to give you an update on
20 it.

21 CHAIR APOSTOLAKIS: Well, I mean, we can't
22 have too many Subcommittee meetings. I think -- do
23 you think that before we write a letter, a
24 presentation to the Full Committee will be sufficient?
25 As you know, there you have about an hour and a half,

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1 or do you think we're going to need a Subcommittee
2 meeting for ISG-6, since it is not final form?

3 MR. KEMPER: I value interactions with the
4 Subcommittee, quite frankly. You all have provided
5 very good insights and feedback to us on this, so I
6 would prefer to bring it to the Subcommittee before
7 the final Committee meeting. That would be my
8 preference, but it's your call.

9 CHAIR APOSTOLAKIS: And when do you think
10 that should happen?

11 MR. KEMPER: I would say in December.

12 CHAIR APOSTOLAKIS: Oh, December.

13 MR. KEMPER: Yes, December. Yes, the
14 slide -- one of the slides says October. We're not
15 going to be able to keep up with that. I would say
16 somewhere in December would be the likely time.

17 MR. HILAND: Excuse me. My name is Pat
18 Hiland, and I'm the Director of Engineering in the
19 Office of NRR. I'd just like to add a little bit of
20 clarity for the discussion. As some of you may know,
21 the Interim Staff Guidance number 6 initially started
22 out a couple of years ago. It was 150 pages long. It
23 took both the licensing, as well as the inspection
24 activities, combined them, and we asked for hundreds
25 of pieces of information. We stopped that effort,

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1 recalibrated ourselves, and I think you recall that we
2 said that we would use our Oconee ongoing review, and
3 we would pick from that some lessons learned. Oconee
4 was not a pilot, but it was an effort that we did, and
5 we're a week away from completing the Division of
6 Engineering's review of the Oconee amendment request.

7 The ISG-6 that we currently have, and the
8 progress we've made, we have one licensee who has
9 requested that we use -- or they requested a pilot
10 status for Interim Staff Guidance 6. It's Diablo
11 Canyon, for an upgrade of their RPS and ESFAS systems
12 to digital, also. If that pilot is accepted, I would
13 anticipate that we would start that review early next
14 calendar year. And we would take this Interim Staff
15 Guidance 6, and, as it's a pilot now, it should be
16 much better refined, and we should go into the next
17 calendar year with a pilot that we would learn a lot
18 of lessons learned from that review in a more formal
19 fashion than we did with the Oconee.

20 Oconee, you know, Duke insisted we are not
21 a pilot, so they were not. But we still -- they
22 agreed. There are lessons learned, and we have a lot
23 of lessons that we learned out of that effort. But,
24 hopefully, by the end of this calendar year, we'll
25 have a product we can get started with real quick.

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1 MEMBER BLEY: Okay. That's good. And
2 just one thing, if we're coming back in December on
3 this, I assume that the draft at that time will do a
4 lot of this, but I'd really like to see a focus on how
5 it integrates, and how it guides people among the
6 various guidance documents in whatever presentation
7 you guys do.

8 MR. KEMPER: Okay?

9 CHAIR APOSTOLAKIS: Yes. You don't have
10 to ask for permission.

11 MR. KEMPER: Okay.

12 MR. HECHT: Can I take you home? On
13 Appendix B of the current version of the plan, you
14 said that the previous version had hundreds of pieces
15 of information. And Appendix B has kind of a list of
16 documents that are required for each of the three
17 phases. Is this a simplified, or is this -

18 MR. HILAND: That's a refinement of what
19 had been done two years ago. I would think that the
20 Appendix B and the list of those documents had not yet
21 gone through what I'll call a management hard board;
22 meaning, I'm going to challenge the people. And if
23 you refer in there, there's one that says maintenance
24 procedures. I'll certainly ask why we need in the
25 licensing space to look at maintenance procedures.

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1 But that's still much better than what we had started
2 with two years ago. It was very ambitious on the part
3 of a regulator to think that we could even review the
4 amount of information.

5 MR. HECHT: Because it is a very
6 substantial list.

7 MR. HILAND: Yes, it is.

8 MR. HECHT: Especially, some of those
9 documents have to be reviewed three times.

10 MR. HILAND: Three times? I'm missing -

11 MR. HECHT: Tier 1, Tier 2, and -

12 MR. HILAND: We'll explain that. It's
13 only once.

14 (Simultaneous speech.)

15 MR. KEMPER: We realize that some of you
16 may not have had the benefit of previous discussions
17 on this.

18 MR. HILAND: Where you're starting. If
19 you're starting as a Tier 1, then you do that. If
20 you're starting as a Tier 2, you do that. If you're
21 starting as a Tier 3, you do that list.

22 MR. KEMPER: But if you think it's -

23 MR. HILAND: The starting point.

24 (Simultaneous speech.)

25 MR. KEMPER: -- just to go through it to

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1 bring everybody up to the same -

2 CHAIR APOSTOLAKIS: Well, let's -

3 MEMBER BROWN: I just want to make sure we
4 were finished. Okay. You laid out a game plan that
5 you had in mind. I've already forgotten half of it.
6 Would you kind of list that, not for absolute, or
7 anything like that, but could you specify what you
8 just went through, what your game plan is in terms of
9 this pilot, and blah, blah, blah, and working this
10 through to using it for the other one?

11 MR. HILAND: The Interim Staff Guidance?

12 MEMBER BROWN: Yes.

13 MR. HILAND: Yes. Of course, the end
14 goal, as we know, the last -

15 MEMBER BROWN: I want to write it down.

16 MR. HILAND: I'm not writing anything
17 down, myself. I don't claim anything, unless I sign
18 it. The end goal, as you've heard, is the Interim
19 Staff Guidelines, when we started the Steering
20 Committee, our goal was to get rid of them; that once
21 they were issued, and they were used in the interim
22 process, we go back in our normal processes, the Reg
23 Guides, the Standard Review Plans, et cetera. If you
24 look at the project plan, and you've looked at it, our
25 project plan has dates in there. I can't swear to all

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1 of them being final dates, but dates in there when it
2 would be handed off.

3 Interim Staff Guidance 6 was how -- it's a
4 licensing process. What information do we need to
5 review an application? And as we went through the
6 Duke review, we learned a lot. As you heard in some
7 public meetings, Duke said they handed us 25,000
8 pieces of paper. I don't doubt it, but it did fit on
9 one DVD disk. So, the information that we gleaned
10 from that, and we're making our decision as a
11 regulator, as in engineering. Now, I can only speak
12 for engineering, but we're a week away from completing
13 the documentation of our decision on that.

14 What we take from that is what information
15 did we not need? What information did we not need to
16 make our reasonable assurance decision? That will be
17 factored into our template, I'll call the ISG-6 now a
18 template, as we start a real pilot. We have a
19 licensee, PG&E and Diablo Canyon have come in. Now,
20 the CFO, our Chief Financial Officer, has to approve
21 whether or not they're a pilot, because that means
22 they have no fees assessed on them during the process.

23 But I would think that they would be an acceptable
24 pilot. We would use that template, ISG-6, go through
25 that process. And then we would have refinements,

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1 whether it could go directly into a Standard Review
2 Plan process, into a Reg Guide process.

3 As you know, the Steering Committee, we
4 want to end -- we want to be the first Steering
5 Committee that ends when we say we were going, so
6 that's as best I can give you as far as a game plan
7 today.

8 Now, the ISG-6, as you know, we got
9 comments from the Subcommittee on ISG-6, I think in
10 April. I'm not sure of the date. I think maybe it
11 was April 3rd or something. I glanced at the letter
12 last night, but we got comments on the ISG-6. Bill is
13 ready to address those, where our status is on those.

14 But our game plan is by the end of this year to have
15 a template ISG-6, move forward with the pilot, then
16 put it in the normal process.

17 MEMBER BROWN: As long as it's in the
18 transcript, I think that would -

19 (Laughter.)

20 CHAIR APOSTOLAKIS: Okay. Are we ready to
21 start? The traditional here to ask Mr. Miller to tell
22 us why he's addressing this Committee. Who are you?

23 MR. MILLER: Good morning.

24 CHAIR APOSTOLAKIS: Who are you? We
25 haven't seen you before, have we?

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1 MR. MILLER: Yes, I've been here before.
2 But, by way of background, I'm a Project Manager in
3 Operating Reactors in NRR, and I've been in that
4 position for about five years now. My plant currently
5 is Oyster Creek. Prior to that, I spent about two
6 years in our Instrumentation and Control Branch. As a
7 member of TWG-6, I'm providing licensing perspective
8 and process development input.

9 CHAIR APOSTOLAKIS: Great. Thank you.

10 MR. KEMPER: And I'm Bill Kemper. I'm
11 Branch Chief of NRR's Instrumentation and Control
12 organization.

13 CHAIR APOSTOLAKIS: Okay. We know you.

14 (Laughter.)

15 CHAIR APOSTOLAKIS: Okay.

16 MR. MILLER: So, briefly, just an overview
17 of what we'd like to go through today. I'd like to
18 review an overall high level view of the process, and
19 then dig down into each of the phases a little bit,
20 talk about what we do in each of those, describe what
21 the tiers of complexity mean, go through a few areas,
22 and Bill has a couple of good examples that we're
23 going to go through to show you what we're thinking to
24 kind of add a lot to the process with those review
25 areas, and then talk about the path forward, which I

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1 will summarize a little, but then we'll try and give
2 some more detail.

3 The purpose of ISG-6 is to augment and
4 clarify the existing licensing process. We're not
5 reinventing the wheel here. We're truing it, and
6 making it more applicable to the Digital I&C aspect.
7 We really want to lay out our expectations for
8 documentation. I think that's one of the places that
9 we get the best benefit in working with industry on
10 this, is those challenges that we're given, and why do
11 we need these things. We go back and say did we use
12 that documentation that we asked for, and we'll
13 continue to learn from that.

14 Additionally, knowledge management is a
15 very important aspect of this. We're facing a very
16 real situation now where some of our senior staff is
17 starting to retire, almost imminently, and we have a
18 very real need to get what they know about Digital I&C
19 in some form that can be transferred to new reviewers
20 as they come on board. So, as Pat had mentioned, we
21 have Oconee, which is near completion, to apply the
22 lessons learned in our development of ISG-6.
23 Additionally, we have Wolf Creek that was completed
24 back in late March of this year. We certainly applied
25 what we learned from that, as well. Again, that's

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1 looking at what did we ask for, what did we think we
2 needed, what did we end up using, what surprised us
3 during the process, what was new to us, things like
4 that. Those are questions that we ask ourselves in
5 the process.

6 CHAIR APOSTOLAKIS: So, this knowledge
7 management, I mean, we keep hearing those words. I
8 appreciate what you said about people retiring, you
9 want to capture their knowledge and expertise. I
10 remember a few years ago, we had a presentation by
11 another group of the staff that told us that it was an
12 agency-wide effort to do that, and use modern
13 electronic means to achieve it. Is this part of that?

14 I mean, how do you do that? You just issue a guide
15 with -- paper or electronic, and that's it, or is
16 there more to it?

17 MR. MILLER: This is a piece to that
18 puzzle. There's a lot of other things that are going
19 on in the Agency independent of what we're doing here.

20 And some of them utilize technology to a larger
21 degree than others. But, like I said, we're just a
22 piece of the puzzle here with this. And what we're
23 really asking is some of our more senior reviewers to
24 go back and put down on paper all the things that they
25 find to be most germane to a review of Digital I&C, so

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1 that there is less of a learning curve for a new
2 reviewer. He doesn't have to come on board and learn
3 the hard way, that he should have asked for something,
4 or doesn't need to worry about a certain aspect of an
5 application ahead of time. He can look at that,
6 understand ahead of time, and interact more
7 efficiently with licensees.

8 CHAIR APOSTOLAKIS: And all this will be
9 in the ISG, or somewhere else?

10 MR. KEMPER: No, no. Like Ed said, this
11 is a piece of the overall picture for knowledge
12 management, and knowledge transfer. My branch is
13 participating in the knowledge management database,
14 the electronic system, just like all the other
15 branches are in the Agency. And what we're doing is,
16 take for example, measurement of uncertainty recapture
17 of power uprates that use ultrasonic flow meters.
18 There are a lot of very hard and good lessons that
19 have been learned by the staff over the years in doing
20 these reviews. Some of the things are associated with
21 nuances specifically related to that technology
22 itself. So, I'm having the most knowledgeable senior
23 folks in my branch write up, if you will, a little
24 script, or testimony, whatever you want to call it,
25 that describes some of those issues, so that it's

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1 documented from somewhat gray matter onto a paper
2 somewhere, so that the new staff can get that before
3 they get their very first assignment.

4 Now, this is an overall process for how
5 they would actually process that license application,
6 if you will. All right? So, this won't have all of
7 those little lessons learned, the things that were
8 very difficult to work through with a vendor, or a
9 licensee, that we don't want to repeat those things
10 over and over again.

11 MEMBER BLEY: Are those things put into
12 some kind of a searchable knowledge base for people?

13 MR. KEMPER: Yes. Yes.

14 MEMBER BLEY: Okay. And that's something
15 on the website that people can get?

16 MR. KEMPER: That's correct. But it's
17 controlled. It's set up where you have to have access
18 to it, and it's got to be granted by the people, like
19 myself, for example, or Dave, who we feel should have
20 access to it.

21 MEMBER BLEY: Is it already there?

22 MR. KEMPER: It's a work in progress.
23 Okay? I can't -- say for my branch, we're maybe 10
24 percent of where it should be. Okay?

25 MEMBER BLEY: But that 10 percent is

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1 already operable.

2 MR. KEMPER: Yes.

3 CHAIR APOSTOLAKIS: Good. That's good.

4 MR. KEMPER: Okay.

5 MR. MILLER: You've seen this slide before
6 in the previous ISG-6 presentations. I don't want to
7 focus on this one too much. It gives you a very high
8 level overview of the different phases. Suffice it to
9 say that we tried to break it down into phases so that
10 there's more discipline introduced into the process,
11 in the hopes that discipline inserted early on will
12 result in smoother operations at the end game in the
13 review.

14 We'll dig into each of these phases in a
15 little more detail, which will be new for what we
16 talked about in ISG-6, thus far. Before I get into
17 that, though, I do want to talk about the tiers that
18 you brought up earlier.

19 Any single application where we expect to
20 bin as one of three tiers, and they increase from one
21 to three in the complexity of the review that we
22 expect to undertake. Tier 1 reviews will be something
23 that is based upon a previously approved topical
24 report with no deviations, or it might be better to
25 say no significant deviations. Significant would be

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1 something that we would have to, on a case-by-case
2 basis, evaluate. Again, since it's more of a
3 confirmatory review, we're making sure that they fit
4 whatever the defined envelope for that previous review
5 was. We expect it will be significantly shorter,
6 barring any unforeseen circumstances coming up, if we
7 find that something doesn't fit the original envelope.

8 A rough estimate for the review length of a Tier 1
9 review will be about 12 to 15 months.

10 Proceeding from there -

11 CHAIR APOSTOLAKIS: But this -- I don't
12 know how these things happen. I mean, that's internal
13 to the Agency, but, I mean, if everything has been
14 approved previously, why does it take a year to
15 approve, to review? And then if you jump to Tier 3,
16 which presumably has much more new stuff, it's not
17 even double, less than double the time. So what is it
18 that takes so long?

19 MR. KEMPER: Well, let me try to answer
20 that, just a couple of good examples here. Typically,
21 these platforms are reviewed on a single channel type
22 of arrangement. That's typical, although they have
23 descriptions of how they would deploy them in RPS or
24 an ESFAS system. Okay? On a conceptual level, if you
25 will, in the topical report. But they don't really

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1 get into the details of what the communication
2 strategy between safety channels themselves. So, many
3 of these systems that are being proposed for new
4 reactors, and certainly for operating reactors, as
5 well, deploy those design features. So, that's where
6 really the meat and the effort is required to review
7 an application specific deployment of that technology.

8 That's just one example.

9 Cyber security is another one. None of
10 these platforms were approved previously back in the
11 day when cyber security was a focus. That was all --
12 most of it was pre-9/11, or at least we hadn't got
13 our act together yet in terms of prescribing cyber
14 security regulatory requirements from a licensing
15 standpoint. So, that's just a couple of examples that
16 just come to mind.

17 Safety and non-safety communications, the
18 topicals will talk about some of these issues
19 conceptually, so the staff would acknowledge that yes,
20 that exists. And if it's deployed properly, it should
21 be approvable, that sort of thing. But when we really
22 get into the meat of that is when we get a license
23 specific application. And, also, there's about 16 or
24 17 specific plant -- plant-specific open items that
25 have to be addressed by each application,

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1 qualification of hardware, software qualification
2 program, so forth for the application software.
3 Because the program only -- the platform approval only
4 covers up to the operating system, runtime
5 environment, that sort of thing. It doesn't cover the
6 application software at all. So, that's where the
7 effort is.

8 CHAIR APOSTOLAKIS: Thank you. Okay.

9 MR. MILLER: Transitioning into a Tier 2
10 review, this is where you take a previously approved
11 platform, but the licensee in this case has made
12 significant changes in how they're applying that
13 topical report that in different situations put it
14 outside of the envelope by which it was previously
15 approved.

16 For Tier 2, we actually have a review area
17 that we're dedicating to answering the question of
18 what do we consider significant, and what do we need
19 to see to resolve and make sure that that is still
20 safe in operation for whatever the changes they've
21 applied are? A review life estimate for a Tier 2
22 review will be approximately 14 to 18 months.

23 And Tier 3 picks up a totally new system.

24 We haven't seen this before, or it's so markedly
25 different from what we have seen before as to require

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1 a full review effort, all technical areas versus just
2 confirmatory reviews, which we see a lot in Tier 1
3 and Tier 2. Again, this would take about 18 to 24
4 months.

5 One thing I wanted to address, too, about
6 the document list in the back of Appendix B. At
7 first, we kind of had the idea that we wanted to put
8 out the definitive document list that we need. But
9 what we found is that due to naming differences, and
10 application-specific differences that we run into,
11 it's really not beneficial to put out an overall
12 document list as the de facto standard for this is
13 what we will need to see. So, instead, we're keeping
14 Appendix B in there as a guide to give you an idea of,
15 if I go with the Tier 1 review, this is about the
16 amount of documentation I'll need, and this is the
17 kind of documents I'll probably need to produce. And
18 you can see as it progresses into a Tier 3, the
19 documentation to be provided becomes bigger onus on
20 the licensee. That's about what we wanted to show
21 with it right now. We're hoping that the actual
22 documentation falls out better from the actual review
23 areas, when we talk about what we need to see for each
24 aspect. Does that resolve what you were asking about
25 the tiers?

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1 MR. HECHT: Yes. I misread tier as phase,
2 and that's why I -

3 MR. MILLER: Okay.

4 MR. KEMPER: And as Pat mentioned earlier,
5 I'd just like to build on what Pat said. We're using
6 Oconee is a benchmark - that's my term, all right - to
7 benchmark this process with. So, we created a thing
8 called a documents usage list, or table that we're
9 going to eventually once the review is over with,
10 benchmark every document, all 26,000 or 27,000 of
11 those pages, and we're going to determine whether that
12 document was used, and identify specifically what
13 section in the SE it was used. So, by doing that, we
14 will flesh this list out, hopefully, at least for a
15 Tier 2 review, because Oconee is a Tier 2 review.
16 Wolf Creek is a Tier 3. And give this some more
17 solidarity in terms of the amount of information that
18 the staff needs.

19 MR. HILAND: Again, this is Pat Hiland. I
20 would just like, and I'm going to minimize how much I
21 talk today, but we recognize that we have the ability
22 to ask for more information as we go in and we find
23 problems, we use the term request for additional
24 information. Just because we have a list of 15
25 documents, that doesn't mean we're not going to ask

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1 for 16 through 20, if our reviews lead us that way.
2 So, the documents we're asking for in Ocone, the ones
3 we didn't use, we would not anticipate using, but we
4 might. And we always tell the licensees that. We
5 might need to get into more detail if, in fact, our
6 questions lead us there.

7 And one thing, I take the opportunity, is
8 to -- we're focusing on our licensing reviews, and the
9 licensee. We've got some vendor issues that were
10 identified in this process that we've shared, as far
11 as lessons learned, for the equipment that's intended
12 to be used in the United States versus the rest of the
13 world. And, in fact, Mr. Kemper is going over to
14 Finland the last week of September to participate in a
15 bi - not a bilateral, but it's UK, Finland, French,
16 and the United States to discuss the same system that
17 we've all licensed, or are licensing at Ocone. So,
18 we're not sharing licensing issues, we're sharing the
19 technical problems that we had. And each country is a
20 little bit different on what their requirements are.

21 MEMBER BLEY: I want to ask a kind of
22 inconvenient question, and it's not really with what
23 you're doing. I see -- I understand ISG-6 is for
24 existing reactors, but your response to George on the
25 Tier 1, where you've had a topical report that's been

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1 approved, talking about how long it's going to take to
2 review it makes me think, and that's a single system.

3 Might be a big system, think of our design certs,
4 where we've got a DCD that doesn't include a full
5 topical report on an even larger system, and a set of
6 design acceptance criteria. Is there any reason I
7 should expect that it would take longer to look at
8 that complete system and understand it, than the kind
9 of times you're showing here to look for the problems
10 that might exist?

11 MR. KEMPER: Well, I can provide some
12 information. Obviously, I'm not NRO, so -

13 MEMBER BLEY: Right. I understand. It
14 seems remotely parallel. That's why I'm asking -

15 MR. KEMPER: Well, it is parallel. That's
16 a very good way of putting it, because often, at least
17 ways with two or three vendors of new reactors have
18 recognized that they want their platform, their
19 platform has not been previously approved. So, what
20 they do is they will request, or typically what
21 they've done is request dual joint office review. In
22 other words, approval by NRO, as well as NRR, for
23 deployment of that platform. And, obviously, the new
24 DCD, as well as the current operating reactors. So,
25 when that happens, we team up with NRO, and we do a

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1 joint review on that. And it does take longer to
2 review a platform at that level, because that's where
3 all -- you have all the details than it would at a
4 conceptual level. I see Tom Bergman is here. He
5 might want to add something.

6 MR. BERGMAN: Actually -- Tom Bergman.
7 I'm Director of Division of Engineering Office of New
8 Reactors. I think Bill answered it very well. We do
9 work closely with NRR where there are commonalities
10 between the systems. In a design certification
11 review, I mean, they're about three years. Right?
12 And then you would have more wrap-up, but they're
13 about a three-year technical review, for comparability
14 with what they're calling a Tier 3 review.

15 MEMBER BLEY: But at the end of that, if
16 you don't have a Tier 1 level design in front of you.

17 MR. BERGMAN: No, I don't think anybody
18 who submitted anything -

19 (Simultaneous speech.)

20 MR. BERGMAN: Oh, well, no. The tiers
21 they have here are referring to the level of prior
22 review, not the amount of information. So, in terms
23 of -- if you look at -- our's would all be Tier 3.
24 They're all totally new systems.

25 MEMBER BLEY: But, I mean, after the

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1 design has been certified, you still don't have a
2 complete topical report on the I&C system. That's
3 coming later.

4 MR. BERGMAN: There may never be a topical
5 report. It would be up to the applicant if they
6 wanted to use it generically. And some of them do.
7 They've already come in with topical reports. So, it
8 varies. You can't give a pat answer. It does vary by
9 applicant. But they would only submit topicals if
10 they wanted to use their systems, which most of them
11 do, in operating reactors, as well as new reactors.

12 MEMBER BROWN: I wanted -- we keep talking
13 about platforms. A platform is a platform. It's a
14 CPU, put your algorithms in, put the program in, et
15 cetera. That's really, in my own mind, a subset of
16 the application of a platform. As you noticed, you
17 review these on a single channel basis, where most of
18 the fundamentals that we have to deal with relative to
19 insuring we have a satisfactory overall system is the
20 independence, redundancy, determinancy, et cetera.
21 So, I'm going to say these every time that we have to
22 talk about it, if I have to. That's where the rubber
23 hits the road. The platforms, those are the bags.
24 There are bits and bytes turned around, get something
25 in, they spit something out. You can do what you

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1 want, but they fundamentally don't -- they don't
2 determine the fundamentals of redundancy,
3 independence, determinancy. They do the -- if you use
4 a different type, you've got the diversity, or the
5 defense-in-depth type thing. So, we keep talking
6 about platforms, and, to me, the issue of making sure
7 we got what we want is how those platforms go side-to-
8 side, front-to-back, communication out with other
9 operational monitoring devices, or outside world, as
10 well as inter-division communication. I tried to
11 emphasize that in the last meeting we had here.

12 MR. KEMPER: I was going to speak to that,
13 too.

14 MEMBER BROWN: Yes. Well, you have to put
15 a few words in there. You tossed a few crumbs in.
16 I'm not saying that negatively, but I -

17 MR. KEMPER: I would prefer to call them
18 nuggets, you know.

19 (Laughter.)

20 (Off the record comments.)

21 MEMBER BROWN: But, to me, that's where
22 when I was looking back through this, in addition to
23 some of the others, is try to -- how do we put the
24 focus on the division-to division operation, the
25 fundamentals that we need to maintain and have

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1 satisfactory, safe, reliable systems that we know are
2 going to respond when we ask for them. So, that's --

3 I agree with you platforms take time, and you've got
4 to know what -- you really have to know something
5 that's in the platform. I shouldn't say this, but you
6 could almost deal with any platform if you maintain
7 the other rigor, in terms of how you apply them
8 division, by division, by division, and how they
9 communicate with the outside world. So that's part of
10 my speech.

11 MR. KEMPER: Well, I was going to speak to
12 that. I'm going to -- and, hopefully, I'll say
13 something that will make you happy here in a minute.

14 MEMBER BROWN: Well, let me -- I'll give
15 you -- because in the process of looking at this, as
16 well as in the fuel facility, ISG-7, there is a
17 reference to ISG-4, which has a whole section on data
18 communications. It talks about inter-channel, excuse
19 me, inter-divisional communications. It talks about
20 various forms of inter-divisional, whether it's voter
21 -- output to voter in each channel, or is shared data,
22 et cetera? And there's some words in there says you
23 shouldn't share data. But then if I go look at some
24 of the stuff that's been laid on the table, they share
25 data. And the Oconee design does that. It's very,

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1 very clear. Yet, ISG-4 said no, you shouldn't share
2 data. But then it has some caveat, where it -

3 (Off the record comment.)

4 MEMBER BROWN: We had a long -- about a
5 30-minute conversation at lunchtime yesterday relative
6 to this. He thought it was prohibited. I said well,
7 no, if you look at the words, it says you shouldn't
8 use them. But then it goes on and says, but if you
9 want to, you have to kind of do all this dog and pony
10 show about showing us why it's not going to do
11 whatever, which was somewhat disturbing in that --
12 it's like dealing with your children, no doesn't
13 really mean no.

14 MR. KEMPER: That's a good analogy. I was
15 a manager and lead for that TWG, when we put that
16 guidance together, so it was a lot like -- that
17 environment was a lot like what you described there.

18 We had a bunch of different vendors trying to get
19 their input into the staff on what their designs
20 proposed, and we, the staff, had to sift through quite
21 a bit of data, and try to see if there was an
22 engineering approach that you could design these
23 systems to invoke those communication strategies that
24 you're talking about, and still comply with the
25 regulations, and be a safe solution. So, that's what

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1 ISG-4 is intending to do.

2 However, the staff still held onto our
3 intrinsic values. We still said you really shouldn't
4 do it, but if you do, these are the requirements that
5 you have to subscribe to; because there was
6 engineering solutions that were provided to us that
7 still provided a safe design to do that, so that's why
8 it's written that way. And Interim Staff Guidance, as
9 you know, is not regulations, it's just one acceptable
10 approach to comply with the regulations.

11 MEMBER BROWN: Yes, but the thing that it
12 boils down to, though, it fundamentally says that if
13 you go down that path, where you're removing the
14 independence from division to division, that armor
15 belt, and now we are translating and saying each
16 platform has to have software embedded in it that can
17 detect any and all different corrupt anomalies, et
18 cetera, et cetera, et cetera. We said hey, we've got
19 an alarm on it. We've got protection and defenses on
20 our health. We've got our alarm units there. But just
21 in case the burglar wants to get in, we're going to
22 leave it off, and we're going to put it up at our
23 bedroom door, and we're going to hope we recognize and
24 have time to do whatever we need to do. That's a bad
25 analogy, but -

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1 MEMBER SIEBER: And a big gun.

2 MEMBER BROWN: And a big gun. Right.
3 We'll use the Montana analogy, if you live in the big
4 sky country. So, it's a great concern when we don't -
5 - and I don't want to hear the old regulatory type
6 thing, we can't call people -- I agree with that. But
7 you also can't accept the designs, system designs that
8 don't provide the assurance of safety that's required
9 to operate these plants.

10 MR. KEMPER: You're absolutely correct. I
11 agree with you a thousand percent.

12 MEMBER SIEBER: But, in this instance, it
13 really wasn't intended as a prohibition, it was
14 intended to set conditions.

15 MR. KEMPER: That's correct. That's
16 right.

17 MEMBER SIEBER: So, I -- the wording is
18 unfortunate. On the other hand, I think that it's
19 understandable what they were trying to do.

20 MR. KEMPER: And, if you recall, two or
21 three months ago, we gave you a detailed presentation
22 on the communication strategy for Oconee. I'm pretty
23 sure that most of you -

24 MEMBER BROWN: You did. I was very
25 disturbed when I walked out of there. I didn't sleep

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1 for four weeks.

2 (Laughter.)

3 MEMBER SIEBER: Actually, the wording is -

4

5 MEMBER BROWN: That's why I've got dark
6 circles under my eyes.

7 MEMBER SIEBER: -- pretty good, because it
8 indicates the strong desire not to do that, and makes
9 the exception a true exception.

10 MR. KEMPER: That's correct. And some
11 vendors have opted not to do that. So, their
12 applications will be far, far easier to review. So,
13 yes, unfortunately the licensees have to -

14 MEMBER SIEBER: They will have their own
15 equipment.

16 MR. KEMPER: They pick their own poison,
17 as we say. Right? I mean, they can take it -- design
18 a system where the regulatory oversight review is
19 easier, or more difficult. They all have their own
20 reason for doing that, and we have to -- the old
21 saying goes, we have to review whatever comes across
22 our desk. We can't prescribe, unfortunately, up front
23 how they build their system. I wish I could. The
24 world would be a lot better if I could do that.

25 MEMBER BROWN: But you can say it's not

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1 acceptable.

2 MR. KEMPER: If it doesn't meet the
3 regulations, that's correct. That's what we do.

4 MEMBER BROWN: But when you put little
5 words in that you're trying to compromise where you
6 boundaries are, that makes it more difficult to --
7 now, it just makes it more difficult. It's not up to
8 you to prove the negative.

9 MR. KEMPER: That's true. That is true.

10 MEMBER SIEBER: Which is very, very
11 difficult to do.

12 MR. KEMPER: Well, it's certainly
13 challenging.

14 MEMBER BROWN: Not impossible.

15 MR. KEMPER: That's a good way of
16 characterizing it. It's not impossible, but it's
17 certainly challenging. And that's why I assume these
18 -- these take so much time and effort. You know, the
19 Ocone is a good example. This is a very complex
20 system that we're reviewing and approving. That's why
21 it's taking us, gosh, pretty near 19 months to get
22 through this.

23 MEMBER BROWN: But where the platform does
24 not require inter-channel -- you can design that using
25 that platform, and not communicate between channels,

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1 if you want to.

2 MR. KEMPER: Trust me, I've already had
3 this discussion with Oconee management on a couple,
4 two or three different occasions.

5 MEMBER BROWN: I'm finished. I'll let you
6 go on with this. It's just -- that's a fairly
7 important point relative to the guidance we're putting
8 out, and this license document doesn't reference these
9 things, and I think that's -- you can tell I'm still
10 hung up.

11 MR. KEMPER: When I get a chance to speak
12 to you in public -

13 MEMBER SIEBER: You can always use
14 precautions.

15 MEMBER BROWN: I preference abstinence to
16 -- that's one way of phrasing it.

17 MR. KEMPER: Well, in fairness, I just
18 made a presentation at an A&S conference last month,
19 and that was a message I sent to them, keep it simple.
20 Simpler is better.

21 MEMBER BROWN: Well, ISG says that. We
22 prefer simple systems. These are not simple systems
23 by any stretch of the imagination.

24 MR. KEMPER: Right.

25 MEMBER BROWN: And anybody who tells me

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1 that I can have error-detecting, error-correction
2 software that's always going to give me the right
3 result, you've got to be kidding me.

4 MEMBER SIEBER: It's an additional
5 opportunity for failure.

6 MEMBER BROWN: Absolutely. And it's more
7 complex than the software. I did see that you threw
8 in the nuggets, the independence, and a few things
9 like that, and all that other kind of stuff. And you
10 included it in the back part, so I think I've probably
11 mouse-milked this to quite a few -- you need to finish
12 this presentation.

13 CHAIR APOSTOLAKIS: Okay.

14 MR. MILLER: At this point, I'd like to
15 jump into a -

16 MEMBER BROWN: But you can see where my
17 result may be if I ever have to write a letter on
18 this.

19 MR. MILLER: Okay. I want to dig into the
20 individual phases a little bit in more detail than
21 we've done before. Starting out with Phase Zero, I
22 think this is probably the best example of how we went
23 back and refined, and augmented our existing
24 processes. We really have introduced a lot of
25 discipline in the pre-application activities that take

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1 place; whereby, previously this was really just a
2 spill the tap that an individual project manager would
3 engage with the licensee, maybe have a public meeting
4 about a big ticket application coming up, maybe talk
5 to the technical staff ahead of time, get some
6 information, something like that.

7 What we've done here is set up a rigorous
8 process through which we have public meetings ahead of
9 application for a Digital I&C upgrade, and we have a
10 much more rigorous layout for what we include in the
11 meeting summaries. And we're hopeful that what comes
12 out of those meeting summaries will, one, give
13 licensees a very good idea of what we expect to see in
14 the application. And, two, help us guide ourselves in
15 doing our acceptance review when this comes in, so
16 there may even be some resource savings in doing that.

17 That is, if we are very clear about what aspects of
18 what they've talked to us about are important to us,
19 they know to be very clear on that in the application.

20 And we're somewhat beholdng to that, too, when it
21 comes in to focus on that. And if we have additional
22 problems with it, we would have to justify why we have
23 additional items coming up. So, again, within Phase
24 Zero, from a process perspective, we're introduced a
25 large amount of rigor into what was before a pretty

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1 informal process. Bill will want to say a few items
2 about that Phase Zero, as well.

3 MR. KEMPER: Yes. The intent here is to
4 provide predictability and transparency to the
5 process. That was one of the biggest complaints that
6 we received from the industry, is about licensing
7 process. That's what really precipitated this whole
8 initiative here to provide this guidance. So, during
9 these meetings, we hope that the staff will gain an
10 understanding of the overall design concept, itself,
11 and how it adequately addresses NRC policy and
12 regulations, itself.

13 The key issues that we would discuss are
14 things like diversity and defense-in-depth.
15 Significant variances from current guidance, because
16 they certainly can do that, and I'll cover one good
17 example where they actually -- one application varies
18 from the regulations, themselves. Complexity of the
19 systems, software quality assurance, and other complex
20 technical issues that could affect the review itself.

21 During these discussions, the staff would
22 gain an understanding of the system's inter-channel
23 communications; specifically, how they intend to --
24 why they need to do it, and how they intend to deploy
25 inter-channel communications. They should have

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1 already figured that out long before they make their
2 license amendment request, so we hope to be talking
3 about this anywhere from six months to two years
4 before they actually make their submittal. That
5 should add a lot more predictability and efficiency in
6 their licensing application, and our review, as well.

7 Safety and non-safety communications, why
8 do you need it? What benefits are there? How does it
9 support the safety functions? All those questions
10 should be asked then, as opposed to when we actually
11 get the application a year or two later.

12 And, also, the staff -

13 MR. MILLER: Do you have a question?

14 MR. HECHT: Yes. In that chart, and in
15 the description on page 3, you have in the second box
16 there, you have "Public Meeting E3 Plus Others." In
17 the text you provide some examples of what the other
18 documentation might be provided, but the examples that
19 you gave in the text didn't include, for example, the
20 software quality assurance documents that you just
21 mentioned. And I'm just wondering how does a
22 applicant know, or I guess a licensee in this case,
23 know what "other" means? Do you have some preliminary
24 non-public meetings with the staff in order to
25 determine what the issues are, or another -

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1 MR. KEMPER: I'm not sure I'm following
2 your question.

3 MR. HECHT: Okay. "D3 Plus Others", in
4 the second box in the public meeting.

5 MR. KEMPER: Okay. Public meeting. "D3
6 Plus Other Topics, Other Issues."

7 MR. HECHT: Other topics. Okay. How does
8 the licensee know what those other topics are?

9 MR. KEMPER: Well, when we get this
10 license review standard completed, this will be the
11 very first primer that they should use to be able to
12 figure out what the staff is going to look at.

13 MEMBER BROWN: I want to springboard,
14 because that was one of my -- Myron brought up one of
15 the same points or similar point that I did. One of
16 the -- these two paragraphs that you have in here are
17 exactly identical to what they were in the ones we
18 reviewed previously. And one of my concerns there was
19 that -- and I don't disagree with the process, by the
20 way. I believe the process, the tiers, the phased
21 approach, I think that's a good game plan. I have
22 absolutely no problem with that, so don't take my
23 comments any other way.

24 The point is getting stuff up in front of
25 what is really critical and important. The second

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1 sentence reads, "To this end, the NRC Staff intends to
2 use the public meetings to process, to engage
3 licensees in the discussion of how their proposed DI&C
4 upgrade will address defense-in-depth and diversity."

5 Those are the two most important things relative to
6 what needs to be addressed when they lay this license
7 application request on your desk. Whereas, in fact,
8 those are just one of the four significant bullets of
9 redundancy, I'm going to say it again, independence,
10 determinancy, defense-in-depth, and diversity, plus
11 one, which is complicity. And they're not even
12 listed. Whereas, if I had to look -- what do I want
13 first in my designs, I want redundancy and
14 independence. And then I go look at what defense-in-
15 depth do I need, based on the design, the complexity
16 of the plant, what diversity do I need based on
17 whatever? Those are another level of -- they're never
18 another level down, but they are -- and they're not
19 subsumed, necessarily, in that, but they're part of
20 the overall four pillars. And that's not laid out.
21 It's okay, they don't really worry so much about the
22 independence, and they've reflected in ISG-4 and
23 others. I say that in a pejorative manner, because I
24 want to make sure I hadn't lost it yet, because I had
25 my earlier -- that I would have thought you would have

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1 laid, in Myron's terms, what are the other significant
2 items that should be identified, as opposed to having
3 them come up in discussions that they ought to be
4 identified right -- because those have really been
5 made -- if you go to the 10 CFR 50, that's
6 independence, single failure, redundancy, all those
7 items are called out in terms of the regulations.
8 They're not guidance, they're not ifs. They are
9 regulations. How you interpret those, and what you do
10 with, another issue, but they are the main fundamental
11 regulations for building -- whether it's analog,
12 digital, or what have you.

13 MR. KEMPER: I agree with you. I agree.

14 MEMBER BROWN: So, I -- when I didn't see
15 that after our discussion the last time, I said, oh,
16 gee, they weren't listening to me. But then I turned
17 the page, and someplace else you had the word
18 independence trickled in there somewhere. I'm not
19 picking on you.

20 MR. KEMPER: That's why I'm trying to
21 explain to you, these are the things that are right
22 now on the top of our head. But you're right, we need
23 to add more clarity to this guidance document.

24 MEMBER BROWN: Yes.

25 MR. KEMPER: Focus on those very things.

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1 You're absolutely right. The last part I was going to
2 say, I didn't get to finish. Also, the staff will
3 ascertain how the system design will provide
4 deterministic data communication -

5 MEMBER BROWN: That's in here.

6 MR. KEMPER: -- throughout the system.

7 That is -

8 (Simultaneous speech.)

9 MEMBER BROWN: I recognize you did put
10 that word in.

11 MR. KEMPER: Actuation device. Okay?

12 MEMBER BROWN: Yes.

13 MR. KEMPER: So, your message is being
14 heard.

15 MEMBER BROWN: I would really like to see,
16 because this is the first thing you do with the
17 licensees. This is the very first meeting that you
18 have. You lay those four pillars on the table. You
19 make them very, very strong. You don't tell them they
20 can't do something to execute those. That's not what
21 I'm asking for. I'm saying you need a strong
22 statement up front as part of the input to this, or
23 the ingress into this licensing process.

24 MR. KEMPER: I agree with you. And it's
25 important to talk about these things at the Phase Zero

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1 meeting, because that's really when the design should
2 have been fleshed out, kind of conceived. But -

3 (Simultaneous speech.)

4 MR. KEMPER: Exactly. All the
5 communications protocol has not necessarily been
6 purchased yet, so that's the time for us to discuss
7 that. You're absolutely right.

8 MEMBER BROWN: So, if we come back, I
9 would like to see a little bit more emphasis on the
10 four pillars, plus -

11 (Simultaneous speech.)

12 MEMBER BROWN: And you've got all those
13 words in there. They're just kind of -- in the ISG --
14 actually, the ISG talks about we want it simple. But
15 then we go, we allow certain things that -

16 MEMBER BLEY: Let me ask a question, and
17 it's a little bit for Charlie, as well as for you,
18 Bill. Because we mostly talk about this one site, how
19 to provide the best protection. But you were saying
20 you've talked this with Oconee, and for various
21 reasons, they didn't want to keep the data
22 independence. And the simple analogy, to me, is a
23 simple two-train cooling water system. And there's
24 two ways you can design it. One, you can design it
25 with absolute separation, and that really protects you

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1 from outside insults, like pipe breaks, and things of
2 that sort. Or you can design it with a lot of
3 segmentation cross-connects, and that protects you
4 much more against independent failures, a pump fails,
5 something like that. In fact, in the Navy, they do
6 that with the big cooling water systems around the
7 ship. And when you know the likelihood of those nasty
8 events, those high and battle conditions you segment,
9 and when the likelihood is lower, you protect yourself
10 the other way, and you operate at all cross-connect.
11 Are there arguments for why it's better to have no
12 data independence? Is there something they're gaining
13 from that that I don't know about?

14 MEMBER BROWN: Yes. Before you answer
15 that, let me add, I agree with your point, because
16 they do make the statement in the ISG about if you're
17 going to do this, it should enhance the performance of
18 the safety function. I may not have the words exactly
19 right, but that's roughly, and that's along the line.

20 But there's a little bit of difference from the
21 systems you're talking about, where it's a feed
22 system. You're controlling -

23 MEMBER BLEY: There is a clear trade-off.

24 MEMBER BROWN: There was an on-line type
25 thing, and reactor protection systems fundamental

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1 requirement is to shut it down when you absolutely
2 have to. So, it's not -- I can't say -- you,
3 obviously, want it to be redundant enough that single
4 failures don't shut you down, but you want it to be
5 independent enough that failures won't prevent a
6 shutdown. And it's -- so, they have the words in
7 there about how the -- whether it's data sharing, or
8 you don't talk about voter inside the program, for
9 instance, is another problem, which you talk about.
10 You identified that as a specific problem in the ISG.

11 So, you're right. I agree with you, and it's about -
12 it's what you want to do with it.

13 MR. KEMPER: Okay. Let's talk about
14 inter-channel communications first. Okay? Ocone
15 implements a second-min, second-max. You all probably
16 heard that before, and we talked about it last time we
17 were here, where it takes all of the sensors from all
18 four channels. Each sensor is processed by its
19 specific channel, and then that information is sent
20 channel-to-channel. It's compared in an algorithm in
21 the safety processor itself, and it selects the second
22 min or max, depending on whether it's a high trip
23 value or a low trip value, to actually actuate that
24 channel. So, by doing that, their basis for doing
25 this is that it avoids half-channel trips. Right?

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1 So, if you have one input sensor that's failed, in
2 today's world, then that channel will trip, say a
3 sensor grows high, you know, high pressure, it'll
4 trip. So, you get a half trip. So, no never mind,
5 because you haven't tripped the reactor. I shouldn't
6 say no never mind, it's quite a significant emotional
7 event to the shift supervisor, and his or her
8 operating crew.

9 MEMBER BROWN: But he knows it.

10 MR. KEMPER: But he knows it. That's
11 right. They know that. However, this particular
12 licensee has chosen to protect against that. They
13 don't even want that to happen. So, does it support
14 the safety function? Well, you could say well,
15 there's less potential challenges to the safety
16 systems, themselves. So, yes, we can make an argument
17 that it supports the safety requirement. If
18 everything works perfectly, though, a half-trip
19 shouldn't be a challenge to the plant. So, that was
20 their argument.

21 MEMBER BLEY: Okay.

22 MEMBER BROWN: But the argument that they
23 didn't address is the fact that -- what's the nature
24 of that data? And can that data, if it's corrupt, if
25 it's wrong for some reason -- I mean, you can -

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1 MR. KEMPER: No, we address that in very
2 much detail. In fact, we -

3 MEMBER BROWN: I haven't seen that.

4 MR. KEMPER: -- audited that very
5 specifically.

6 MEMBER BROWN: That's fine.

7 (Simultaneous speech).

8 MEMBER BROWN: We looked at doing that
9 data sharing routine in some of the initial systems we
10 did with one of the projects, which I can't tell you
11 which one it is, and we rejected it out of hand after
12 we went through a number of these with second-min,
13 second-max, or averaging, and taking the selection or
14 the deviation of whatever. We just decided, you know.

15 MEMBER BLEY: But you looked at it, and
16 they had some pretty good arguments.

17 MR. KEMPER: Yes, we looked at it in
18 detail. We had to go all the way to the source code,
19 itself, in that safety function processor, and we
20 satisfied ourselves. They brought their experts from
21 Germany over, and we had a very detailed design review
22 on that particular aspect. We don't normally do
23 design reviews, but in cases where they deviate from
24 what we prescribe as the preferred path, if you will,
25 then we do have to get right down to the bits and the

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1 bytes, and understand how the software is developed.
2 And they showed us, they were able to demonstrate that
3 under all possible failures from inputs from other
4 channels, the safety function channel itself would
5 still perform its function based off its own input.

6 Now, that's more complicated than if you
7 don't have that at all. I can't argue with that. But
8 that's the way we used to do business here for many
9 years. But back in 2006, as you all know, the
10 industry came in and approached the Commission, and
11 said hey, we need to have better guidance here,
12 because we don't understand, given your current
13 guidance and policy, how we're going to be able to
14 license our new reactors, which used a lot of non-
15 safety control and display systems to control safety
16 systems. I hope I don't get off on that, because I'm
17 going to really -- I could talk for two hours just on
18 that particular topic.

19 MEMBER SIEBER: Your problem is different
20 than the designer's problem. The designer can take an
21 absolutist position and design in accordance with
22 those strictures, but you have to review what's sent
23 to you.

24 MR. KEMPER: That's correct.

25 MEMBER SIEBER: And that these features

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1 are in there, you have to review them, and make a
2 determination. And, to me, the versatility to be able
3 to do that, and do it correctly, is important.

4 MR. KEMPER: Yes, sir. I agree.

5 CHAIR APOSTOLAKIS: Can we now -

6 MEMBER BROWN: Say goodbye.

7 CHAIR APOSTOLAKIS: Can you move to page
8 3?

9 MR. KEMPER: Sure. Let me finish my -

10 CHAIR APOSTOLAKIS: Can you finish in 19
11 minutes?

12 MR. KEMPER: Nineteen minutes? Yes, sir,
13 we will do that. We're going to have to pick up the
14 pace here.

15 (Laughter.)

16 MR. KEMPER: Okay. And last but not
17 least, these Phase Zero meetings is where we would
18 really want to talk to the licensee specifically about
19 what is their strategy? Do they intend to build in
20 diversity in the application itself, do they intend to
21 have no diversity in the primary system, and then
22 depend on operator actions, or a separate diverse
23 actuation system, or some combination thereof? So,
24 this is a two-way dialogue. That's the intent of
25 these Phase Zero meetings. And, hopefully, we can

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1 have this dialogue while the ink is not dry yet.
2 Okay? The software hasn't been totally written, so
3 licensees have a chance to make wise choice on the
4 design of the system based on the regulatory impact of
5 the review itself. Next slide.

6 MR. MILLER: Okay. I'll keep it moving
7 here, too. Phase One begins when they apply for the
8 actual change. And what I'll do here is I'll discuss
9 both Phase One and Phase Two at the same time, because
10 to understand them. We put them in their separate
11 phases to give them the distinction that we expect
12 information to come in at different times with these
13 applications. By the time they're applying for the
14 amendment, they're not going to have all the
15 documentation that we would expect to see, so we
16 wanted to express that understanding by having two
17 different phases.

18 Phase One, as I said, begins when they
19 apply for the initial amendment, but then Phase Two
20 picks up when they provide that final batch of
21 information that we're expecting to see. Typically,
22 we would get a schedule for that in the Phase One
23 application, and we would expect that the Phase Two
24 information would come in no later than one year in
25 advance of what they expect for approval, or

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1 disposition of the amendment.

2 Included in Phase Two would be the audit, as well,
3 where we go out and confirm various aspects that we
4 feel we need to dig into based upon a review of the
5 information submitted.

6 Now, at the conclusion of our review, we
7 issue our safety evaluation and transition into Phase
8 Three. This point is where for headquarters, we go
9 from a reviewer to a support role for the Regional
10 staff. We come up with a lot of guidance here.
11 Specifically, is Inspection Procedure 52003, and
12 another important aspect is, Bill's group is embedding
13 in the safety evaluations items to be used by the
14 Region on installation, start-up testing of these --
15 Site Acceptance Testing of these systems to guide the
16 Regional inspectors who right now haven't seen many
17 of these upgrades. And the familiarity will come, but
18 for right now, we're trying to put out the information
19 to them through the SE. What you need to look at,
20 what's important in this thing, what do they say they
21 would do with it, what do you need to confirm?

22 MR. KEMPER: Yes. This is the first of
23 the kind. This is the first full Reactor Protection
24 System, and these are safety feature system digital
25 upgrades in this country.

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1 MEMBER SIEBER: Where in this process do
2 you look at the start-up test program to provide
3 assurances that the critical features of the design
4 are all tested?

5 MR. KEMPER: Right there, Phase Three.

6 MEMBER SIEBER: Yes. It's somewhere on
7 that chart, but which of the blocks, and how do you do
8 it?

9 MR. KEMPER: Okay. Well -

10 MEMBER SIEBER: For example, it says --
11 the way I remember it is, the licensee decides what
12 the start-up test procedures will be. And a
13 construction inspector comes in with his construction
14 inspection procedure from the Region, which is sort of
15 generic to all these start-up tests. Okay? And he
16 confirms that the licensee's personnel are doing what
17 the licensee's procedure says, but how do you know
18 that the licensee's procedure covers every important
19 attribute of the design where you need that kind of
20 assurance that the system will work?

21 MR. KEMPER: Well, the Region -- the
22 expectation is the Region will inspect that. We will
23 have the basis for the design approval in the SER, of
24 course. We will outline various specific action
25 items, and I expect there will be many of them for the

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1 Region to follow-up on. So, really -- and as we write
2 the SE, as the licensee commits to do the things by
3 procedure, control things in certain manners, those
4 are the kinds of things that we will base our decision
5 on, but have to be followed up by the Region to verify
6 that that's done.

7 MEMBER SIEBER: Is there some document
8 that NRO or NRR, in the case of a current plant, sends
9 to the Region that says these are the important things
10 about this design. Make sure you inspect to see?

11 MR. KEMPER: Yes. Yes, that -

12 MEMBER SIEBER: And what is that document
13 that you send? Do you send the SE, and let the
14 inspectors figure it out, or Branch Chief, or do you
15 have an inspection plan that you send?

16 MR. KEMPER: Well, as Ed said, this
17 inspection procedure, IP 52003, is a procedure that we
18 worked with our Division of -- DIRS, to write that
19 procedure, specifically to articulate these various
20 things you're talking about.

21 MEMBER SIEBER: Yes, but that's a generic
22 procedure. That could cover piping, instrumentation.

23 MR. KEMPER: No, no, no. This is strictly
24 for instrumentation and control.

25 MEMBER SIEBER: Okay.

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1 MR. KEMPER: This procedure is written
2 specifically to accommodate the Oconee application;
3 although, albeit, it should apply generically to RPS
4 and ESFAS upgrades anywhere.

5 MEMBER SIEBER: So, any kind of a digital
6 I&C system can be inspected using that procedure.

7 MR. KEMPER: That is correct. That's the
8 intent.

9 MEMBER SIEBER: Okay.

10 MR. KEMPER: And the SE, the action items
11 for the SE will -

12 MEMBER SIEBER: How many pages is it? I'd
13 like to read it.

14 MR. KEMPER: It's a work in progress.
15 It's about that thick last time I looked at it. I
16 can't tell you, maybe 25 pages, or something like
17 that. But it's certainly not complete, because we
18 haven't generated all of the action items yet.

19 MEMBER SIEBER: Yes. I'd really like to
20 read it.

21 MR. KEMPER: Okay. We'll get that for
22 you.

23 MEMBER BROWN: Your Phase Three, and along
24 with Jack's comment, in the last paragraph under Phase
25 Three says, "The start-up testing is conducted in

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1 accordance with the plan submitted during Phase Two."

2 And if I went back and looked at the Phase Two, there
3 was no statement of that in the Phase Two discussion.

4 And when I looked at Appendix B, there was nothing
5 referring to start-up testing in terms of a line item.

6 Appendix B doesn't say what Phase in which it's going
7 to be incorporated, but, I mean, it's just a list of
8 documents that you all want to see.

9 MR. KEMPER: This is the result of a
10 philosophy change that we invoked about a year ago.
11 We used to review all that in the licensing review
12 portion of approval of the system. We thought about
13 it after the industry approached us and asked hey,
14 what -- is it really necessary to look at all this
15 stuff? And we did some soul searching. We said well,
16 by golly, I guess you're right. The start-up testing
17 is not really part of the licensing review, if you
18 will. These plants were started up 25, 30 years in the
19 very same manner. Right?

20 MEMBER SIEBER: Right.

21 MR. KEMPER: PSARS were turned to FSARS,
22 and then the Region went out and reviewed all the
23 start-up testing that was done to confirm that the
24 plant was operating in accordance with its approved
25 design. So, we're trying to build on that same

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1 philosophy, if you will.

2 MEMBER BROWN: So, in your Phase Three
3 statement, you really need to revise that, because it
4 implies that you've -- the start-up testing is
5 conducted in accordance with the plan submitted during
6 Phase Two.

7 MR. MILLER: Yes, and it needs to be
8 changed.

9 MEMBER SIEBER: So, it just seemed to be
10 an inconsistency. That's all. I'm not complaining
11 one way or the other. To me, I'm not totally familiar
12 with the relationship of factory-acceptance testing
13 and start-up testing. To me, factory-acceptance
14 testing, qualification tests.

15 MEMBER SIEBER: Component testing.

16 MEMBER BROWN: Yes.

17 MEMBER SIEBER: As opposed to system -

18 MEMBER BROWN: That's where the software
19 QA -- I understand. Plant-integration testing is very
20 important. I'm not disagreeing with that. Okay?
21 It's just that they're dumping it now off to the
22 Region to define that. That's a poor choice of words.
23 I'm sorry. They're allowing this to be performed by
24 the Region, if I might -

25 MR. KEMPER: We're working collaboratively

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1 with the entire Agency.

2 (Simultaneous speech.)

3 MR. KEMPER: -- we possibly can to approve
4 this system. However, we do -- the licensing review
5 does go up through factory-acceptance testing, because
6 that's the last part of the V&V. It's a very
7 essential part of the V&V, where the actual design is
8 demonstrated that it will, in fact, implement the
9 safety functions. And then, from that point, I use
10 the analogy, the system is ready to shrink wrap, you
11 know, box up, crate up, whatever, and sent from
12 Germany, or Sweden, or wherever it was produced to the
13 site. And then they will produce their site
14 acceptance testing, which is really a do-over of the
15 FAT, only they're using actual input, and sensors on
16 the site, and then start-up testing is their own
17 internal processes. So, this is an error. I
18 apologize for this. They wouldn't really send us a
19 start-up testing plan that we would review itself.
20 That was probably not characterized exactly the best
21 way. But the Region most likely will ask for that.
22 But, as I say, we're still working our way through
23 this. We haven't fleshed that out yet.

24 MEMBER BROWN: Okay.

25 MR. KEMPER: So, moving right along.

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1 CHAIR APOSTOLAKIS: Now, this is not -

2 MR. MILLER: Bill, we'll transition to
3 review areas real quick.

4 CHAIR APOSTOLAKIS: Unless a member wants
5 to go over this -

6 MEMBER BROWN: No, these are -- I've had
7 no problems with these.

8 CHAIR APOSTOLAKIS: Okay.

9 MEMBER SIEBER: Unless they send me the 25
10 pages, and that will answer all my questions.

11 CHAIR APOSTOLAKIS: Yes. So, go to -

12 MR. KEMPER: Okay. Well, the next slide -
13 - pardon me? Okay. Slide 11 here, this is right now
14 what we conceptualize as the review areas that will be
15 highlighted in the review standard, itself. This is
16 still, again, a work in progress, so these may change
17 before it's actually issued, and sent to -

18 CHAIR APOSTOLAKIS: Let's move on to the
19 examples. I think Bill -

20 MR. KEMPER: Okay. So, just to give you
21 an example in detail what we're talking about here.
22 Remember, the idea is to take the requirements that
23 are already out there for licensing in Chapter 7 for
24 licensing systems and put them into a more user-
25 friendly, understandable format. That's really what

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1 we're doing here. So, for example, IEEE 603 is
2 codified in 10 CFR 55a(h), so we have to demonstrate
3 how a proposed system complies with each and every
4 clause of that standard as part of insuring it meets
5 the regulation.

6 So, Oconee, for example, they propose that
7 their system be licensed to the 1998 version instead
8 of '91 version. So that requires either an exemption,
9 or an alternative approach according to the
10 regulations. So, we're going to go into that, and
11 explain to them how you work your way through that.
12 That's not a very clear, transparent process to a lot
13 of folks.

14 MEMBER BROWN: You did that in ISG-7, also,
15 because when you look -- ISG-7 refers to the 1998
16 version, not the 1991 version.

17 MR. KEMPER: Right.

18 MEMBER BROWN: So, even though it's not
19 "approved".

20 MR. KEMPER: Oh, are you asking me if we
21 did that in ISG-7?

22 MEMBER BROWN: It is in ISG-7.

23 MR. KEMPER: Oh, it is. There's David
24 back there. He can speak to that. Yes, that
25 definitely should be in ISG-7, as well, because that's

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1 what we're seeing. All these systems and gadgets that
2 are being sold now, they all show performance in the
3 `98 version, instead of `91. That's why I've got
4 rulemaking going right now to endorse the `98 version
5 for now, and then the 2010 or 11 version will be
6 endorsed in another three or four years. It's just -

7 MEMBER BROWN: You cannot update this ISG
8 if you haven't gotten to the Reg Guide yet to make --
9 to list all -

10 MR. KEMPER: That is correct. Okay. Next
11 slide.

12 All right. In this example, like I say,
13 I'll just pull one or two clauses out here. Clause
14 5.6 of 603 requires independence between redundant
15 portions of safety systems, safety systems and the
16 effects of design-basis events, and safety systems and
17 other systems.

18 ISG-6 in Section D-9 states that, "Each
19 case should be addressed with respect to physical,
20 electrical, and communications independence. They
21 provide specific guidance for the areas, such as
22 guidance for evaluating physical and electrical
23 independence, and is provided in Reg Guide 1.75, Rev
24 3."

25 What we're trying to do is expose all the

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1 various issues and the items with the standards that
2 we would use to review this to a licensee, so they can
3 do their homework up front before they ever make the
4 submittal to us, because they know -

5 MEMBER BROWN: I thought this was
6 excellent, by the way, the listing of all the -

7 MR. KEMPER: This is the test.

8 MEMBER BROWN: List it right out on the
9 table. They can see what they've got -

10 MR. KEMPER: Right. Well, remember when
11 we were in college, if you can get your hands on the
12 test, you're probably going to pass it. Right?
13 That's the whole idea here.

14 (Laughter.)

15 MR. KEMPER: We're going to give them the
16 test.

17 (Simultaneous speech.)

18 MEMBER BROWN: There's one point that I've
19 heard in a number of the I&C presentations that have
20 been made, when we talked about independence. And
21 they said oh, we're totally independent because we
22 have fiber optic communications links. They meet the
23 electrical independence requirement.

24 MR. KEMPER: Exactly.

25 MEMBER BROWN: And fiber optic -

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1 MR. KEMPER: Not for data.

2 MEMBER BROWN: Exactly. So, there's this
3 idea of -- I've forgotten where it is in your little
4 words there. Talk about transmission of signals
5 between should be through isolation devices. That
6 still doesn't meet, necessarily, the independence.
7 Because you have isolation, or because you have --
8 depends on which way the isolation goes. Okay? It
9 doesn't necessarily -

10 MEMBER SIEBER: It's simplex, as opposed
11 to full duplex.

12 MEMBER BROWN: Yes. So, my point being is
13 that somehow you ought to get -- we went from analog
14 to digital. In the old days, electrical independence
15 by definition gave you total independence. If you had
16 no electrical -- because there wasn't anything else.
17 Okay? Now, electrical independence means nothing.
18 Well, it doesn't mean nothing, but it does not deliver
19 the same inherent independence that you had in the
20 analog systems.

21 MR. KEMPER: That's true.

22 MEMBER BROWN: That doesn't fall out of
23 the discussions in terms of your amplification of the
24 stuff. You should just talk about isolation, fiber
25 optic, by definition, its' the nature of the data

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1 communications are what really counts, if you're going
2 to do it. And that's what you're doing, you're
3 looking at the specific data that's being shared in
4 the Oconee. I'm not blessing that, or agreeing with
5 it. You just said you all reviewed it, but by looking
6 at that, then you -- it's the nature that matters, and
7 how it's utilized.

8 MR. KEMPER: Right.

9 MEMBER BROWN: In order to get to that
10 independence determination.

11 MR. KEMPER: And this is where we tie in
12 the last sentence here, this last bullet, where we
13 mentioned ISG-4, specifically. Okay?

14 MEMBER BROWN: Exactly.

15 MR. KEMPER: Licensees need to understand
16 what we're asking for really is to give us a
17 compliance -- show us line-by-line where they actually
18 meet the criteria that's specified in ISG-4.

19 MEMBER BROWN: Yes. By the way, I've been
20 trying to figure out all the things this stuff is
21 supposed to meet in the commercial world. This is the
22 first time I've seen a list where it was all in one
23 place where I could actually oh, gee, it's all here.

24 MR. KEMPER: So, that's a good thing.

25 MEMBER BROWN: Pretty good. This was very

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1 good.

2 CHAIR APOSTOLAKIS: That's a good thing.

3 MEMBER BROWN: Oh, very good document.

4 Yes, I love this document.

5 MR. KEMPER: Great.

6 MEMBER BROWN: I've loved it since the
7 first time I saw it. You'd never know that based on
8 my discussion.

9 (Simultaneous speech.)

10 MEMBER BROWN: No, I like this. I said
11 that in the last meeting. I said this was an
12 excellent way to go, even though I had some concerns
13 with the details.

14 CHAIR APOSTOLAKIS: Let me ask the
15 members, there are several examples following. Do you
16 want to focus on any one, or -

17 (Simultaneous speech.)

18 MR. KEMPER: What we're trying to do is
19 give you a flavor for the level of detail we're trying
20 to present, and make -

21 CHAIR APOSTOLAKIS: If the members are
22 happy, we can go straight to path forward.

23 MR. KEMPER: Path forward. Okay.

24 MR. MILLER: And like Pat said, this has
25 pretty much been discussed at the forefront here. But

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1 draft out for public comment late in the year '09,
2 have it issued -- the final document issued, Rev O
3 calendar year early 2010.

4 CHAIR APOSTOLAKIS: So, you would -- I'm
5 sorry. Go ahead.

6 MEMBER BLEY: I was just going to say, you
7 say late 2009, but we were talking about a meeting in
8 December, so we'll have that before that meeting.

9 CHAIR APOSTOLAKIS: When will you need a
10 letter from us, in December?

11 MEMBER BROWN: No, he wanted to talk to
12 the Full Committee in December. That was -

13 CHAIR APOSTOLAKIS: Well, the moment this
14 happens, is a letter.

15 MEMBER BROWN: Well, no, that's fine. I'm
16 just saying he wanted a Full Committee meeting. I'd
17 like to have a Subcommittee meeting before that, where
18 we -

19 CHAIR APOSTOLAKIS: That we can do, but
20 let's understand the plan. Is it December when you
21 would like to have a Full Committee briefing, and the
22 letter, or later?

23 MR. KEMPER: What we'd like to do is get
24 industry feedback before we come back to the Full
25 Committee.

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1 CHAIR APOSTOLAKIS: Okay.

2 MR. KEMPER: That won't happen until
3 January, because the plan is right now to send it out
4 for a final industry review in late December. So,
5 maybe, if possible, we could get the Subcommittee
6 review done in December. That would be great. That
7 way we could get the benefits of any insights you
8 have, before we send it out -

9 CHAIR APOSTOLAKIS: Okay.

10 MEMBER BLEY: So, we'll have that final
11 before that time.

12 MR. KEMPER: Yes, we'll have the final
13 before that. Right. And in January, we can -

14 CHAIR APOSTOLAKIS: In terms of the
15 letter, you're talking now February and beyond.

16 MEMBER SIEBER: Yes. When you say early
17 2010, what is your concept by month?

18 MR. KEMPER: A couple of months, month or
19 two. Okay? We're talking January, February, most
20 likely February I would say. It'll take at least in
21 industry to get industry -- a month to get industry
22 comments all brought into us. Although, it shouldn't
23 be a far and wide distribution. I mean, Gordon is
24 sitting right over here, so we work very closely and
25 collaboratively with NEI on this. We have industry

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1 group already focused on this TWG.

2 MEMBER BROWN: The Full Committee -

3 MEMBER SIEBER: If you -

4 MEMBER BROWN: I'm sorry, Jack. Go ahead.

5 MEMBER SIEBER: You issue in November, 60
6 days, that January. Then you have to resolve, that's
7 a month, a month and a half, so really you're talking
8 March. Right? Do you want -- and we want to see it
9 after comments are incorporated.

10 CHAIR APOSTOLAKIS: Yes. And we will need
11 some -

12 MR. KEMPER: Yes.

13 MEMBER SIEBER: Sometime first quarter,
14 late first quarter for us.

15 CHAIR APOSTOLAKIS: I think yes,
16 realistically, I don't see how we can write a letter
17 before March, which is okay. I mean, I don't have a
18 problem with that.

19 MEMBER BROWN: We can have a Subcommittee
20 meeting in December.

21 CHAIR APOSTOLAKIS: Absolutely.

22 MEMBER SIEBER: Yes.

23 MEMBER BROWN: So, we can see -

24 MEMBER SIEBER: Still like to see the
25 public comment.

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1 MEMBER BROWN: I agree with that.

2 MR. KEMPER: But we'll see that at the
3 Full Committee meeting. Okay? We can send you that
4 as part of the information we give you in -

5 CHAIR APOSTOLAKIS: The Full Committee
6 meeting in 2010.

7 MR. KEMPER: That's correct, 2010.

8 CHAIR APOSTOLAKIS: That's something we
9 can resolve.

10 MEMBER BROWN: We can work the details
11 out. I mean, what I'd like to see as part of that
12 Subcommittee meeting is, since you've used Ocone as a
13 pilot - excuse me - wrong word. Benchmark -

14 MR. KEMPER: We're benchmarking the
15 process.

16 MEMBER BROWN: Benchmarking. And they
17 have presented you, and you've mouse-milked that
18 inter-divisional communication scheme that they've
19 got, it would be useful to present it how you came
20 through that, so that we can see how the licensees are
21 presenting the information to you in a manner in which
22 you can understand that you still meet the
23 independence, and a manner you're comfortable with.
24 And I don't pretend to be a smart on min, max second
25 algorithms, but there are some folks in here that

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1 would love to play with that that are a lot smarter
2 than I am. I just work on barriers. If I don't see a
3 steel wall between the divisions, I'm not happy.

4 CHAIR APOSTOLAKIS: Good old defense-in-
5 depth.

6 MEMBER BROWN: Yes, good old defense-in-
7 depth, independence, it works. So, if I'm skeptical,
8 I am. That's why I think it's important to get that -
9 - if we're going to allow that, if that's what's going
10 to go on, I think it's important for the Full
11 Committee to understand how that is being done, in
12 light of the way we've done stuff in the past. Do you
13 have any problem with that, George?

14 CHAIR APOSTOLAKIS: No, I have no problem.

15 MEMBER SIEBER: Dennis?

16 CHAIR APOSTOLAKIS: Okay. So, thank you
17 very much. We will recess until 10:20.

18 (Whereupon, the proceedings went off the
19 record at 10:00:31 a.m., and went back on the record
20 at 10:22:29 a.m.)

21 CHAIR APOSTOLAKIS: Okay. We're back in
22 session. The subject is now Digital I&C Systems in -

23 MEMBER SIEBER: Fuel cycles.

24 CHAIR APOSTOLAKIS: -- fuel cycle.
25 Please, Mr. Rahn.

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1 MR. RAHN: Thank you, Dr. Apostolakis. My
2 name is David Rahn. I'm Senior I&C and Electrical
3 Engineer in the Office of Nuclear Material Safety and
4 Safeguards, specifically in the Division of Fuel Cycle
5 Safety and Safeguards. And what I do is review
6 license applications for new fuel cycle facilities, as
7 well as amendments, and changes to existing
8 facilities, and renewals when they come through. And
9 I review both the electrical designs aspects, as well
10 as the I&C design aspects.

11 Just to let everyone know, with me today
12 is Patty Silva. She's my Branch Chief in Fuel Cycle
13 Safety and Safeguards, and Marissa Bailey is our
14 Deputy Director in the Division of Fuel Cycle Safety
15 and Safeguards. And, also, Luis Betancourt, who is
16 NSPDP candidate helping me with review of some license
17 applications.

18 Today, what I wanted to talk a little bit
19 about was background of what is the 10 CFR 70
20 licensing process, and what kinds of fuel cycle
21 facilities have what types of processes. I also want
22 to talk a little bit about the specifics of how 10 CFR
23 70 is written, so as to provide information to license
24 reviewers to make a determination of adequate safety,
25 reasonable assurance of adequate safety, adequate

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1 protection of, primarily, the public, workers, and the
2 health and safety of the public, as well as the
3 workers in the facility. And, also, I'm going to talk
4 about the four major review topics that are covered
5 within the ISG, and what is our next steps for
6 completion of that ISG, and incorporation of the
7 guidance into permanent locations.

8 MEMBER BLEY: Is this ISG independent of
9 the other six, or is -

10 MR. RAHN: Yes. This is an interesting
11 process. The original six ISGs were formed by the
12 original committee that put together the Digital I&C
13 program. Along the way, both industry, and the NRC
14 Staff identified that we need to have something
15 similar put together for fuel cycle facilities,
16 because it's becoming more and more of an area of
17 interest, and being used more and more. So, the
18 seventh working group was formed about halfway through
19 the process. So, I think the original I think started
20 like in November of '06. Our specific committee
21 started in October of '07.

22 MEMBER BLEY: Okay. But you have your own
23 section on cyber security in your -

24 MR. RAHN: Yes. Within our own ISG, we
25 have criteria that defines how fuel cycle facilities

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1 would address certain topics, as they pertain to 10
2 CFR Part 70. There was enough of a difference between
3 Part 50 and 52 licensing, versus Part 70 licensing,
4 that we thought it would be critical that we identify
5 what kinds of guidance would a license applicant want
6 to follow to be consistent with the Part 70 licensing
7 scheme.

8 MEMBER BLEY: Okay.

9 MR. HECHT: Question.

10 MR. RAHN: Yes?

11 MR. HECHT: What are the fuel cycle
12 facilities, is it only the front end, or does it
13 include the spent fuel pool, or does it -

14 MR. RAHN: Our mission is, primarily,
15 materials handling, in general, the mission of the
16 office. In fuel cycle facilities, we handle
17 facilities that convert fuel, convert yellow cake to
18 UF6, which is used in the manufacturing of fuel. We
19 also regulate facilities that take UF6 and turn it
20 into UO2, Uranium Dioxide powder, and then form
21 pellets, which are then assembled into the fuel
22 assemblies. We also have a series of enrichment
23 facilities that take the yellow cake -- take the UF6
24 right out of the natural uranium, and enrich it to a
25 high level, essentially anywhere between 4 and 6

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1 percent range, that's used for making fuel. We also
2 regulate high enriched uranium facilities, as well.
3 So, it's primarily, as far as the fuel cycle goes, at
4 the present time, almost all of our efforts are into
5 that front end process.

6 Now, there are also efforts going underway
7 to address -- getting ready for our regulatory
8 framework for potential use of reprocessing
9 facilities, but that's pretty far down the road.

10 MR. HECHT: Yes, that's not in the scope -
11

12 MR. RAHN: That's not -- right now, this
13 is not in the scope of what we're covering. This
14 particular TWG was primarily formed to address the
15 Standard Review Plan materials that are needed, that
16 we're applying for fuel cycle facilities, which is --
17 currently, it's NUREG-1520.

18 We have a special facility that handles
19 Plutonium. It also has a Standard Review Plan NUREG-
20 1718, so what we're doing is we're primarily
21 addressing -- we're trying to breach both areas.

22 MEMBER SIEBER: Does ISG-7 apply to the
23 Savannah River MOX plant?

24 MR. RAHN: Yes. To the extent that future
25 amendments to the MOX plant, but at the present time,

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1 there's already a licensing framework for the MOX
2 facility, so we're performing reviews of the MOX
3 facility per that existing framework. So, this is
4 criteria that's being developed for future
5 applications that come in.

6 MEMBER SIEBER: Now, the rules that -- for
7 things other than reactors, facilities other than
8 reactors are different. You don't have -

9 MR. RAHN: They're quite different.

10 MEMBER SIEBER: -- defense-in-depth to the
11 same extent, and redundancy, and -

12 MR. RAHN: Those are all important
13 criteria, but they're not to the same depth. And I'm
14 going to have some slides, I'm going to talk a little
15 bit about some of those differences.

16 MEMBER SIEBER: Okay. I think that's
17 important, to understand that.

18 MR. RAHN: I agree with you. And I think
19 that that was something that we assumed in the
20 preparation for this meeting, that you guys would like
21 to understand a little bit about the licensing basis
22 for Part 70.

23 MEMBER SIEBER: Right. Thank you.

24 MEMBER BLEY: And this all applies to Part
25 70?

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1 MR. RAHN: Yes. Only Part 70.

2 MEMBER BLEY: Okay.

3 MR. RAHN: Yes?

4 MEMBER BROWN: Are you going to address,
5 as part of that, and I was just now trying to find the
6 words relative to the application in Part 70, fuel
7 cycle facilities, that it almost read like the concern
8 for a criticality accident was of less - what's the
9 right word - not -- it was less critical, no pun
10 intended on the words.

11 MR. RAHN: Yes.

12 MEMBER BROWN: Than the issue relative to
13 protection systems, and operating plants.

14 MR. RAHN: Yes. I think that's a misnomer
15 you got from when you read the code, it's the third
16 paragraph listed. But that doesn't mean it's any less
17 important. If you read the protections, we have
18 protections for events of certain consequence. And
19 high consequence events have to be rendered unlikely,
20 highly unlikely. And intermediate consequence events
21 have to be rendered unlikely. And then in the code,
22 the third section talks about criticality events. So,
23 it just happens to be listed third, but that doesn't
24 mean it's any less important.

25 MEMBER BROWN: Okay. But there seemed to

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1 be less emphasis on the need for redundant systems.
2 So, I was just trying to balance -

3 MR. RAHN: Yes, I don't think -

4 MEMBER BROWN: A different thought process
5 than I'm used to, and that's -

6 MR. RAHN: We don't view that as the case.
7 We view that as the criteria that applies to the
8 design of control systems for non-criticality events,
9 are just as important, so they all have equal
10 importance, I guess is the best way of saying it.

11 MEMBER SIEBER: Yes. You can deal with
12 criticality through geometry, also. I think where
13 this becomes very important is in places like the MOX
14 plant.

15 MR. RAHN: Yes. And I'll talk a little
16 bit about the MOX plant later. I just wanted to give
17 you a little heads-up, that in terms of that
18 difference for the MOX plant, there -- the applicant,
19 in that case, has committed to a process that is more
20 like the power reactor process. But that's not a
21 specific requirement of 10 CFR Part 70.

22 MEMBER SIEBER: That's right.

23 MR. RAHN: It's more a requirement of the
24 10 CFR Part 50 attachment for Plutonium facilities
25 that's within Part 70, that causes that to occur.

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1 MEMBER SIEBER: And DOE has the equivalent
2 stringent requirements for its facilities.

3 MR. RAHN: Facilities, as well.

4 MEMBER SIEBER: Which don't fall under
5 NRC's regulations.

6 MEMBER BLEY: This little discussion
7 brought something up -

8 MR. RAHN: Yes?

9 MEMBER BLEY: -- that I hadn't thought
10 about, and I'm not a real student of Part 70 yet. I
11 probably will be as we move into that more and more.

12 MEMBER SIEBER: Right.

13 MEMBER BLEY: A lot of the -- since we're
14 talking about criticality, criticality events in the
15 past have the strong element of the human in them.
16 And is there guidance now, or is there something in
17 here that I slid passed that would urge using maybe
18 the flexibility you get with some digital systems to
19 help prevent some of those human problems that have
20 happened in the past?

21 MR. RAHN: Well, I wouldn't say that we
22 specifically called out human interface-type problems
23 within our ISG. What we tried to do was identify the
24 important design criteria that would result in the
25 prevention of hazards of any type, including

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1 criticality. So, as a matter of fact, an early
2 edition of our ISG, we were focusing on criticality
3 when it dawned on us that prevention of chemical
4 releases that contain nuclear material, or prevention
5 of spills, or potential explosion hazards are all of
6 importance. And the overall risks are not -- they're
7 not like major differences in risks. They're all
8 important, so we've tried to come up with an envelope
9 of important design criteria to be considered.

10 MEMBER BLEY: And some of those can go
11 further.

12 MR. RAHN: Yes, some of them do go. In
13 the case of criticality, which I think I'll get into
14 later, but in case of criticality, we also have some
15 Reg Guides that pertain to the design of controls for
16 prevention of criticality.

17 CHAIR APOSTOLAKIS: You mentioned earlier,
18 responding to a comment about likely, unlikely, and
19 highly unlikely.

20 MR. RAHN: Yes.

21 CHAIR APOSTOLAKIS: You will come back to
22 this?

23 MR. RAHN: Yes, I will. I'm going to.

24 CHAIR APOSTOLAKIS: Okay. Let's keep
25 going.

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1 MR. RAHN: Okay. Currently, the Standard
2 Review Plan that we're trying to address is NUREG-
3 1520, and it currently does not contain specific
4 criteria that identifies the important industry codes
5 and standards to be applied to the design of Digital
6 I&C, or I&C, in general. And, further, 10 CFR Part
7 70, itself, doesn't have anything analogous to the
8 general design criteria contained in 10 CFR 50,
9 Appendix A. So, as a consequence, when reviewing
10 license applications in the past, I&C reviewers have
11 had to use their best knowledge, skills, and abilities
12 to make generalized conclusions regarding reasonable
13 assurance of adequate protection. And, so far, of
14 course, we've had a lot of success. We've had a lot
15 of highly knowledgeable people doing the job, so
16 current facilities are well protected. But what we
17 thought was it would be good to get something down on
18 paper that could be applied across the board in a
19 consistent manner for future reviews. So, we formed
20 this particular group in response to both industry,
21 and NRC Staff concerns regarding the need for that
22 consistent review.

23 And one of the things I'd like to point
24 out is a little bit about -

25 MEMBER BROWN: Back to your other

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1 statement.

2 MR. RAHN: Yes?

3 MEMBER BROWN: What I got out of that was
4 fundamentally, all our previous fuel facilities just
5 kind of depended, got wings, in a way.

6 MR. RAHN: I wouldn't say wings, because -

7

8 (Simultaneous speech.)

9 MR. RAHN: Yes. We have highly -

10 MEMBER BROWN: No, no, no. I -- there was
11 not a set of things to -- I mean, it's fairly key.
12 You see, you did not have design criteria now with 10
13 CFR Part 50, Appendix A.

14 MR. RAHN: Right.

15 MEMBER BROWN: So, it was up to people to
16 use their judgment as they ran through and evaluated
17 the I&C systems for both control, alarms, blah, blah,
18 shutdown process, what have you.

19 MR. RAHN: Yes.

20 MEMBER BROWN: So, you lived and died by
21 the quality of the people doing the reviews. Is that
22 what I got out of that?

23 MR. RAHN: I would say that's probably a
24 fair statement.

25 MEMBER BROWN: Okay.

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1 MR. RAHN: The main differences that we
2 would see in a fuel cycle facility, as far as I&C
3 system design goes, I wanted to talk to you a little
4 bit about that. Typically, in a process in a fuel
5 cycle facility, I would say it's mostly a chemical,
6 and electro mechanical process. And that process is
7 one in which material is processed pretty much in
8 batches. And once that process starts, monitoring
9 takes place to identify when that process is venturing
10 outside of some predefined parameters. And what we
11 try to do is identify those parameters which will
12 cause it to go in an unsafe manner, or prevent the
13 formation of an event, of a design-basis event.

14 So, what happens is, the controls are
15 designed such that it immediately shuts down that
16 process. And once it stops, typically, what happens
17 is, someone has to go investigate as to what caused it
18 to stop. And then, after analyzing what occurred, and
19 backing out of that process, it's then corrected, and
20 allowed to go on, and maybe equipment to repair, or
21 something like that. But, essentially, it's a process
22 that once it's started, it can be shut down
23 immediately. Whereas, in Light Water Reactor design,
24 not only do you have to worry about shutting that
25 reactivity process, but you also have to worry about

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1 how to respond to major leaks, and how to remove the
2 heat out of the containment, what does it take to
3 bring it to a long-term safe shutdown condition? So,
4 there's a less complexity involved in terms of fuel
5 cycle design. Yes?

6 MEMBER SIEBER: But stopping is not always
7 the safe thing to do. For example, in red oil issues,
8 you have to -

9 MR. RAHN: Yes, there are some -

10 MEMBER SIEBER: There are some composition
11 -

12 MR. RAHN: There are some cases you want
13 cooling.

14 MEMBER SIEBER: Temperatures, pressures.

15 MR. RAHN: Right. Right. Removing --
16 there are some cases like that.

17 MEMBER SIEBER: So, it does have some
18 analogy to the reactor plant, the consequences may not
19 be as severe.

20 MR. RAHN: As severe. Right. That's a
21 fair statement, too. But those cases, just are not --
22 they're not -- what I'm trying to give you is a
23 flavor for about how many those are. There's not very
24 many of those kinds of cases.

25 MEMBER SIEBER: That's right.

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1 MR. RAHN: The vast majority of them are -

2

3 MEMBER SIEBER: Three or four.

4 MR. RAHN: Right. Now, in addition, most
5 of the design of the controls within a facility are
6 such that you may have a pair, or maybe three
7 automatic engineered controls, which will work to stop
8 a particular process happening in a node.

9 MEMBER SIEBER: Right.

10 MR. RAHN: We don't have a one out of two
11 twice logic, or two out of three voting logic, so we
12 have very little need for cross-channel comparisons,
13 and things like that.

14 I'll give you a little bit of an idea
15 about what the framework of Part 70 is. If a licensee
16 wants to design a new fuel cycle facility, the first
17 thing he'll do is identify all his processes that are
18 needed in order to accomplish the business goals for
19 that facility. And in doing so, he will identify what
20 types of protections that he might need, based on his
21 general knowledge of designing of chemical processes.

22 In terms of licensing that facility, however, our
23 licensing requirements require them to perform an
24 integrated safety analysis. And what that analysis
25 consists of is an identification of all the potential

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1 hazards which could occur in the various nodes of the
2 plant. And once those hazards are identified, their
3 likelihoods are estimated, and their consequences are
4 determined.

5 And what happens when we license a
6 facility, we license it in terms of a specific set of
7 performance requirements. The performance
8 requirements are based upon making sure that all high
9 consequence events are rendered highly unlikely, and
10 that all intermediate consequence events are rendered
11 unlikely, and that criticality events are prevented
12 from occurring. And the likelihoodness is something
13 which is to be defined by the licensee. However,
14 within 10 CFR - within NUREG-1520, we have some
15 guidance as to how those likelihoods, and consequences
16 are estimated and determined. Yes?

17 CHAIR APOSTOLAKIS: How -- I mean, I know
18 that the ISA -- has the Commission blessed the ISA?

19 MR. RAHN: Yes.

20 CHAIR APOSTOLAKIS: How is it different
21 from what we call PRA?

22 MR. RAHN: It is a little different. In
23 terms of -- PRA is fairly mathematical, and it is
24 fairly rigorous. The ISA methodology allows a
25 combination of quantitative and qualitative arguments

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1 for assessing, or categorizing events, and also for
2 categorizing equipment probabilities and durations,
3 and probability of failures and durations. And then
4 the specific NUREG-1520 Standard Review Plan describes
5 a method by which you could take those quantitative
6 values and combine them -- assign them index numbers,
7 and then combine them in such a way that you can
8 demonstrate that an event with a certain likelihood of
9 occurrence may be reduced through risk reduction
10 factors to a value that is considered relatively
11 representative of adequate safety.

12 In addition, another difference is that
13 there's a special team of people that are put together
14 to perform these ISAs. And that team consists of
15 chemical specialties, specialists, emergency response
16 personnel, specialities in all the disciplines
17 involved, whether that be electrical or I&C, and,
18 also, this method that is basically a hazards analysis
19 method. So, it's a team of people -- and this is
20 typical not just of nuclear facilities, but is similar
21 to the hazards analysis that might be performed at a
22 chemical facility.

23 MEMBER SIEBER: Right. In fact, that's
24 where these -

25 MR. RAHN: That's right. I think that's

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1 where it originated. I believe the NRC is following
2 suit to that. I believe that we are -

3 MEMBER SIEBER: And it looks -- in
4 addition to what happens in the plant, to the
5 structure.

6 MR. RAHN: Yes. The environment, as well.
7 Right. Exactly. It takes all of those factors into
8 account.

9 MEMBER SIEBER: And mitigation is a
10 tactic, as opposed to purely prevention.

11 MR. RAHN: Prevention. Right. But we also
12 -

13 CHAIR APOSTOLAKIS: I mean, it seems to me
14 that philosophical conceptual basis is the same for
15 both ISA and PRA. I mean, you do develop some areas
16 and so on. It's more -- I think it's -- your approach
17 is more stylized. I mean, in 1520, you have tables
18 for just about everything, as I remember. And you
19 give guidance, do this, do that. In the PRA, it's a
20 little up to the analyst to identify the event,
21 collect the evidence, and produce a probability
22 distribution. But you are dealing with very low
23 frequency events. I mean, a highly unlikely event is
24 what, 10 to the minus 5 or less.

25 MR. RAHN: Right. Ten to the minus five

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1 or less. Right.

2 CHAIR APOSTOLAKIS: These are pretty low
3 numbers. And there is no uncertainty. Right? I
4 mean, you're just working with point values, as far as
5 I can tell?

6 MR. RAHN: Yes. Well, there's guidance
7 for categorizing them. And there also -- as an
8 example, they have for event frequencies, I believe
9 there's a table of indices that identify how you would
10 categorize the frequency of the event, and then assign
11 it an index value.

12 CHAIR APOSTOLAKIS: Yes. This index
13 business bothers me a little bit. It's not the
14 present discussion, but it seems to me at some point
15 PRA and ISA should converge a little better.

16 MEMBER BLEY: It's kind of a pick-and-
17 choose.

18 CHAIR APOSTOLAKIS: Pick-and-choose,
19 right.

20 MEMBER BLEY: I would expect - I don't
21 know _ I would expect sometime not too far off, some
22 licensees will be submitting things that move closer
23 to what the other PRAs tend to look like, including
24 uncertainty, because that's got to be coming up as an
25 issue at some point.

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1 CHAIR APOSTOLAKIS: Does the ISA, or the
2 term "ISA" appear in the regulations?

3 MR. RAHN: Yes, for sure.

4 CHAIR APOSTOLAKIS: In the rule?

5 MR. RAHN: Yes.

6 CHAIR APOSTOLAKIS: Oh, my.

7 MS. SILVA: As a qualitative -

8 CHAIR APOSTOLAKIS: Well, it's not quite
9 qualitative. I mean, there are 10 to the minus 4s,
10 5s, and 6s here. And there are decisions made based
11 on those numbers.

12 MS. SILVA: This is Patricia Silva. The
13 numbers that are given in there are examples of
14 indexing. It's not -- those are not hard and fast
15 numbers. The facility is supposed to look, and they
16 are estimating the frequencies, and consequences, and
17 such. But in a fuel cycle, our facilities are all
18 very different, and we don't have a lot of historical
19 information like the reactors would have to be able to
20 pull from that information to say that those numbers
21 are exactly what they're supposed to be.

22 CHAIR APOSTOLAKIS: I understand that, but
23 I also see in several places the statement of common
24 cause failures should be two orders of magnitude, or
25 frequency two orders of magnitude lower than the rest

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1 of the sequence. That's a pretty serious statement.
2 I mean, you say that based on my judgment this is two
3 orders of magnitude lower, requires super-human
4 ability. Who knows 10 to the minus 6 what it means,
5 or 10 to the minus 5?

6 Again, I appreciate that this is not your
7 topic today, but it seems to me that if this Committee
8 gets more involved into this, as long as you are
9 dealing with the ACNW, maybe things were okay. Now,
10 unfortunately, you have to deal with these guys here,
11 so that's why I asked whether it was in the
12 regulations, but even regulations can be changed. It
13 takes longer. But I think it's only fair to warn you
14 that I don't think the Full Committee will be too
15 thrilled by seeing statements of that nature, when the
16 basis for these numbers is not -

17 MR. RAHN: You mean the 10 to the minus 5th
18 number, the two orders of magnitude for CCF?

19 CHAIR APOSTOLAKIS: To dismiss a common
20 cause failure because it has -- when it is two orders
21 of magnitude lower. I mean, that -- it would be much
22 easier in the PRA world if we could do things like
23 that.

24 MR. RAHN: Yes. We'll get into this a
25 little bit later, but I wanted to tell you that I

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1 think that our method forces us to deal with the
2 common cause failure, rather than try to demonstrate -

3
4 CHAIR APOSTOLAKIS: Absolutely.

5 MR. RAHN: -- that it's really, really
6 small.

7 CHAIR APOSTOLAKIS: I agree with that, but
8 how do you demonstrate that is subject to debate, it
9 seems to me.

10 MEMBER SIEBER: Well, there is another
11 challenge, too, because there's a much wider variety
12 of things that can go bad. You know, you could
13 accumulate dust in a ventilation duct, and end up with
14 a big time problem.

15 CHAIR APOSTOLAKIS: Yes. And on that
16 point, I think it's instructive to go to history.
17 Norm Rasmussen called me, and I'm sure -

18 (Simultaneous speech).

19 CHAIR APOSTOLAKIS: -- several times, when
20 he and Saul Levine were charged with doing the Reactor
21 Safety Standard. Most people from the Agency, and the
22 industry, were telling them this cannot be done. It's
23 too complicated. There are so many things that can go
24 wrong, and so on.

25 MEMBER BLEY: No data.

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1 CHAIR APOSTOLAKIS: You know, and,
2 eventually, it was done. So, maybe here it's complex,
3 because different -- the complexities of different
4 nature.

5 MEMBER SIEBER: Right. That's the issue.

6 CHAIR APOSTOLAKIS: And I agree with that.
7 So, again, I repeat, this is not today's topic.
8 However, it seems to me, it's only fair to tell you
9 that things are coming up. Eventually, you will have
10 to come here and the Full Committee, I just don't see
11 how they will -

12 MS. BAILEY: This is Marissa Bailey, and I
13 appreciate the heads-up. But I would like to make
14 sure that the Committee understands that while the
15 integrated safety analysis is a regulatory
16 requirement, it is in Part 70, that the numbers that -
17 - what's unlikely, or highly unlikely, that's in the
18 guidance. Those are guidance that our staff can use
19 in making the determination.

20 CHAIR APOSTOLAKIS: Okay. Very good. I
21 mean, we will have to deal with it. And I'm sure the
22 Committee will appreciate where you're coming from.
23 By the way, for 30 years now I've been hearing from
24 the chemical people, you made a mistake. You went the
25 physics route, and kept -- we went the chemical route.

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1 We are different. I don't think we are that
2 different here in this respect, when we evaluate
3 safety and risks from a particular facility. There
4 will be differences, there's no question about it.

5 MEMBER BLEY: And it's certainly been done
6 in the chemical field.

7 MR. RAHN: It's been done, yes.

8 MEMBER BLEY: The Army's chemical weapons
9 program did it for all of their major facilities.
10 They published them at first, and they've withdrawn
11 them, but they were out in public for a very long
12 time.

13 CHAIR APOSTOLAKIS: But the basic elements
14 -

15 MEMBER BLEY: Still probably lying in
16 libraries in other countries.

17 CHAIR APOSTOLAKIS: Now, the basic
18 evidence of analyzing, which is good, they talk about
19 initiating events, the sequence of events, so we don't
20 have to disagree at that fundamental level.

21 MEMBER SIEBER: Right.

22 CHAIR APOSTOLAKIS: It's the probabilities
23 later that may create some disagreements. I mean,
24 this annex to Appendix A was fascinating. It's a
25 separate report. Right? It was new to me. Let's go

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1 on.

2 MR. RAHN: Yes. So, once -- in order to
3 achieve the performance requirements, fuel cycle
4 facilities are required to identify any and all items
5 that are relied on for safety. And it's a term we use
6 that we call an IROFS. And it's a term that's used
7 extensively when we're dealing with mitigative or
8 preventative controls for fuel cycle facilities.

9 CHAIR APOSTOLAKIS: This stands for Items?

10 MR. RAHN: Items Relied On For Safety.
11 And, typically, the terms is used both in singular and
12 plural meaning, interchangeably, because it ends with
13 an S, so I may, when I talk about IROFS, I may be
14 talking about multiples, or I may be talking about a
15 single component, single set of controls.

16 In addition, in order to make sure that
17 the IROFS perform to their requirements, we rely on
18 what are considered to be part of what are called
19 management measures. Management measures I'll define
20 a little bit later, but management measures are that
21 set of activities that are performed typically on a
22 regular basis, but also at the beginning stages during
23 the design that assure that all items relied on for
24 safety are available and reliable, when needed.

25 Okay. So, a little bit about IROFS.

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1 IROFS are structure, systems, or equipment,
2 components, and activities of personnel that are
3 relied on in order to prevent accidents that could
4 exceed the performance requirements, or to mitigate
5 their potential consequences. And by "activities", I
6 could mean -- it might be an administrative action
7 that someone takes. So, administrative actions are
8 relied on for safety controls, just like automatic
9 controls are.

10 CHAIR APOSTOLAKIS: But, surely, there
11 must be a preference for a structure, system, or
12 component.

13 MR. RAHN: There are.

14 CHAIR APOSTOLAKIS: Administrative
15 actions.

16 MR. RAHN: There are. As a matter of
17 fact, I'll talk a little bit about that.

18 CHAIR APOSTOLAKIS: As a matter of fact,
19 you know, in -

20 MR. RAHN: Yes?

21 CHAIR APOSTOLAKIS: -- Regulatory Guide
22 1.174, I think there is a clear statement that says
23 administrative actions, I don't know, they're put down
24 a little bit. You shouldn't rely -- do you remember,
25 Jack? I don't remember.

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1 MEMBER BLEY: I don't remember the -

2 CHAIR APOSTOLAKIS: When they list the
3 attributes of defense-in-depth, they have a statement
4 somewhere there, that don't rely too much on
5 administrative actions.

6 MEMBER BROWN: I thought you had something
7 like that in here.

8 MR. RAHN: I do. I have -

9 (Simultaneous speech.)

10 MEMBER BROWN: Yes, I thought there was a
11 statement in here relative to -

12 CHAIR APOSTOLAKIS: Okay. Good.

13 MEMBER BROWN: -- subjugated, or -

14 MR. RAHN: Yes, I'll talk a little bit
15 about that. I'll tell you right now, as a matter of
16 fact. An IROFS can consist of either an active
17 engineered component, or a passive engineered device.

18 Dr. Sieber was mentioning earlier geometry control.
19 Typically, we have processes that include specially
20 shaped tanks, for example, that would end up resulting
21 in separation of fluids containing nuclear materials
22 in such a manner that they cannot possibly become
23 critical, as long as they're in that geometry.

24 MEMBER SIEBER: Right.

25 MR. RAHN: In addition, we also have

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1 administrative controls. And, typically, we rely on -
2 - there are certain preferences. We do prefer
3 engineered controls to administrative controls -

4 MEMBER SIEBER: Yes.

5 MR. RAHN: -- as our first lines of
6 defense. But, in addition, we prefer passive
7 engineered controls over active engineered controls in
8 order to achieve that high reliability.

9 MEMBER BROWN: How come you had them in
10 the wrong order here?

11 MR. RAHN: I just threw them all in there.
12 But if I was going to do it in preference, I would
13 say preference for passive first.

14 MEMBER SIEBER: Alphabetic.

15 MR. RAHN: Yes. Alphabetic.

16 CHAIR APOSTOLAKIS: What did you say,
17 Jack?

18 MR. RAHN: In my listing, I listed -

19 MEMBER SIEBER: Alphabetic.

20 MR. RAHN: Yes, they went second.

21 CHAIR APOSTOLAKIS: The third one, of
22 course, is not Alphabetic.

23 MR. RAHN: And, also -- I could also
24 mention that even administrative controls have two
25 flavors. We have two types of administrative

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1 controls. Some are considered enhanced administrative
2 controls, and I'll talk a little bit about those, as
3 well.

4 So, what we decided between industry and
5 the NRC Staff was that we thought that guidance needs
6 to be provided to identify how could we embody the
7 processes and procedures for cyber security to prevent
8 IROFS from being compromised? We also need to discuss
9 the term "independence", as used in performing the ISA
10 -- review of the integrated safety analysis. We also
11 wanted to have some general criteria that we could
12 apply for the design of inter-channel - I'm sorry -
13 communications between field sensors and control
14 areas. And, also, to maintain them independent from
15 non-safety-related channels. And, also, we want to
16 talk a little bit about what kinds of control
17 processes will we need to insure that software has
18 been adequately integrated into the design of new
19 control systems that rely on digital.

20 Essentially, we met about 18 times now.
21 Gordon, who is here, was part of that group. We had
22 members of the NRR, and Research attend some of our
23 meetings for, essentially, continuity amongst the
24 different Task Working Groups. And NEI personnel from
25 the Fuel Cycle, Materials, and Digital I&C were

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1 regular attendees. We also had representatives of
2 Fuel Manufacturing facilities in regular attendance,
3 as well as -- we actually had quite a few public
4 observers, primarily consultants to licensees, but
5 also manufacturers.

6 I'll talk a little bit about cyber
7 security. Currently, we don't have rulemaking. Our
8 policy pertains to the applicability of cyber security
9 controls, specifically for materials facilities, and,
10 in particular, fuel cycle facilities. We identified
11 that we -- in the ISG that there's a need to
12 programmatically protect all IROFS so that they're
13 available and reliable when called upon. And we
14 defined the fact that cyber security events, whether
15 they be deliberate, or inadvertent, could potentially
16 affect the reliability and availability of digital
17 IROFS. And, also, the ISG pointed out that there are
18 numerous other activities that take place in a
19 facility that point to the reliance upon data from
20 information systems that may be used to perform
21 judgments or activities that take place on a regular
22 basis.

23 MEMBER SIEBER: It would seem to me that
24 since most of these processes are batch processes, you
25 would not find an opportunity to design very many

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1 fully integrated digital control systems, most would
2 be local loops.

3 MR. RAHN: That's a true statement. I
4 would say the majority of the controls are local loops
5 in different nodes of the plant.

6 MEMBER SIEBER: Right.

7 MR. RAHN: Many of which may communicate
8 some status information to a control area.

9 MEMBER SIEBER: It's data acquisition, as
10 opposed to integrated control.

11 MR. RAHN: Exactly. Exactly correct.

12 MEMBER SIEBER: So, if the opportunity to
13 attack individual controllers in a system that is
14 loosely integrated like that -

15 MR. RAHN: Relatively isolated.

16 MEMBER SIEBER: Yes, it would be hard to
17 do.

18 MR. RAHN: Yes.

19 MEMBER SIEBER: And it would more likely
20 be somebody putting in a bad EPROM, as opposed to a
21 hacker.

22 MR. RAHN: And putting the wrong software

23 -

24 MR. RAHN: That's true. If they're in the
25 configuration, management of process is a critical

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1 process. So, if you're modifying software, that's a -
2 - and any time you change a parameter, like a set
3 point, or something, if you do that digitally, usually
4 from a work station or something like that, you run
5 the risk of introducing -

6 MEMBER SIEBER: So, the logical conclusion
7 I come to is that the cyber security steps that one
8 would take are substantially different than that which
9 you would take a power plant with an integrated
10 control system, just because of the design aspects of
11 what goes into these facilities.

12 MR. RAHN: Yes. I think that's a fair
13 statement. And, essentially, the process by which you
14 analyze for protection is the same process, but you
15 would make different conclusions regarding what kinds
16 of protections or controls are needed in order to
17 insure their protection throughout the fuel cycle
18 process.

19 MEMBER SIEBER: Right. Correct.

20 MR. RAHN: Yes?

21 MR. HECHT: Your definition of cyber
22 events includes both deliberate and -

23 MR. RAHN: Unintended, yes.

24 MR. HECHT: -- unintended actions from
25 both malicious and non-malicious sources.

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1 MR. RAHN: Yes. You still have the risk
2 of an insider, for example, a worker in the facility
3 deliberately, potentially, sabotaging the facility.

4 MR. HECHT: Well, I can say that a
5 software developer making an unintended, or making a
6 mistake in the code, which causes a failure is also a
7 cyber event.

8 MR. RAHN: It is.

9 MEMBER SIEBER: Right.

10 MR. HECHT: Well, isn't that kind of very
11 broad?

12 MR. RAHN: Yes.

13 MR. HECHT: Don't you want to include
14 something about the consequences of that event,
15 because what you're saying, basically, is any software
16 failure, actually, any computer failure, whether or
17 not it has an impact on the cyber security, or overall
18 security of the facility would also be included in
19 that definition, so we get to the whole area -

20 MR. RAHN: Well, our definition includes
21 the -- an introduction of software that would cause a
22 misoperation, and that's -- typically, that would be
23 after it's installed, so that would be -- we would
24 consider that to be an event. So, you could still make
25 a change to the software that was unintended. And,

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1 typically, that happens not only from a -- the
2 malicious part of it would be introduction of a virus
3 when we're making a change, but that would be
4 considered a cyber event for us.

5 MR. HECHT: Well, let's just say I'm
6 buying my control system from a vendor, and it has
7 some defects in it that cause system failures. You
8 spoke about changes just now, but if it's in the
9 baselines, are those failures also cyber events?

10 MR. RAHN: Well, I would say that would be
11 a level of security that needs to be built in at the
12 front end. I wouldn't necessarily call it an event.

13 MR. HECHT: Okay. Well, the definition, I
14 think maybe needs to be refined so that the
15 consequence, or the impact of the failure is oriented
16 towards, I guess, detecting -

17 MR. RAHN: Yes, you could say after -

18 MR. HECHT: -- security -

19 MR. RAHN: Once installed, may be a better
20 -- we can add that at the end of our definition.

21 MR. HECHT: Well, isn't it more not only
22 after it's installed, but, also, relating to
23 compromise of the security of the plant?

24 MR. RAHN: Well, okay. That's a good
25 question. Now you're going into a different area.

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1 MR. HECHT: Because you also have a
2 section on software quality, which is related to
3 those.

4 MR. RAHN: Yes. Well, one thing that
5 we've tried to do in this ISG is talk about cyber
6 security as it affects IROFS. So, primarily, we don't
7 want a compromise of any safety grade components. But
8 there's a whole slew of facility protection criteria
9 pertaining to cyber security that falls under 10 CFR
10 Part 73, and we tried to keep like a barrier in
11 thinking so that we're identifying the need to keep
12 all IROFS available, and reliable at all times. There
13 could be other events where, for example, an exterior
14 event might intrude into the business network, for
15 example, for the facility, and our criteria on cyber
16 security in terms of this ISG doesn't cover that.
17 That's something that we believe falls rightly under
18 Part 73.

19 MR. HECHT: Okay. Well, it looks like you
20 have a narrow path you need to keep to.

21 MR. RAHN: Yes.

22 MR. HECHT: And it's maybe more
23 complicated than I can come up with right here, but I
24 would just make the observation that in order to
25 prevent cyber security concerns from being diluted by

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1 more general system failure concerns, that you might
2 want to clarify or narrow that definition so that not
3 everything goes into that basket.

4 MR. RAHN: Yes.

5 MR. HECHT: It seems to me, though, that
6 the methods by which you identify hazards, identify
7 potential intrusions, for example, and then identify
8 vulnerabilities in systems, and apply security
9 controls should cover the gamut, whether those
10 exterior entries, or whether they be those that are
11 introduced during normal maintenance, for example.
12 So, if we maintain a risk management framework that
13 continuously assesses the assets that we have in the
14 facility, and evaluates where we have vulnerabilities,
15 and then comes up with controls to prevent those
16 vulnerabilities from becoming attacked, for example,
17 then we've covered the need to protect IROFS.

18 MR. RAHN: Okay. But I think we've agreed
19 that those events don't happen in the initial baseline
20 with the software. And I think we've also agreed that
21 they -

22 MR. HECHT: Yes.

23 MR. RAHN: -- don't cover events which
24 don't have a security implication that threatens the -

25

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1 MR. HECHT: Correct.

2 MR. RAHN: Okay.

3 MR. HECHT: Yes, we do agree on that.

4 MR. RAHN: Okay. I think I mentioned in
5 our previous slide that we have identified certain
6 critical tasks that are performed in a facility that
7 could also benefit from implementation of a
8 programmatic cyber security process. And our ISG
9 identifies a set of acceptable management measures, or
10 good practices which could be flagged in a manner that
11 results in an overall level of protection of a
12 facility. In addition, the guidance we have given are
13 given in terms of goals and attributes.

14 Now, let's move a little bit into the
15 subject of independence. The ISA methodology
16 identifies all the event sequences that are to be
17 prevented or mitigated through the application of one,
18 or two, or three IROFS. And the likelihood of any
19 potential common cause failure contributions to those
20 IROFS failing need to be minimized. And the entire
21 process by which we identify the hazard mitigation, or
22 prevention relies upon them being independent. And
23 coping mechanisms for that independence includes such
24 things as redundancy and diversity, but the goal is
25 maintenance of IROFS as being independent from one

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1 another, so as to minimize any potential common cause
2 contribution.

3 Just give you a quickie idea of how we're
4 using this, this figure shows that if I have a
5 particular event which could occur that has no IROFS
6 applied to it, it goes unmitigated. But if I have one
7 IROFS applied to it, I'll end up with a certain risk
8 mitigation, or risk reduction value that's due to the
9 operation of that IROFS.

10 Each individual IROFS has its own
11 probability of failure on demand, and also has a
12 certain duration which it may go undiscovered. So,
13 the combination of those ends up with a resulting
14 available risk reduction. If I have a second IROFS
15 component that's also used to mitigate that same
16 event, I have then two possibilities. One, that
17 they're completely independent, and they have a
18 combined risk reduction value of the probability
19 values of each of them, or there may be some
20 additional component that is due to their common cause
21 failure contribution.

22 CHAIR APOSTOLAKIS: Now why -

23 MR. RAHN: Yes.

24 CHAIR APOSTOLAKIS: I mean, this
25 requirement that the CCFs contribute at most 1

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1 percent, isn't that too stringent?

2 MR. RAHN: Okay.

3 CHAIR APOSTOLAKIS: Two orders of
4 magnitude, is it provable?

5 (Simultaneous speech.)

6 CHAIR APOSTOLAKIS: Is it provable?

7 MEMBER BLEY: I mean, that kind of says
8 it's not a problem.

9 CHAIR APOSTOLAKIS: I mean, if you could
10 do it, that would be great.

11 MR. RAHN: No, what we're saying is that
12 when one identifies the IROFS that are going to be
13 used for mitigating a particular event, part of the
14 goal -- part of their process of identifying what
15 IROFS are to be applied should look at the fact that
16 do they have any potential common cause contribution
17 between them, common cause failure component between
18 the two of them. And what we're saying here is that
19 our index methodology that we're using in the NUREG
20 1520, looks at to see if I have, at most, additional 1
21 percent or less contribution due to that IROFS, then
22 my decision that I made regarding the overall risk
23 reduction capability of the IROFS systems is not
24 changed very much. So, we're saying we have an
25 additional, at most, 1 percent -

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1 CHAIR APOSTOLAKIS: If we, I mean, if you
2 manage to demonstrate that it's 1 percent, of course
3 it doesn't change very much. I would say even 10
4 percent wouldn't -- but, actually, I think coming back
5 to this provable point, you do give a way out of
6 quantitative analysis -

7 MR. RAHN: Yes.

8 CHAIR APOSTOLAKIS: -- because you say on
9 page something, in lieu of the requirement to
10 quantitatively demonstrate that potential common cause
11 failures are sufficiently unlikely, the following
12 coping mechanisms may be used. And I suspect that's
13 what you do most of the time. In other words, if you
14 have one active engineered control, blah, blah, blah,
15 blah, which makes more sense.

16 MR. RAHN: You suspect correctly.

17 CHAIR APOSTOLAKIS: That was on page 24.

18 MR. RAHN: Yes.

19 CHAIR APOSTOLAKIS: Now, these are common
20 cause failures of any nature. Right?

21 MR. RAHN: Yes.

22 CHAIR APOSTOLAKIS: Any kind of
23 dependency.

24 MR. RAHN: Yes.

25 CHAIR APOSTOLAKIS: And then you focus on

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1 the software common cause failures.

2 MR. RAHN: Yes. Exactly right.

3 MEMBER SIEBER: Let me ask another
4 question.

5 MR. RAHN: Yes.

6 MEMBER SIEBER: Is material
7 accountability, especially nuclear material
8 accountability errors, are they events as far as the
9 control system is concerned? And does the control
10 system enter into the accountability process?

11 MR. RAHN: Okay. I'll answer that partly,
12 because I don't know the full answer yet. It's
13 something I'm looking into.

14 MEMBER SIEBER: Okay.

15 MR. RAHN: The area that we have concern
16 right now is prevention of hazards that could affect
17 workers, and the environment, external to the
18 facility. And we've concentrated, primarily, on
19 processes within the facility. We recognize that
20 there are some digital systems that are used for
21 material control and accountability, some of which are
22 susceptible to the kinds of problems that Dr. Hecht
23 was talking about, that have -- and those are some of
24 the ideas that we talk about under cyber security, for
25 which those are business activities, or other

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1 accounting activities which are affected by cyber
2 events.

3 We did not cover -- okay. One reason that
4 we didn't talk about it from a controls standpoint is
5 that, typically, the decision to move material within
6 a facility from one spot to another is a human
7 decision. So, what we're doing is we're essentially
8 making sure that there are bar code readers that tell
9 the control room operator what material is at what
10 location, and we have criticality rules defining what
11 materials can be put into the same area at the same
12 time. And those controls are typically administered
13 by humans.

14 MEMBER SIEBER: I'm thinking about a
15 situation where I have a batch of processed stream,
16 and you account for what you put in there.

17 MR. RAHN: Okay.

18 MEMBER SIEBER: And you measure somehow
19 what comes out, and if they aren't equal -

20 MR. RAHN: Yes.

21 MEMBER SIEBER: -- then maybe you've got a
22 problem in there that could be a hazard.

23 MR. RAHN: That's definitely something
24 that you would build into the use of digital scales,
25 and digital read outs.

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1 MEMBER SIEBER: Assays.

2 MR. RAHN: Assays. Right. Raw sampling,
3 right.

4 MEMBER SIEBER: But would that be a part
5 of the control system, or is that part of the business
6 system?

7 MR. RAHN: That's, typically, not part of
8 the safety controls. That's treated as an accounting
9 process.

10 MEMBER SIEBER: Well, would you ever worry
11 about a leak in a cell that would drip and create an
12 unforeseen geometry?

13 MR. RAHN: We would worry about that. And
14 that's something that we have actually had events
15 occur. And, typically, though, there are sensors that
16 are designed to identify those failures.

17 MEMBER SIEBER: You're looking more at the
18 places where accumulations would occur, as opposed to
19 traceability, input to output.

20 MR. RAHN: Yes. That's a good statement.

21 MEMBER SIEBER: Okay. Well, I'm curious
22 as to if you have an opinion as to whether
23 incorporation of some kind of accountability system
24 would enhance the safety?

25 MR. RAHN: I do have an opinion, but I

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1 haven't been able to follow-up on it in detail yet.

2 MEMBER SIEBER: Yes. You could do it in
3 an automated fashion, or you could do bookkeeping, but
4 I like automated things better than bookkeeping,
5 unless you're really good at arithmetic.

6 CHAIR APOSTOLAKIS: Okay.

7 MR. RAHN: Dr. Hecht?

8 CHAIR APOSTOLAKIS: I'm sorry.

9 MR. HECHT: Yes. Well, I don't know. You
10 made the comment relative -- I read the compensating
11 thing slightly different than you when I was looking
12 at it. You talk about the coping mechanism, if you
13 didn't have a quantitative.

14 MR. RAHN: Yes.

15 MR. HECHT: But the coping mechanisms they
16 demonstrated were specific engineered systems, and
17 then they went on to the common cause failure back
18 down to the end and says to resolve the problem of
19 being able to define all this, well, we've got the
20 option of doing diversity, or 100 percent testability.

21 CHAIR APOSTOLAKIS: That's the software -

22 MR. HECHT: That didn't sound like -- I
23 mean, you used the word "qualitative." It also is
24 quantitative, and I thought that they had introduced
25 the thought process of an alternate, a diverse

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1 instrument which may be just now one, and another one,
2 but whatever it is, and then subsequent to that --
3 also, if you didn't do that, you could go into where
4 you could -- really the code was simple enough, you
5 could do 100 percent testability. So, you're not
6 doing a quantitative. You're going through a
7 qualitative -- that sounded more quantitative to me,
8 as opposed to just -

9 CHAIR APOSTOLAKIS: Quantitative in the
10 sense of probability calculations. Well, these are
11 two orders of magnitude, and -

12 MR. HECHT: Yes, but -

13 CHAIR APOSTOLAKIS: -- they get around it
14 by doing this.

15 MR. HECHT: All right. Maybe we're saying
16 the same thing.

17 CHAIR APOSTOLAKIS: Yes.

18 MR. HECHT: Okay.

19 CHAIR APOSTOLAKIS: I think so.

20 MR. RAHN: There are actually -

21 MR. HECHT: Qualitative, I didn't think of
22 it. I thought of more of a hand waving. Qualitative
23 stuff is well, gee, it's nice. We've seen it before.
24 It's been in use in other places -

25 CHAIR APOSTOLAKIS: But it's also a loud

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1 summary there.

2 MR. HECHT: Yes, some of that in there -

3 CHAIR APOSTOLAKIS: It says that -

4 MR. HECHT: This is a little bit more
5 definitive.

6 CHAIR APOSTOLAKIS: -- in our engineering
7 judgment, and my question was can you really trust any
8 judgment when it comes to such low probabilities, and
9 so on? But, yes, that's -

10 MR. RAHN: Okay.

11 CHAIR APOSTOLAKIS: Non-quantitative is to
12 avoid that little note that he has there, to show that
13 it's two orders of magnitude lower.

14 MR. RAHN: Yes.

15 MR. HECHT: Right. Okay. Thank you.

16 MR. RAHN: Now, this is just a little -

17 CHAIR APOSTOLAKIS: How did you define
18 event in this case? We have seen these matrices
19 before.

20 MR. RAHN: Okay. Okay.

21 CHAIR APOSTOLAKIS: So, as you probably
22 know, one criticism of such matrices is that if I have
23 an event sequence which is an ill-defined concept that
24 falls in the back box, I can take the sequence, break
25 it up into ten sub-sequences, each one falling in the

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1 good boxes, because the frequency goes down. Right?
2 Divide by 10, the consequences are reduced. So,
3 artificially, I manage to say that everything is fine,
4 when, in fact, I haven't done anything. And the root
5 cause of that is that term "event sequence" is not
6 well defined. I mean, in reactors now we are tending
7 to think when we say "sequence", we mean system level.

8 So, you're not going to go and get down to the little
9 valve. I mean, is your high pressure injection
10 working or not? Have you worried it about here? I
11 mean, is what event sequence is, is well understood by
12 the practitioners?

13 MR. RAHN: Yes. There is. Typically,
14 they divide -- as part of the ISA process, they had to
15 break this process down into many nodes, and they'll
16 look at -- a node might be empty this tank, put it
17 through this filter, and put it in this tank, just a
18 little piece of the thing.

19 CHAIR APOSTOLAKIS: Right.

20 MR. RAHN: So, then they'll identify all
21 of the steps that are needed, and what chemicals are
22 included, and what hazards could result if too much of
23 one chemical, or not enough of another, or no heat
24 removal is taken out of that tank, and so forth. So,
25 they narrow the scope small enough so that they'll

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1 look at what is the resulting hazard I'm trying to
2 mitigate from this small piece?

3 MEMBER BLEY: But at the process level,
4 because the thing -

5 MR. RAHN: At the process level.

6 MEMBER BLEY: -- George brought up would
7 be, you could take that same little segment of the
8 process and say oh, by adding too much heat, that's
9 one sequence. Oh, by adding the wrong chemical,
10 that's another. And you could break it into 10 or 20
11 separate sequences that way.

12 CHAIR APOSTOLAKIS: Or you can say -- I
13 mean, if I empty the whole tank, I'm in trouble. But
14 I will consider five different sequences where I empty
15 20 percent, 20 percent. I mean, if I don't have a
16 definition of event sequence, I can do that.

17 MEMBER BLEY: But if it is like a segment
18 of the -

19 CHAIR APOSTOLAKIS: I'm sure the -- I
20 don't know. The reviewer probably will catch it, but
21 it seems to me that you need to worry about it,
22 because these matrices do not deal with a cumulative
23 effect. See, that's -- the net result of all these
24 things is that in addition to this, you should have
25 some sort of a guidance or acceptability criteria for

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1 the cumulative. This level of consequences or
2 greater, then you can't play those games. But if you
3 -- and I know that in the chemical business, people
4 like this. In aerospace, too, by the way. But as
5 long as you are careful with your definitions, that's
6 fine. So, I'd like to see some warnings somewhere in
7 there that say event, when we say "event", this is
8 what we mean. Unless it's there, and I missed it.

9 MR. RAHN: What I was going to say was, if
10 you were to read one of these ISA summaries that are
11 submitted, you could see that they've actually
12 narrowed the scope of each process pretty narrowly, so
13 that there are not too many event sequences possible
14 out how they narrowed the scope of defining these to
15 occur. So, it's -- I don't think that's a likely
16 occurrence. I see it as a possibility, and that's why
17 they have so many different expertise personnel on the
18 committees of people who perform these ISAs prior to
19 submitting them to us.

20 When we review the ISA summary, there are
21 also people in NRC Staff that are expert at reading
22 between the lines to see have they forgotten a
23 particular possibility, or have they forgotten a
24 particular failure likelihood, or have they estimated
25 a failure likelihood too low. So, I would say that we

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1 are probably looking at it from a couple of different
2 directions to arrive at an overall qualitative
3 assessment of reasonable assurance.

4 CHAIR APOSTOLAKIS: This is broader than
5 today's topic.

6 MR. RAHN: Yes.

7 CHAIR APOSTOLAKIS: But that's something
8 that, again, you guys have to worry about. All you
9 need is some warning there that, don't play games.

10 MEMBER BROWN: You just want a definition.

11 CHAIR APOSTOLAKIS: Huh?

12 MEMBER BROWN: You just want a definition.

13 MEMBER BLEY: The standard, inter-agency
14 standard for PRA now for reactors has warnings like
15 that, in the standard itself.

16 CHAIR APOSTOLAKIS: Yes, but I don't know
17 whether these -

18 MEMBER BLEY: But it's not in here.

19 CHAIR APOSTOLAKIS: Yes. We're trying to
20 be constructive, by the way.

21 MR. RAHN: Yes. And we appreciate your
22 input.

23 MEMBER BROWN: They were smiling when you
24 said that, so it must mean something.

25 CHAIR APOSTOLAKIS: We are trying, I said.

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1 Whether we succeed is -

2 (Laughter.)

3 MR. RAHN: I'll try to move on a little
4 bit.

5 CHAIR APOSTOLAKIS: Yes, please do that.

6 MR. RAHN: We have more material to cover.

7 CHAIR APOSTOLAKIS: Because we have
8 another meeting.

9 MR. RAHN: Well, what we've done is -

10 CHAIR APOSTOLAKIS: Yes, we discussed
11 this, didn't we?

12 MR. RAHN: Yes, we did. And I want to
13 tell you that -

14 CHAIR APOSTOLAKIS: Let's skip it.

15 MR. RAHN: Well, before I move on, I want
16 to tell you, there's also a basis for it. We actually
17 have a fuel cycle ISG, a fuel cycle processes ISG that
18 defines this and allows it to occur. That's how we've
19 incorporated into the design of I&C.

20 CHAIR APOSTOLAKIS: Do we have a
21 subcommittee on fuel cycle?

22 MEMBER BLEY: The only subcommittee we
23 have that's even related is Mike's on things related
24 to radiation, but that's more radiation protection. I
25 don't think we do, yet.

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1 CHAIR APOSTOLAKIS: Maybe we can talk
2 about it at the September meeting, because I want to
3 be even more constructive.

4 (Laughter.)

5 MR. RAHN: And we can hardly wait.

6 (Off the record comments.)

7 MR. RAHN: So, as Dr. Brown mentioned -

8 MEMBER BROWN: I appreciate that. Just
9 let him answer.

10 CHAIR APOSTOLAKIS: Okay.

11 MR. RAHN: As, Mr. Brown mentioned, that
12 we do have ways of identifying how you could cope with
13 the fact that you cannot quantify things to the level
14 of it is 10 to the minus 2, smaller, or not. And
15 those combinations, they may be the use of a hardwired
16 control, for example, in parallel with a digital
17 control. There may be an enhanced administrative
18 control used in conjunction with a digital control.
19 So, there are means by which we identify how we can
20 attain independence between IROFS. And, in principal,
21 and in practice, a lot of the applications we have
22 received so far do that very thing.

23 CHAIR APOSTOLAKIS: Good.

24 MR. RAHN: We included a few criteria
25 pertaining to the use of communications, and the goal

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1 that we're trying to achieve here, we actually have --
2 it's like a two-phase goal. One goal is to make sure
3 that all IROFS are protected. That's what we're after
4 for the whole -- this whole ISG. But, in this case,
5 protected against potential communications errors that
6 could occur. And a lot of this guidance was based
7 upon the guidance that was contained in ISG-04.

8 However, there was a lot of criteria
9 provided in ISG-04 that discusses cross-channel
10 communications, and protection of how do I maintain
11 that isolation? I did not include that kind of
12 criteria in this particular ISG, because we don't have
13 a lot of examples of that.

14 MEMBER BROWN: You only refer to Section
15 1, if I remember.

16 MR. RAHN: One. That's correct. That's
17 exactly correct.

18 CHAIR APOSTOLAKIS: ISG-04, is the same as
19 ISG-4.

20 MR. RAHN: Yes, ISG-04. I'm sorry. Yes.
21 We've been using all 7 in our's. I don't know, but
22 the names I think are -- the nomenclature isn't -

23 CHAIR APOSTOLAKIS: It implies year, I
24 guess.

25 MR. RAHN: Oh, no. No, no, no. No, no.

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1 It's number.

2 CHAIR APOSTOLAKIS: It doesn't imply it.
3 It doesn't mean it, but it implies it.

4 MEMBER BROWN: Mike in the last round had
5 an ISG-6 relative to some -- I don't know, whatever he
6 works on. And he talked about it. And I said hold
7 it, I've got an ISG-6 over here. Why are they the
8 same number? He said, oh, but the title is different.
9 One is an I&C ISG, the other one didn't have
10 anything. It was just ISG-6. Well, okay.

11 MEMBER BLEY: These are supposed to last
12 long-term.

13 MR. RAHN: The criteria that we've
14 included are primarily protection from faults,
15 isolation between the non-safety and the safety,
16 prevention of any changes on-line while the system is
17 operating, and mainly to protect the integrity of
18 communication between the field and the control area,
19 if there's any human actions that need to take place
20 based upon the readings from those. That's all I had
21 on that particular topic.

22 From your previous discussion, though,
23 there were some -- I listened to the discussion on
24 TWG-6, and there are -- you had some points that I
25 think are valid. And I'll need to take those into

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1 account, as well.

2 MEMBER BROWN: That means I don't have to
3 say it any more. That's good.

4 MR. RAHN: Yes.

5 MEMBER BLEY: Adopted by reference, I
6 guess.

7 CHAIR APOSTOLAKIS: Yes. I was wondering
8 why you were so quiet.

9 MEMBER BROWN: Well, until he said this, I
10 was not going to be quiet. But he just co-opted me.

11 CHAIR APOSTOLAKIS: Okay.

12 MR. RAHN: We were going to discuss a
13 little bit about software quality. And one thing I
14 need to say about how we described the controls needed
15 for software quality, is that the criteria that we
16 provided pertaining not just to the development of the
17 software, but also the integration and testing, and
18 functional performance, and periodic maintenance of
19 the system that contains that software. So, although
20 the title of this is software quality, it's really
21 meant to include system quality, inclusive of that
22 software.

23 The guidance that we've -- yes?

24 MR. HECHT: In that case, you include that
25 in the title.

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1 MR. RAHN: In the heading. That would be
2 a good comment, because I was considering doing that.

3 MEMBER BROWN: In the title of?

4 MR. RAHN: In the title of this section of
5 the ISG.

6 MEMBER BROWN: Oh, okay.

7 MR. HECHT: It's a kind of digital I&C
8 system.

9 MEMBER BROWN: There is a title on page
10 41. It says "Software Quality". There is -- I don't
11 know what -

12 MR. HECHT: Well, his point was -

13 MR. RAHN: My point is that the criteria
14 that's here is not just pertaining to the quality of
15 the software, but the quality of the processes used
16 for integration, testing, and start-up, and
17 maintenance of the system that includes that software.
18 So, it's more than just the development, over the
19 life cycle development processes.

20 MR. HECHT: You can have very high quality
21 software which is incompatible with the system.

22 MEMBER BROWN: Yes. I'm sure as soon as
23 they use the word COTS later, you can have high
24 quality software which is incompatible with a system,
25 but it won't make the system better.

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1 MR. RAHN: Okay. Our 10 CFR Part 70
2 allows the use of a graded approach, and to make sure
3 that items related to safety are available and
4 reliable when needed. And what the grade approach
5 does is it allows you to use highly rigorous processes
6 for those that have the highest risk, and use less
7 rigorous processes for those that have minimal risk.
8 So, what we tried to do -

9 MEMBER BROWN: You use Radio Shack stuff
10 in the really low grade -

11 MR. RAHN: Not quite that level. What
12 we've done is, we've identified, first of all -

13 MEMBER BROWN: The calibration.

14 MR. RAHN: First of all, Radio Shack puts
15 out some nice products, by the way. But what I was
16 going to say was that -

17 (Off the record comment.)

18 MR. RAHN: No, what we're trying to do is
19 identify if you don't have the rigorous software
20 development process, or system development process,
21 there are compensating means that we are identifying
22 as good practices to consider before implementing a
23 commercial grade process that has not been developed
24 through this rigorous Appendix B-type software
25 process. So, what we've done is we've identified the

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1 full life cycle that would be considered as -- that's
2 now identified as Reg Guide 1.152, and 10 CFR 50,
3 Appendix B, and IEEE 7432, that is the full
4 development process. That's one of the allowed
5 methods.

6 Another allowed method is a commercial
7 grade dedication process. And for that, what we've
8 tried to do was determine how can we achieve an
9 equivalent level of assurance that that system that
10 uses the commercial grade process has been followed,
11 even though the specific steps for software life cycle
12 design haven't been included?

13 MEMBER BROWN: You know, I did that once.

14 MR. RAHN: Did you?

15 MEMBER BROWN: Yes, it was a disaster.
16 The only way we were able to make it work was to strip
17 out almost all of the non-relevant code. It was a
18 Windows-based control system for a machinery control,
19 and by the time you looked at all the miscellaneous
20 stuff they had in the standard Windows software, it
21 got -- there were so many things being done, it would
22 continue to lock up, so we ended up stripping out the
23 code. That was a very laborious process. I just
24 throw that out.

25 MR. RAHN: Yes.

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1 MEMBER BROWN: I'm not saying do it. I'm
2 just -- using commercial graded software, it depends
3 on what it is.

4 MR. RAHN: Well, there's been in the
5 process, in the chemical process industry, and in the
6 petrochemical industry, there's been a lot of
7 attention paid to the design of highly reliable
8 digital platforms, mostly PLC-based.

9 MEMBER BROWN: That's different.

10 MR. RAHN: Yes. And the idea there is
11 that -- what we're trying to do is perform sufficient
12 testing, and availability, and potentially failure
13 modes and effects analyses, to identify what are the
14 possible things that could go wrong with that system
15 prior to implementing it in a safety application.

16 The third area that we mentioned in the
17 ISG, but we don't go into in great detail is the use
18 of the current IEC standards for designing processes.

19 And those standards are used more and more throughout
20 the chemical process industry, which I believe it has
21 some value that we could be considering for use in
22 nuclear processes for fuel cycles, not for power
23 reactors. But those -- a little bit about that. That
24 system requires you to perform a similar hazards
25 analysis, and then identify layers of protection that

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1 are built into that system. And then from that
2 determine whether or not any specific safety
3 instrument or functions need to be added, so as to
4 come up with an overall level of risk reduction
5 factor. And then there are processes by which other
6 independent third-parties, and other institutions have
7 evaluated individual PLC-type platforms, and assigned
8 them safety integrity level values. And those safety
9 integrity level values are only good for a certain
10 amount of risk reduction factor that could be applied.

11 MEMBER SIEBER: I would think that because
12 of the similarity between fuel cycle industries and
13 the chemical industry that almost everything would be
14 applicable, almost the same standards. They have
15 their own body of standards not only for the process,
16 but for I&C. They have integrated safety analysis,
17 and I can see where you borrowed heavily from that.

18 MR. RAHN: Yes.

19 MEMBER SIEBER: You could almost borrow
20 everything.

21 MR. RAHN: Yes. I've been looking more
22 and more at that since I've been in the fuel cycle
23 department. And I think there's a lot of value to be
24 gained by borrowing from that.

25 MEMBER SIEBER: Well, yes. And it makes

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1 competencies you get -

2 MR. RAHN: Yes.

3 MEMBER SIEBER: The chemical industry is a
4 lot bigger than the power industry, so there's
5 manufacturers out there that do just that.

6 MR. RAHN: Yes.

7 MR. HECHT: Okay. On page 25 of the
8 standard, you make reference to operating history.

9 MR. RAHN: Yes.

10 MR. HECHT: Which is, I guess -- but you
11 don't say how much operating history you need.

12 MR. RAHN: Yes. We have a wide range of
13 components that have been proposed for use at fuel
14 cycle facilities, and we also have some licensees that
15 have significant in-house operating experience. So,
16 what we are trying to do here is allow the licensees
17 that have a lot of experience with individual
18 platforms to be able to evaluate the operating
19 performance, the number of failures per operating
20 hour, for example, the failure modes -- identify the
21 failure modes that have occurred for those use of
22 that. And prior to proposing a new application for
23 that type of software, he should be able to be able to
24 borrow heavily from his own in-house operating
25 experience. But if he does not have an existing

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1 operating experience with a particular platform, I
2 believe we have criteria in here to say how well
3 documented that operating experience has to be. I
4 think we have it in here in several places, actually.

5 And, essentially, what we're telling them is that
6 they have to be -- they have to have a very good
7 understanding of the conditions under which that
8 particular application has been used, and determine
9 whether they're similar to his conditions. And they
10 also need to evaluate the types of failures that have
11 occurred for those components, and determine whether
12 they're likely to occur for his application.

13 But even over and above that, after having
14 evaluated the available operating experience, we're
15 encouraging them to perform rigorous in-house testing,
16 both functional testing prior to the use of equipment
17 in service, and then periodically thereafter, in order
18 to insure that the operating history is reflected in
19 his own use.

20 MR. HECHT: Okay. You're talking about
21 the nature of the operating history, which I
22 characterize as sufficiency, I mean, as relevance.
23 I'm dealing with another question, which is
24 sufficiency.

25 MR. RAHN: Okay.

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1 MR. HECHT: And, I guess, the real
2 question is, how do you determine whether 5,000 hours
3 is sufficient, or if 50,000 hours is needed?

4 MR. RAHN: Or 200,000, and so forth.

5 MR. HECHT: Yes.

6 MR. RAHN: That's an area that I don't
7 think I provided guidance for the reviewer in here.
8 But there -- that's something that we would have to
9 rely on the skills and abilities of the license
10 reviewer to make a determination. Most reviewers
11 would know that 5,000 hours of history is not
12 adequate. I mean, that's something where he would
13 have to have a reasonable assurance that the history
14 that the licensee has based his design on feels
15 sufficiently adequate to give a reasonable assurance
16 of protection.

17 MR. HECHT: Well, couldn't that lead to a
18 wide range of uncertainty, which could make certain
19 applicants unhappy?

20 MR. RAHN: Well, it wouldn't be the first
21 time. But, yes, there can be a wide range of
22 uncertainty. And I think this area is an area that I
23 have considered applying for some help from the Office
24 of Research on. So, in the works I have a draft user
25 needs document that I will be submitting to the Office

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1 of Research that helps me quantify some of these
2 measures. And one of the things I'm looking at is not
3 just operating history, but level of rigor applied to
4 a software quality process, and also a software
5 testing process.

6 MR. HECHT: I might also suggest that you
7 might consider the rigor with which failure data is
8 collected. In other words, you want to have some
9 assurance that not only do you know that the things
10 that's using 1,000 chemical points over the last 10
11 years, that the vendor collected failure history.

12 MR. RAHN: One thing just to that effect,
13 I have seen that chemical facilities are paying more
14 attention, now that IEC 61508-type applications are
15 out there, they are documenting better that kind of
16 history. So, I think as time goes on, we'll have a
17 better database to choose from.

18 MR. HECHT: Okay. So, you'll be
19 considering that in the future, just -- given that you
20 want to use COTS, given that you want to use existing
21 equipment, given that it's probably appropriate to do
22 that, I guess that it behooves the applicant to know
23 what he can buy, and what he can't.

24 MR. RAHN: Yes, I think so. I think we
25 need to have criteria for it. I don't have anything

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1 to base it on right now, except qualitative terms.
2 Shall we move on?

3 MR. HECHT: Yes.

4 MR. RAHN: Okay. Typically, where we are,
5 our highest areas of concern are specification of the
6 software requirements that go into the design, the
7 actual design itself, but then integration,
8 installation, and testing of the system that contains
9 that software, and making sure that it appropriately
10 implements the safety requirements for the facility.
11 And then identification of what periodic maintenance
12 needs to be performed, and how the modes of operation
13 of the system should be used in order to insure that
14 the safety is still -- is being adequately employed by
15 that system.

16 The next steps for completion of this ISG
17 is to incorporate any comments we receive from the
18 public. The closed period ends on September the 2nd
19 for this particular ISG, and I'm sure we'll entertain
20 any comments that we receive from the public shortly
21 thereafter. But what we'd like to do is complete this
22 ISG by the end of this year. So, what that means is,
23 I want to roll into the ISG any comments from your
24 organization, and also from the public. And what I'd
25 like to be able to do is enhance it by identifying

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1 level of information needed to be reviewed by a
2 reviewer when they submit the application, because
3 I've seen several applications come in over the past
4 two years, and there's been a wide variance in the
5 amount of detail that's been submitted. So, I would
6 like to identify some additional criteria that covers
7 that.

8 CHAIR APOSTOLAKIS: When will you need the
9 letter from us, the first quarter of -

10 MR. RAHN: Yes, that would be nice. What
11 I'd like to be able to do is draft this thing, I would
12 say by Thanksgiving. And then -- so, what was your
13 question?

14 MS. ANTONESCU: Meaning the Full Committee
15 meeting.

16 MR. RAHN: Oh, Full Committee.

17 CHAIR APOSTOLAKIS: After the public
18 comments?

19 MR. RAHN: Yes, after the public. Right.
20 For sure.

21 CHAIR APOSTOLAKIS: So, that's first
22 quarter of -

23 MR. RAHN: Yes.

24 MEMBER SIEBER: After resolution.

25 CHAIR APOSTOLAKIS: Resolution.

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1 MR. RAHN: Yes. And I think I'll be able
2 to finish those by the end of September. I don't think
3 I'm getting a lot of public comments. And part of the
4 reason for that is that -

5 CHAIR APOSTOLAKIS: I'm confused now.

6 MR. RAHN: Yes.

7 CHAIR APOSTOLAKIS: Address public
8 comments and issue final document by the first quarter
9 of fiscal year `10.

10 MR. RAHN: Right. That's to do -

11 CHAIR APOSTOLAKIS: So, you're saying now
12 you're going to do something by the end of September?

13 MR. RAHN: Yes. I'm anticipating
14 completion of incorporation of the public comments
15 part of it by the end of September.

16 CHAIR APOSTOLAKIS: So, what is happening
17 then in the first quarter of `10?

18 MR. RAHN: What I'd like to be able to do
19 is identify during that time period between then and
20 the end, criteria for what level of detail is needed
21 for submission into an ISG.

22 MEMBER BROWN: Where are you going to get
23 that?

24 MR. RAHN: This is based on stuff that --
25 I've seen a bunch of different applications already,

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1 and I've seen areas where they were weak in providing
2 the information. So, I'm going to get that from my
3 own experience.

4 MEMBER BROWN: Well, ISG-6 for operating
5 reactors identified -- they developed of what's the
6 type of thing. So, that's in there. So, that's not
7 in here now.

8 MR. RAHN: No, we have not incorporated
9 that in our ISG.

10 MEMBER BROWN: So, if you get all the
11 public -- pardon?

12 (Simultaneous speech.)

13 MEMBER BROWN: Oh, yes, there are some
14 differences. If you complete the public comment, I'm
15 just trying to get to the same place you are. When do
16 you intend to finish and have it incorporate public
17 comments, resolve them, whatever you do, and then have
18 your additional items identified such that it can be
19 presented to the Full Committee? I mean -

20 CHAIR APOSTOLAKIS: I suspect something
21 like March. Is that what you're saying there?

22 MR. RAHN: I don't know. Let me ask my
23 boss.

24 MEMBER BROWN: Don't look at me. I'm just
25 -

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1 MS. SILVA: Okay. There's a couple of
2 things here. First of all, it's completing this ISG,
3 and finalizing that. Then it's incorporating it into
4 NUREGs. The September deadline is completing the
5 public -- getting all the public comments in on this
6 ISG, and then he plans on incorporating those. He
7 doesn't plan on getting a lot of public comments,
8 close to be getting the ISG done by the end of
9 September. However, the ISG is an Interim Staff
10 Guidance. We're looking at putting this ISG into a
11 NUREG on its own so that we don't lose any of the
12 details of the information that's in this NUREG.

13 The other thing is -- in this ISG. I'm
14 sorry. And the other thing is that we have the
15 Standard Review Plan, which is the 1520 that's up
16 there. We need to put in there the criteria for
17 acceptance of applications based on what we need for
18 electrical, or digital I&C, so we need to update our
19 NUREG to provide criteria. That's where the criteria
20 comes in.

21 MEMBER BROWN: Issue the NUREG without
22 what they have to provide? That's not what he just
23 said.

24 MR. RAHN: No. My thinking is that the
25 NUREG should contain this detail, plus the level --

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1 this ISG material, plus level of detail material.

2 CHAIR APOSTOLAKIS: The question is -

3 MS. SILVA: When do we need -

4 CHAIR APOSTOLAKIS: -- before the ISG is
5 issued for use, I suspect there's going to be a letter
6 from the Committee, since we're reviewing it. And the
7 question is, when? When would this happen? When will
8 you come to the Full Committee, present the final form
9 of the ISG, and then the Committee will write a
10 letter? Is that this year, or next year, or you were
11 not planning to ask a letter at all?

12 MS. BAILEY: It will be January.

13 CHAIR APOSTOLAKIS: We don't meet in
14 January, so it will be February and beyond.

15 MS. BAILEY: Right. Our goal is to
16 finalize the ISG by the end of this year.

17 CHAIR APOSTOLAKIS: Of calendar year.

18 MS. BAILEY: Of this calendar year.

19 CHAIR APOSTOLAKIS: Okay. So, we're
20 talking about next year.

21 MEMBER BROWN: We're talking about a Full
22 Committee meeting in February.

23 CHAIR APOSTOLAKIS: Something like that.

24 MEMBER BROWN: Or something like that.

25 Okay.

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1 CHAIR APOSTOLAKIS: Now, a second
2 question. When you receive all the public comments,
3 and you start thinking about putting those criteria,
4 and so on, would you like to have a Subcommittee
5 meeting to discuss those before you come with the
6 final product?

7 MR. RAHN: My anticipation is that the
8 public information will be minimal, because I believe
9 the people that have been interested in this have been
10 contributing all along.

11 CHAIR APOSTOLAKIS: Okay.

12 MR. RAHN: So, I think I don't need
13 another Subcommittee.

14 CHAIR APOSTOLAKIS: Fine. That's good.
15 Any other comments from the members? Anybody else?
16 Do you want to make a comment? No? That's fine. Oh,
17 how do you do?

18 MR. CLEFTON: This is Gordon Clefton. I'm
19 with NEI. As David has mentioned, we've worked very
20 closely with him in creating this, the same success
21 that we're doing in TWG-6's ISG, we worked individual
22 sections week-by week, and ended up with a compilation
23 of individual sections, then rolled and worked to
24 deliver this. We expect to have a friendly set of
25 comments coming back with David on them, because we've

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1 been active in the consideration. So, I think his
2 estimate that less than a month to incorporate the
3 incoming comments is probably quite accurate. And
4 we'll work with him continuing to refine the list of
5 what's necessary, so there's still industry
6 cooperation that's going on quite a bit.

7 CHAIR APOSTOLAKIS: Very good. Yes, sir?

8 MEMBER BROWN: The information to be
9 submitted, the list he'd like to put together, that
10 would be nice to have that at the time of the
11 presentation to the Full Committee, because it's kind
12 of -- let's see if it's consistent for the Digital I&C
13 from the software, just to see if it's consistent.

14 MEMBER SIEBER: With that part of the
15 document.

16 MEMBER BROWN: Yes.

17 CHAIR APOSTOLAKIS: You know that the rule
18 is -- we have to have the document a month in
19 advance.

20 MEMBER BROWN: The implication it was not
21 going to be seen until the NUREG was issued, or the
22 SRP was changed. That was the implication I got from
23 Patricia's comment.

24 MS. SILVA: Yes, but then he said that he
25 was going to go ahead and put it in the ISG.

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1 MEMBER BROWN: Okay. Well, that's what I
2 thought I heard him, then you counteracted that.

3 MR. RAHN: You know, when I said that, I
4 forgot about the NUREG. I forgot that part. We are
5 developing -

6 MEMBER BROWN: We know you're going to put
7 it in the NUREG. It's just a matter of when you do the
8 -

9 MR. RAHN: Okay. Let's take a step back.
10 Where we need it is in NUREG 1520. Somehow it needs
11 to get incorporated into our Standard Review Plan.

12 MEMBER BROWN: We understand that.

13 MR. RAHN: Okay. The way we're going
14 about doing that is creating a stand-alone document
15 which is called a NUREG. It doesn't have a number
16 yet, but was to have included this Digital I&C
17 criteria, as well as licensing-related criteria.

18 MEMBER BROWN: Yes.

19 MR. RAHN: So, our original thought
20 process was to put it into that NUREG, not into the
21 ISG, that list of things needed to be submitted with
22 an application.

23 MEMBER BROWN: Okay.

24 MEMBER SIEBER: And all you want us to
25 look at is ISG-7.

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1 MR. RAHN: That's right.

2 MEMBER SIEBER: And that will be -- you'll
3 worry about the NUREG. That's for the future.

4 (Simultaneous speech.)

5 MR. RAHN: -- that subject, because we
6 need to get it ironed out.

7 CHAIR APOSTOLAKIS: Thank you very much,
8 David.

9 MR. RAHN: Sure.

10 CHAIR APOSTOLAKIS: Do we want to make
11 final comments? Yes, sir?

12 MEMBER BROWN: I got my questions
13 answered. I'm satisfied.

14 CHAIR APOSTOLAKIS: The members are fairly
15 satisfied with what they heard?

16 MEMBER BLEY: Yes.

17 CHAIR APOSTOLAKIS: Myron, do you have any
18 parting remarks?

19 MR. HECHT: No.

20 CHAIR APOSTOLAKIS: No. Okay. Well, then
21 we are adjourned. Thank you all.

22 (Whereupon, the proceedings went off the
23 record at 11:53:08 a.m.)

24

25

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Overview of Digital I&C Steering Committee and TWG Activities

**Advisory Committee on Reactor Safeguards
Digital Instrumentation and Control Systems Subcommittee Meeting**

August 21, 2009

Shakur A. Walker, Digital I&C Project Manager
Division of Engineering
Office of Nuclear Reactor Regulation

Digital I&C Steering Committee Activities

- Will maintain oversight of TWGs until remaining ISGs are completed
- Will maintain awareness of activities outside of the DI&C Project Plan
- Will remain functional for completion of long term deliverables (i.e., SRP updates)
- Will continue to schedule internal and public meetings

Digital I&C Steering Committee Activities *(continued)*

ISGs To Be Completed

- ISG-6, Licensing Process, draft is scheduled to be complete by end of the year
- ISG-7, Fuel Facilities, is currently issued for public comment and scheduled to be complete by end of the year

Digital I&C Steering Committee Activities

(continued)

Current Activities Outside of Project Plan

- Digital I&C Operational Issues
- Cyber Security
- Research Activities

1. Digital I&C Operational Issues

- Continue to evaluate treatment of DI&C operational issues such as:
 - 50.59 Modifications
 - 50.65(a)(4) Maintenance Rule
 - Significance Determination Process
 - Licensee Event Reports

2. Cyber Security

- Different activities occurring related to Cyber Security including the Cyber Security ISG being developed by NRR and NRO:
 - Clarify guidance in RG 1.152, Regulatory Positions 2.1-2.9
 - Inclusion of cyber security guidance on design and development process of important to safety systems

3. DI&C Research Activities

- Tracking development and implementation of 5 Year Research Plan (2010 - 2014)
- Continue to ensure research activities encompass high priority program office issues related to digital I&C

Digital I&C Licensing Process Task Working Group-6

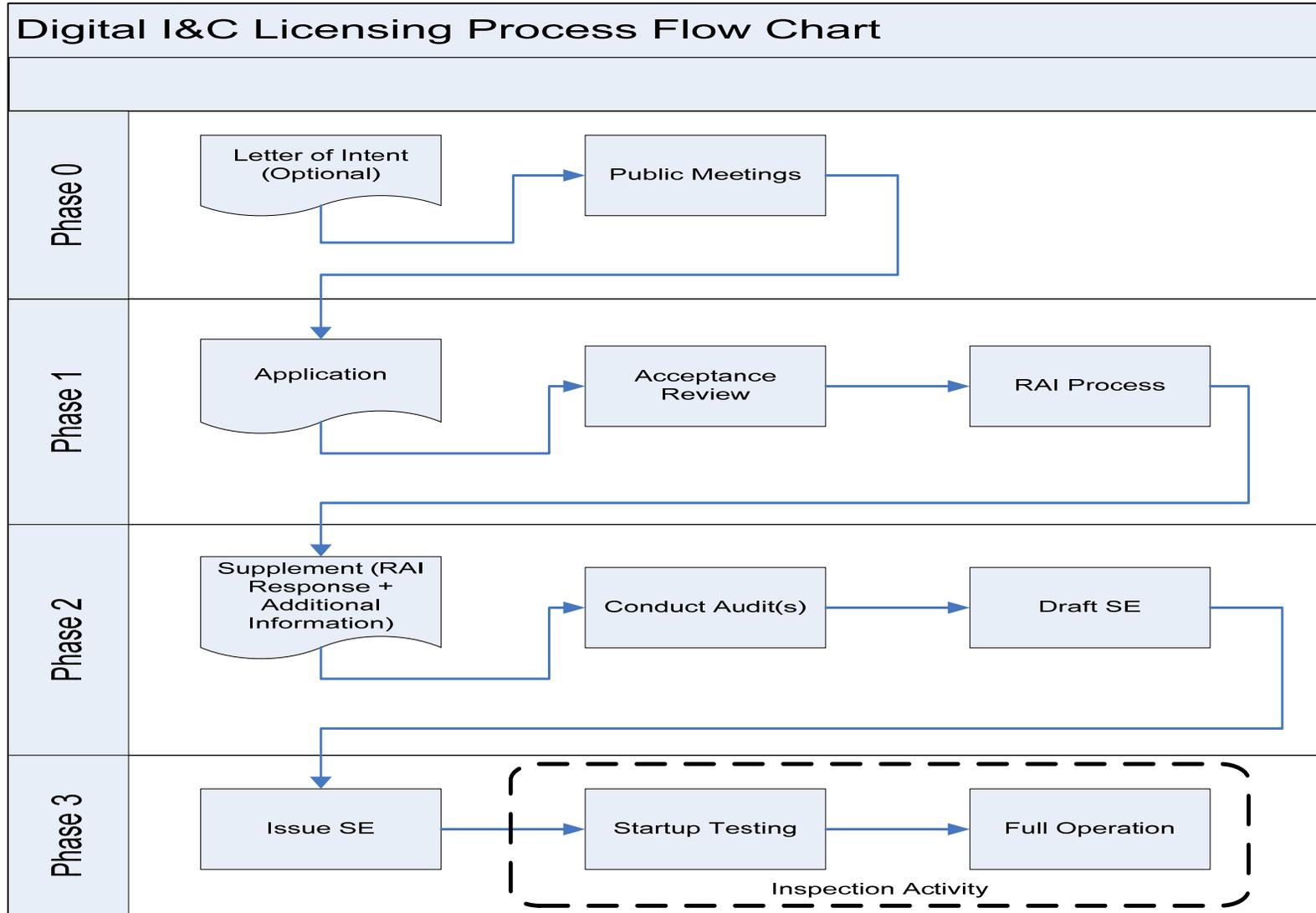
Lois James, Licensing Lead
William Kemper, Technical Lead
Task Working Group 6
Office of Nuclear Reactor Regulation

August 21, 2009

- Overview of ISG-6
 - Introduction
 - Process Overview
 - Tiers of Complexity
 - Phases of Process
 - Areas of Review
 - Path Forward

- Purpose of ISG-6
 - Augment and clarify existing licensing process
 - Expectations for documentation
 - Knowledge management
- Lessons learned from recent I&C amendment reviews
 - Wolf Creek (Completed 3/31/09, ML090610317)
 - Oconee (Near Completion)

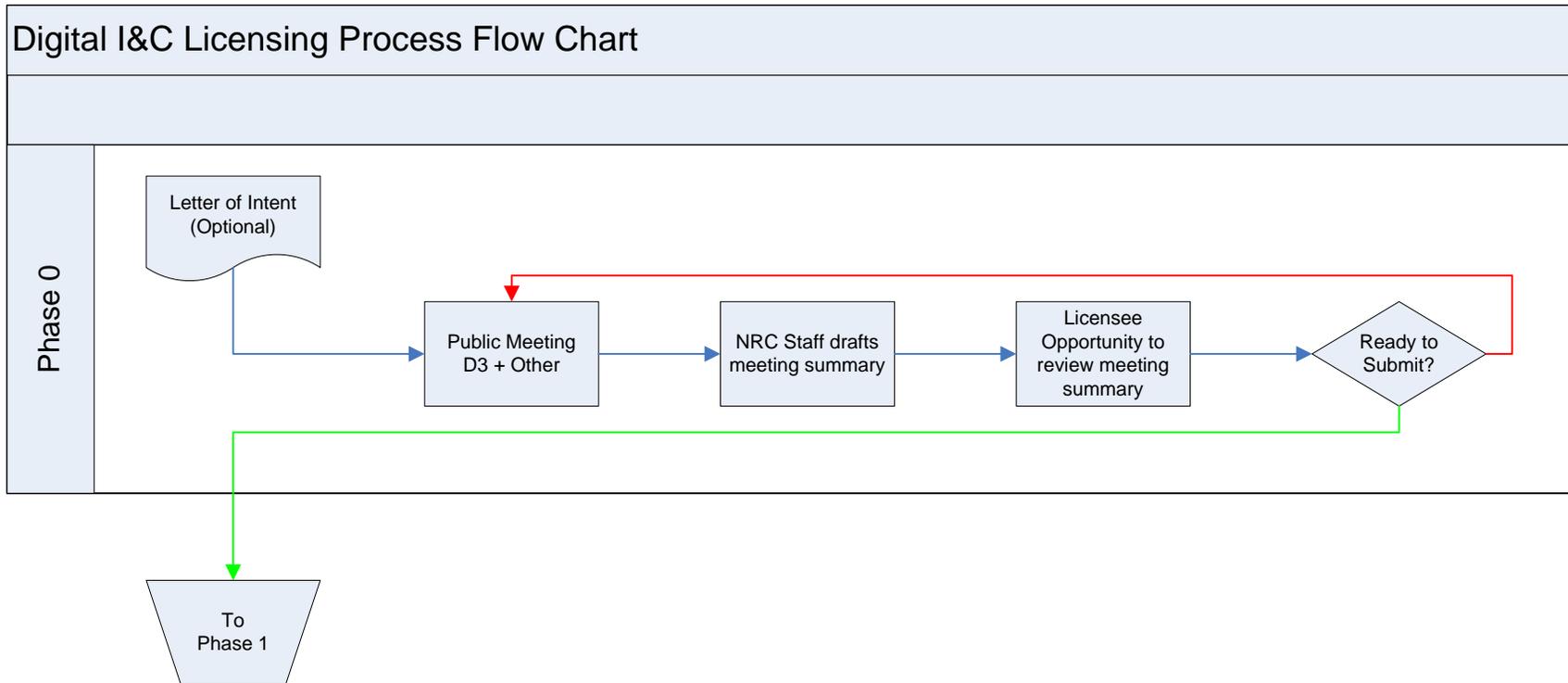
Process Overview



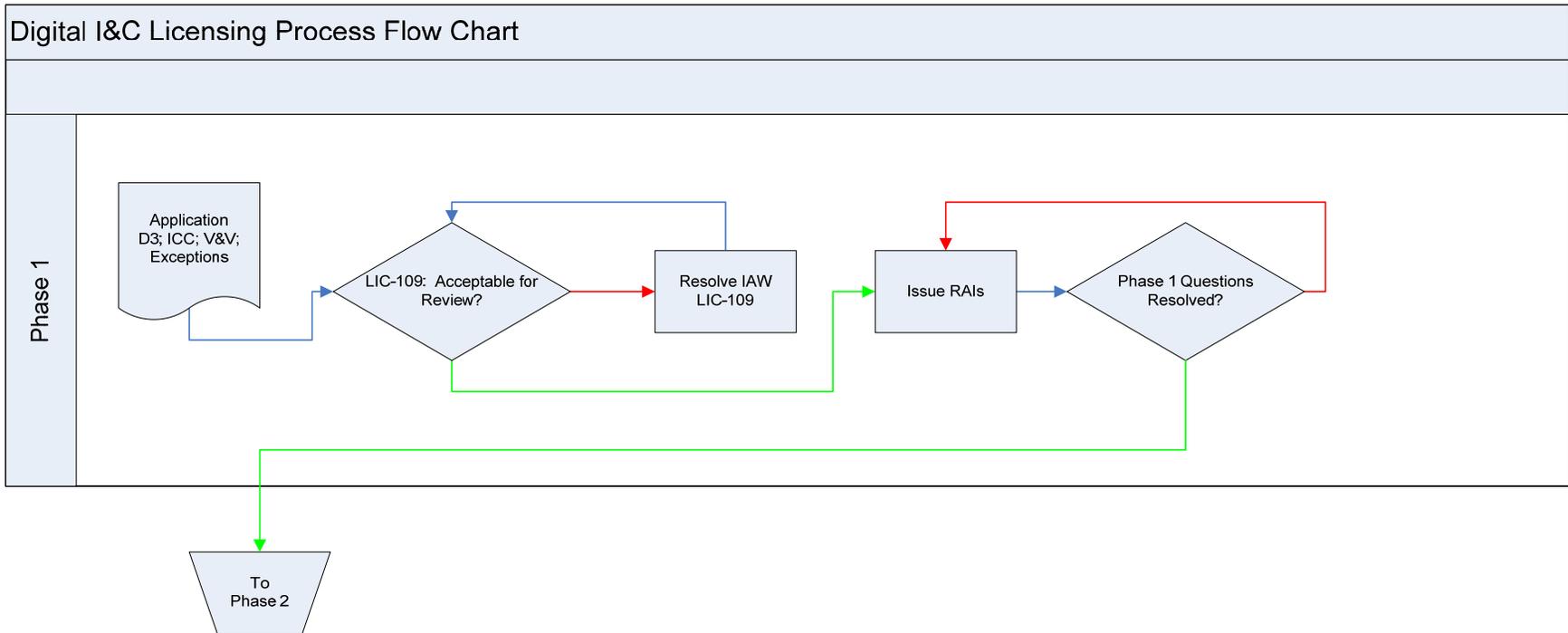
Tiers of Review

- Each Tier corresponds to an expected review complexity:
 - Tier 1: Previously approved system, no deviations from topical report, review to focus on plant specific aspects, least review effort expected. Majority of effort expended during topical report review, prior to submittal. Review length estimate: 12-15 months
 - Tier 2: Previously approved system, with deviations, moderate review effort expected. Staff focus is on what is different. Review length estimate: 14-18 months.
 - Tier 3: Totally new system, extensive review effort expected. Full review of all technical areas versus confirmatory reviews for Tiers 1 and 2. Review length estimate: 18-24 months.

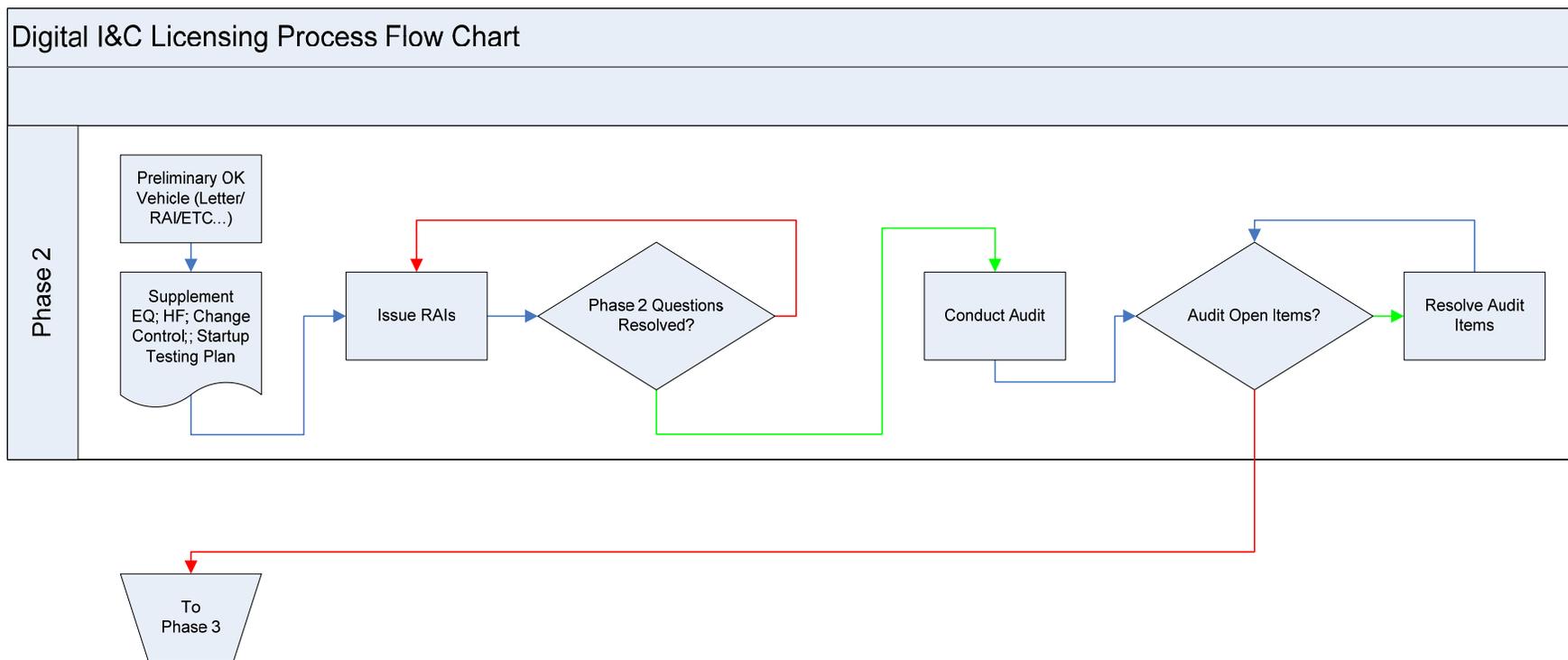
Process Overview



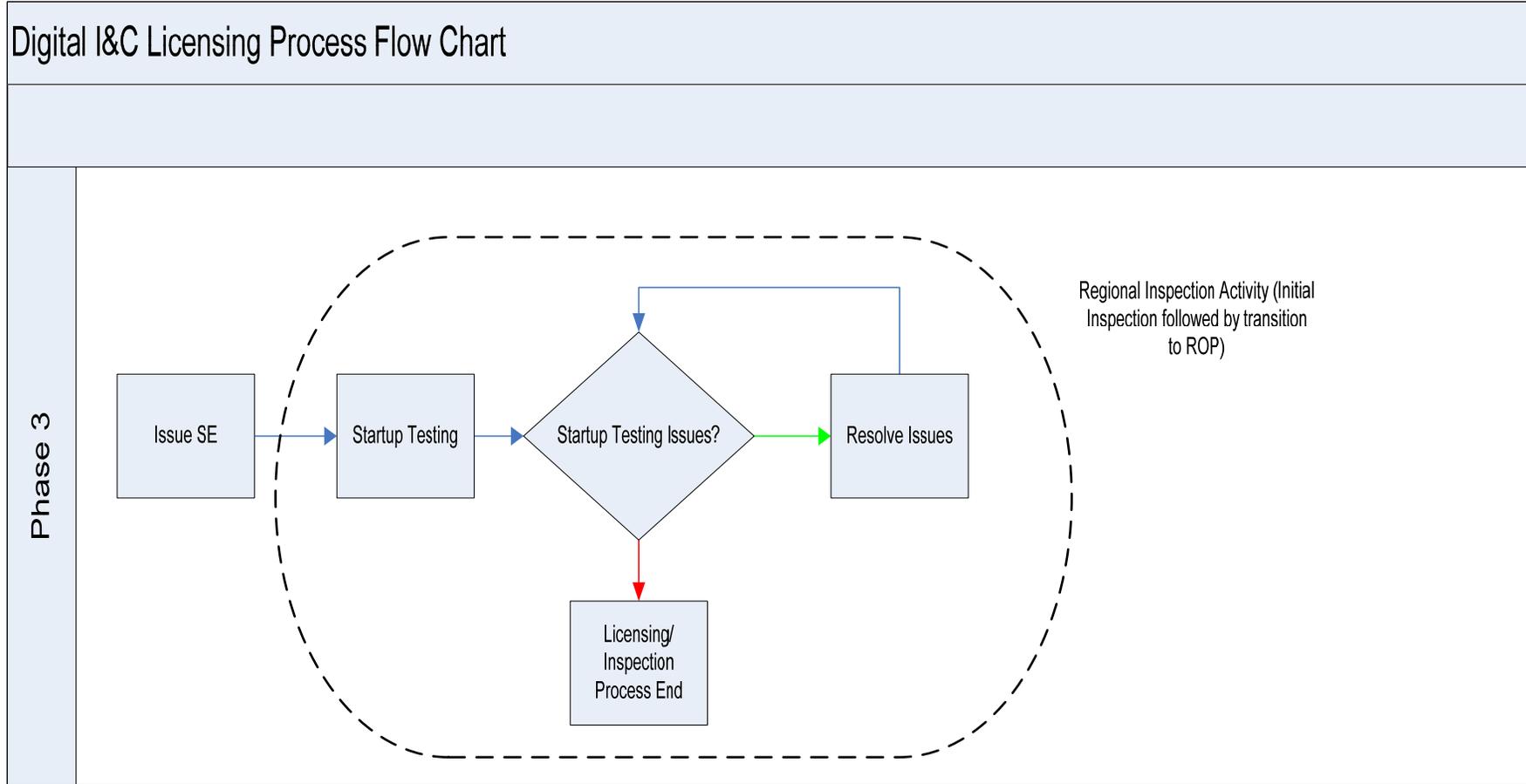
Process Overview



Process Overview



Process Overview



- Introduction
- Purpose
- Licensing Process
 - Process Overview
 - Pre-Application Meetings
 - Initial Application
 - Continued Review and Audit
 - Implementation and Inspection
 - Review Areas
 - Scope of Review
 - Information to be Provided
 - Regulatory Evaluation
 - Technical Evaluation
 - Conclusion
- Appendices
 - Example Document List
 - Meeting Summary Formats

- **Review Areas (Working List)**
 - Hardware Architecture (ISG-5)
 - Hardware Design Process and Quality Control
 - Software Architecture
 - Software Design Process
 - System Qualification
 - Defense-in-Depth & Diversity (ISG-2)
 - Communications (ISG-4)
 - System, Hardware, Software, and Methodology Modifications (Tier 2 Only)
 - IEEE 603 Compliance
 - IEEE 7-4.3.2 Compliance
 - Technical Specifications
 - Cyber Security, to be incorporated once other staff guidance is available (New ISG to be developed)

- **Example Content of Review Areas**
 - IEEE 603-1991 is the current standard required by 10 CFR 50.55a(h), but a number of systems are qualified to the more recent 1998 edition. The review area both discusses how licensee's can apply 10 CFR 50.55a(a)(3)(i) to propose the alternative use of the newer standard, while providing digital-specific guidance for each of the clauses.
 - This section will also provide detailed guidance on how the license application should be formatted, the technical scope of information to be provided, and the level of detail required on the subject matter.

Draft Review Areas

(Continued)

- Example 1: IEEE 603-1991, Clause 5.6 requires independence between (1) redundant portions of a safety system, (2) safety systems and the effects of design bases events, and (3) safety systems and other systems.
- ISG 6, section D.9.4.2.6 states that “each case should be addressed with respect to physical, electrical, and communications independence.” It provides specific guidance for this area such as “guidance for evaluation of physical and electrical independence is provided in RG 1.75, Revision 3, “Criteria for independence of Electrical Safety Systems,” which endorses IEEE Std. 384-1992, “IEEE Standard Criteria for independence of Class 1E Equipment and circuits.”
- The information provided in the LAR should confirm that the safety system design precludes the use of components that are common to redundant portions of the safety system. Physical independence is attained by physical separation and physical barriers. Electrical independence should include the utilization of separate power sources. Transmission of signals between independent channels should be through isolation devices. SRP BTP 7-11 provides guidance for the application and qualification of isolation devices.” This section also provides additional guidance to the reader: “SRP Appendix 7.0-A and SRP Section 7.9, which provides guidance on communication independence. The review of communications is addressed in greater detail in the Data Communications Review Area and in ISG-4.”

- **Example Content of Review Areas**

The Software Design Process review area discusses the various plans used in the software life-cycle. Each plan is described as to what it does, what aspects of the plan are most important to the NRC Staff, and the NRC staff position that the plan addresses.

- The Software Design Process review area will provide guidance pertaining to the various Plans used in the software life-cycle. The scope of each plan will be described, what aspects of the plan are most important to the NRC Staff, and the applicable NRC review criteria that the plan must address to be approved.
- This section will draw the most significant information from BTP 7-14.

Draft Review Areas

(Continued)

- Example 2: Software Design Process – BTP-14, section B.3.1.8, discusses the Software Operations Plan.
- ISG 6, section D.4.4.8 provides additional guidance on this Software Operations Plan. This section states “The acceptance criteria for a software operations plan are contained in the Standard Review Plan, BTP 7-14, Section B.3.1.8, “Software Operations Plan.”
- This section states that the primary aspect is completeness, however it adds that the operations plan needs to address the security of the system, and in particular, the means used to ensure that there are no unauthorized changes to hardware, software and system parameters, and that there is monitoring to detect penetration or attempted penetration of the system.”
- Furthermore, “The Software Operations Plan will be reviewed for completeness, and therefore the plan needs to address all operations of the system and the plant. A new criterion for operations is cyber security, and therefore the plan should discuss measures to ensure the security of the system, and in particular, the means used to ensure that there are no unauthorized changes to hardware, software, and system parameters. Additionally, the plan should show how the operators will be able to detect actual or attempted penetration of the system. There should also be provisions on how to respond to security problems. In general, the plan should show how the licensee has considered the problem and is prepared to respond.”

- **Example Content of Review Areas**

The Technical Specification review area addresses the potential for new types of Technical Specification changes (e.g., elimination of channel checks) due to the additional abilities of a digital I&C system.

- Example 3: Technical Specifications – Licensees often wish to take credit for automated diagnostics contained within the digital system to eliminate or reduce the frequency of TS required surveillances.
- ISG 6 will contain guidance on the information needed to be provided for the staff to reach a determination of adequate assurance. This will say that the licensee needs to show what components are currently being tested by the TS required surveillances, and compare this to the components which are subject to the self-diagnostic tests. If not all components are covered by the self-diagnostic tests, the guidance will prescribe that the license application demonstrate how the missing items will be tested, and the staff will assess this additional surveillance testing.
- This guidance is not yet contained in ISG 6, but will be added prior to being issued for comment (October 30, 2009).

- Full Draft of ISG for Public Comment
 - Late CY 2009
- ISG-6 Issued
 - Early CY 2010
- Diablo Canyon has volunteered to pilot the process



Digital I&C Systems in Safety Applications at Fuel Cycle Facilities

**Advisory Committee on Reactor Safeguards
August 21, 2009**

David Rahn, Sr. I&C/Electrical Engineer
Division of Fuel Cycle Safety and Safeguards,
Office of Nuclear Material Safety and Safeguards

Agenda

- Background
- Regulatory Basis
- Review Topics of DI&C-ISG-07
- Status/Next Steps

Interim Staff Guidance (ISG) DI&C-ISG-07 on Fuel Cycle Facilities

- Purpose
 - To establish guidance for the consistent review of availability and reliability of safety-related digital I&C systems and equipment
- Applicability
 - License applications, license amendments, and license renewals for fuel cycle facilities

Regulatory Background

- Standard Review Plan NUREG-1520 does not contain specific references to design criteria within industry codes and standards for I&C
- 10 CFR Part 70 does not contain design criteria analogous to 10 CFR Part 50, Appendix A

Regulatory Background (continued)

- TWG-7 was formed in response to Industry and NRC concerns regarding the need for consistency of review of fuel cycle facility applications
- Differences in emergency shutdown I&C designs:
 - Fuel Cycle Facilities
 - Process stops immediately -- Facility is in a safe condition
 - Light Water Reactors
 - Decay heat removal continues
 - Multiple redundant channels—1oo2 twice, 2oo3, etc
 - Inter-channel logic comparisons (newer designs)

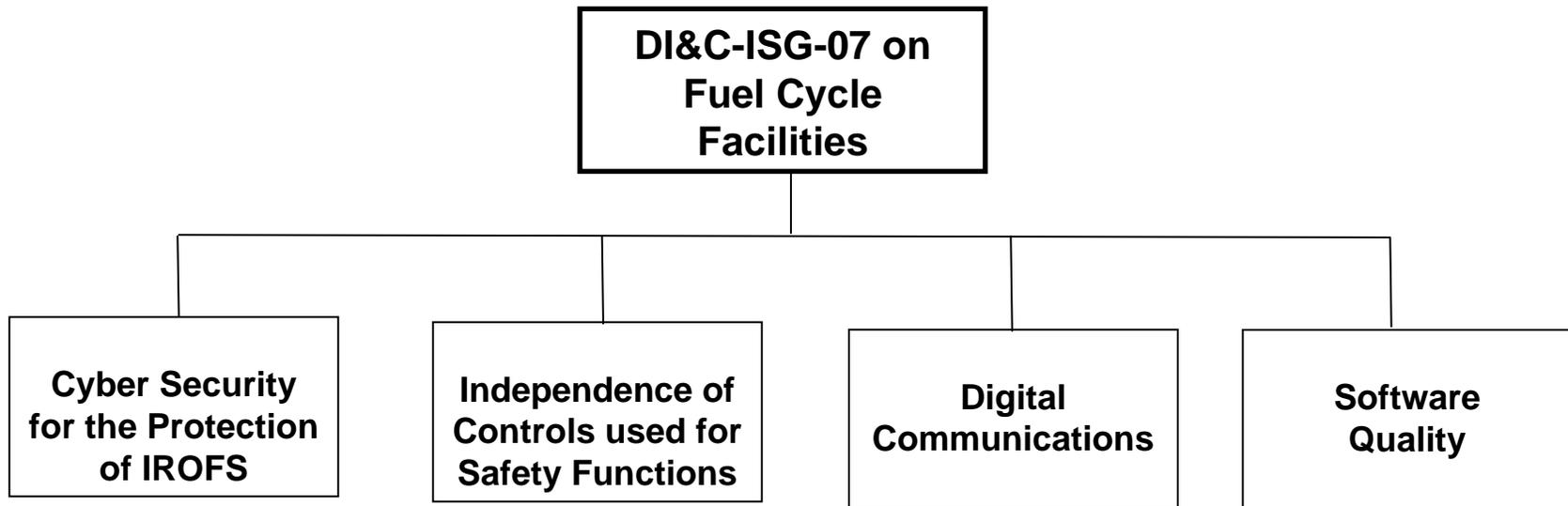
Regulatory Basis of DI&C-ISG-07

- 10 CFR Part 70 Safety Program
 - Integrated Safety Analysis (ISA)
 - Hazards, Likelihood and Consequence
 - Performance Requirements
 - Items Relied on for Safety (IROFS)
 - Management Measures

Items Relied on for Safety (IROFS)

- IROFS are structures, systems, equipment, components, and activities of personnel relied on to prevent potential accidents at a facility that could exceed the performance requirements in 70.61 or to mitigate their potential consequences.
- IROFS consist of combinations of:
 - Active Engineered Controls
 - Passive Engineered Controls
 - Administrative Controls

Review Topics DI&C-ISG-07



Participants

- TWG-07 Public Meeting Participants
 - NRC Staff
 - NMSS coordinated with the Program Offices (NRR and RES) for continuity with other DI&C TWGs
 - NEI Staff
 - Fuel Cycle, Materials, and Digital I&C staff
 - Industry

- Frequent Public Observers

Cyber Security

- No current NRC policy or rulemaking regarding cyber security for fuel cycle facilities
- ISG identifies the need to programmatically ensure the reliability and availability of digital IROFS
- ISG defines Cyber Security Events – challenges to digital IROFS—either deliberate or inadvertent
- ISG identifies that safety functions performed by digital controls should be protected from the effects of cyber events

Cyber Security (continued)

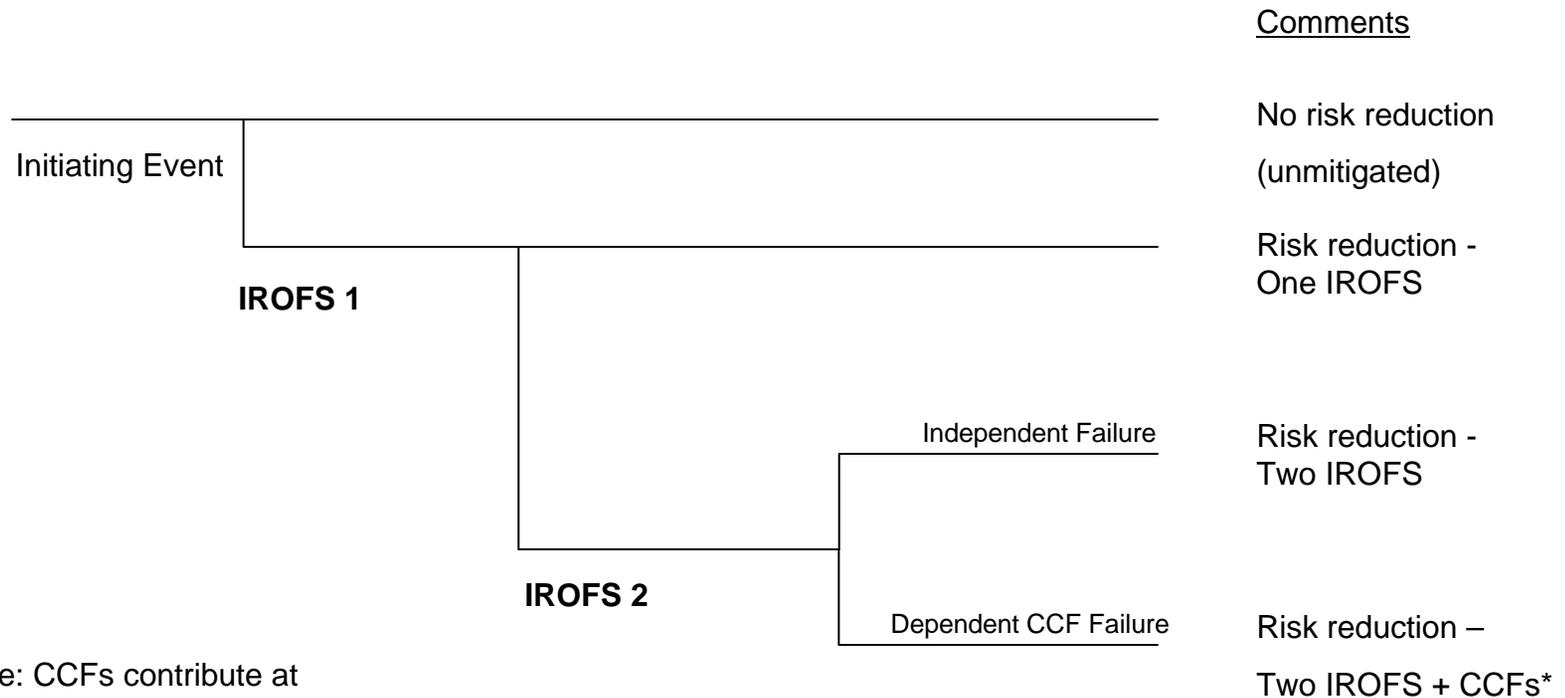
- ISG identifies examples of critical tasks performed in fuel cycle facilities by digital systems that could benefit from a cyber security program
- Describes acceptable management measures and good practices which may be applied programmatically
- Provides review guidance in the form of acceptable high-level management measures describing performance goals, elements, and characteristics

Independence of IROFS

- The ISA identifies event sequences to be prevented or mitigated through the application of one or more IROFS
- The likelihood of potential Common Cause Failure (CCF) contributions between two or more IROFS designed to prevent or mitigate a specific event should be minimized

Independence of IROFS (continued)

Simplified Event Tree



*Note: CCFs contribute at most 1% additional risk

Independence - Event Sequence Categories using Risk Index Values

Severity of Consequences	Likelihood of Occurrence		
	Likelihood Category 1 Highly Unlikely (1)	Likelihood Category 2 Unlikely (2)	Likelihood Category 3 Not Unlikely (3)
Consequence Category 3 High (3)	Acceptable Risk 3	Unacceptable Risk 6	Unacceptable Risk 9
Consequence Category 2 Intermediate (2)	Acceptable Risk 2	Acceptable Risk 4	Unacceptable Risk 6
Consequence Category 1 Low (1)	Acceptable Risk 1	Acceptable Risk 2	Acceptable Risk 3

Independence of IROFS (continued)

- Acceptance criteria for the likelihood of occurrence of potential Common Cause Failure (CCFs) contributions:
 - The combined sum of all likelihoods of CCFs must be significantly less than the likelihood of independent failures.
 - “Significantly less” means at least 2 orders of magnitude smaller than the estimate of independent failures for a system of IROFS. (No more than an additional 1% risk contribution.)

Independence of IROFS (continued)

- The ISG provides practical examples of acceptable designs for digital IROFS considered to be independent
- The ISG also provides guidance for the acceptance of other coping mechanisms for achieving independence when mathematical independence cannot be demonstrated
- The ISG also provides a discussion of acceptable ways of resolving software common cause failure contributions to risk (Use of diversity or 100% testability)

Digital Communications

- Goal is to provide assurance that IROFS are protected against potential communications errors
- Guidance is based on DI&C-ISG-04, ISG on Highly Integrated Control Rooms – Communications Issues

Digital Communications (continued)

- Digital Communication Management Measures
 - Protection from Communication Faults
 - Isolation between Safety and Non-Safety
 - Prevention of On-Line Changes to Software
 - Protection of the Integrity of Communications between Field Controllers and Human Machine Interfaces

Software Quality

- Goal is to protect against the potential effects of common cause software failures
- Guidance is provided regarding acceptable graded management measures
 - Guidance addresses acceptable processes for achieving high quality software, and methods for evaluating systems proposed for use in accomplishing safety functions

Software Quality (continued)

- The graded approach steps considered in the ISG include a range of quality processes:
 - 10 CFR 50 Appendix B software quality life cycle processes developed for use in commercial power reactors
 - Commercial grade dedication processes for Commercial off-the-shelf (COTS) systems
 - IEC 61508/ISA S84.00.01 and IEC 61511 (SIL Levels)
 - Alternative means, including third-party certification processes, for acceptably low-risk applications

Software Quality (continued)

- Management Measures should be implemented to address:
 - Software Requirements Specifications
 - Software Design
 - System Integration/Installation and Testing
 - Operations and Maintenance

Status/Next Step

- Currently out for Public comments – Due early September
- Address public comments and issue final document by 1st Quarter FY10
- Incorporate by reference DI&C-ISG-07 guidance into the fuel cycle licensing standard review plan, NUREG-1520



Questions?