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UNITED STATES NUCLEAR REGULATORY COMMISSION
BRIEFING ON DIGITAL INSTRUMENTATION AND CONTROL

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Monday

April 7, 2008

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The Commission convened at 9:30 a.m., Dale E. Klein, Chairman
presiding.

NUCLEAR REGULATORY COMMISSION

DALE E. KLEIN, CHAIRMAN

GREGORY B. JACZKO, COMMISSIONER

PETER B. LYONS, COMMISSIONER

KRISTINE L. SVINICKI, COMMISSIONER

1 PANEL 1: INDUSTRY REPRESENTATIVES

2 AMIR SHAHKARAMI, Senior Vice President Engineering
3 and Technical Services, Exelon and Chairman, NEI Digital I&C and
4 Human Factors Working Group

5 RON JONES, Senior Vice President Nuclear Operations,
6 Duke Energy

7 MITCH LUCAS, Vice President, Nuclear Engineering and
8 Support, Luminant Power and Member, NEI New Plant Working Group .

9 ALEX MARION, Executive Director of Nuclear Operations
10 and Engineering, Nuclear Energy Institute

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12 PANEL 2: NRC STAFF

13 LUIS REYES, Executive Director for Operations

14 JACK GROBE, Associate Director, Engineering and Safety
15 Systems, Office of Nuclear Reactor Regulation

16 RICHARD CROTEAU, Deputy Director, Division of
17 Engineering, Office of Nuclear Regulatory Research

18 PATRICK HILAND, Director, Division of Engineering,
19 Nuclear Reactor Regulation

20 MICHAEL MAYFIELD, Director, Division of Engineering,
21 Office of New Reactors

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

2 CHAIRMAN KLEIN: A lot of advancements have occurred in
3 the Digital Instrumentation and Control. I think this is our third
4 Commission meeting on Digital Instrumentation and Control. And since
5 our last meeting you had about 30 public meetings on that subject in I
6 think we have about four staff guidance documents issued so certainly, a
7 productive period.

8 Before we start, I would like to initially welcome our new
9 Commissioner, Kristine Svinicki. Kristine is now an old hand, she was
10 sworn in a week ago last Friday. So she's been here and well-established
11 and she knows her way around. Kristine comes to us with a lot of
12 experience, both in the Wisconsin Public Service Commission and then
13 Department of Energy for a while.

14 Then worked with a lot of energy and research development
15 activities for Senator Craig and most recently on the Senate Armed
16 Services Committee. So, she comes to our agency with a lot of
17 experience. Welcome Kristine.

18 COMMISSIONER SVINICKI: Thank you, Mr. Chairman. I
19 would like to thank everyone, everyone has been very welcoming and I'm
20 pleased to be here. Thank you.

21 CHAIRMAN KLEIN: Before we start any comments.

1 Commissioner Lyons.

2 COMMISSIONER LYONS: Welcome Kristine.

3 CHAIRMAN KLEIN: Well, Amir, it's all yours.

4 MR. SHAHKARAMI: Good morning, Chairman Klein and
5 Commissioners Jaczko, Lyons and Svinicki. It is my pleasure this morning
6 to present the industry's perspective on the application of digital
7 technology in U.S. nuclear power plants. My name is Amir Shahkarami,
8 Senior VP for Exelon Nuclear and I'm also the Chairman of Industry I&C
9 Working Group.

10 Please allow me to introduce our supporting speakers today. Mitch
11 Lucas. Mr. Lucas is the Vice President of Engineering and Support,
12 Luminant Power. Mr. Ron Jones next to me, Senior Vice President
13 Nuclear Operations, Duke Energy and Mr. Alex Marion, Executive Director
14 of Nuclear Operation, Nuclear Energy Institute. Slide two.

15 The topics I'm going to cover today are objectives, goals, overview,
16 status and conclusions. We will provide our thoughts today on the
17 regulatory involvement regarding the use and application of digital
18 technology and plan to offer our perspective on our project objectives and
19 goals and overview on the status of our ongoing activities. Finally, I will
20 offer some conclusion.

21 We believe the safety focus application of digital technology is

1 essential for the future of the nuclear industry. Digital technology is
2 important for current operating units in addressing obsolescence and will
3 enhance plant safety, availability and reliability. Digital control and
4 protection systems are an integral part of design certification, new plant
5 design, as well as new fuel processing facility.

6 I just want to tell you that within Exelon about eight or nine years
7 ago we developed a strategy for the Digital I&C and over time a lot of
8 project moved to the right on a safety related application because of the
9 issue we have today. So, I'm very optimistic about where we are going
10 and trying to pull a lot of those to the left.

11 There is a need for continued level of coordination and cooperation
12 between the NRC and the industry to ensure consistency in the regulatory
13 process associated with application of this technology. We have
14 established a management structure for identifying issues and moving
15 them to resolution in a disciplined and timely manner. We must create
16 realistic guidance with the licensing processes of digital applications.

17 Now, let me talk about some of the goals; the short term. The
18 specific short-term goals are to develop interim staff guidance as you
19 mentioned, Mr. Chairman, in time to support the submittal of licensing
20 amendment and review of the anticipated digital applications. The ISG
21 must be technically sound, practical to apply and contain guidance for an

1 appropriate level of detail for regulatory evaluations and reviews.

2 The long-term goals are to continue industry interactions to
3 incorporate the ISG content into final regulatory guidance, assure
4 consistency with applicable industry codes and standards and endorse
5 related detailed industry guidance through established agency processes.

6 Success of the application of digital technology with our nuclear
7 industry will be dependent upon assuring the continued safe operation
8 through each nuclear facility digital application. Realistic, practical
9 guidance and cooperation must prevail.

10 We have seen significant technical gains in other industries,
11 especially in digital technology. This technology is undergoing continuous
12 change and improvement. We must work together to change regulatory
13 guidance to keep pace and technology development that can assist
14 nuclear power generation. In our push to attain timely issuance of
15 guidance, we must ensure changes to current positions are made in
16 accordance with appropriate regulatory process and well communicated to
17 all the stakeholders. Page six.

18 The project plan is working well to define the roles and
19 responsibilities of Digital I&C, the Steering Committee and Task Working
20 Group. Ms. Kristine, you may not be familiar with our structure, but
21 basically we have an industry working group, with 7 members, and NRC

1 has the same format. And with the leadership of Jack Grobe and I
2 represent industry, we routinely interact. Like Mr. Chairman said, we have
3 had numerous meetings over time.

4 The pilot project, Duke's license amendment request, provides the
5 opportunity to benchmark to NRC interim staff guidance. It also will
6 demonstrate the effectiveness of the licensing process and address
7 industry concern of regulatory uncertainty in the timely application of
8 Digital I&C system.

9 We see the need to maintain the project steering committee with
10 industry involvement and support throughout this year and into next year if
11 necessary to support the timely implementation of future digital
12 applications. Slide seven.

13 Fundamentally, we are concerned about the fixed time period. This
14 is related to manual operator actions and the 30-minute time requirement.
15 I can tell you that we appreciate the cooperative effort between the three
16 task working groups to develop a method for determining an acceptable
17 time period associated with crediting manual operator action. The draft
18 guidance is undergoing review at this time.

19 Our principal focus is on a process that determines the time period
20 using the plant safety analysis and best estimate methods and acceptable
21 criteria as defined in BTP19. Our guidance should show what is to be

1 submitted and when. It also should specify which document must be
2 available, which will be reviewed and which must be docketed. Without
3 resolution of document inventory control the review approval process will
4 see unnecessary delays. Slide eight.

5 An ongoing challenge is to attain an acceptable level of detail for
6 the digital application reviewers. They remain concerned that the
7 requested level of detailed questions suggest an independent design
8 review/re-verification rather than attaining a reasonable assurance
9 determination. It takes years to design, to layout, to get the material, build
10 it and test it.

11 So, I think what we're trying to say is that we will provide all that
12 information and we ask them specifically what piece of that is required to
13 do the review rather than fully independent verification. We want to avoid
14 expanding the scope of situations that do not result in a significant safety
15 benefit. Expanding that functionality can be very complex.

16 Complexity can lead to a spurious actuation and adverse
17 interaction with the primary protection system which would reduce plant
18 safety. Slide nine.

19 As I mentioned earlier, we see the need to maintain the project
20 steering committee with its industry involvement and support throughout
21 this year and possibly into next year. Its significant commitment of

1 resources are critically important. The NRC and industry will be active into
2 2009 with oversight by the Steering Committee and Task Working Groups.
3 Project deliverables are in use now.

4 As announced at the Regulatory Information Conference, the
5 ISG-04 in regard to communication was used in a staff review.
6 Additionally, ISG-06 draft, which is licensing process, was used in
7 licensing documents from Duke License Amendment Requests. Rollover
8 to permanent guidance has started in ISG-01, which is Cyber Security.
9 This is being used in draft rulemaking and regulatory guide development.

10 Let me give you some project status. I want to make sure on page
11 10 this number of problem statements resolution do not reflect the effort
12 expended nor their closeness to completion on a deliverable within the
13 project plan. We have had several discussions several weeks before -
14 after these things were issued to you -- and we have made progress and
15 we are close to coming to a conclusion on a lot of these items.

16 We originally identified seven technical issues that became topic for
17 interim staff guidance. The Task Working Group identified 25 problem
18 statements. Three of these have been completed to date. As I said, a lot
19 of them are coming to closure.

20 COMMISSIONER JACZKO: Can you just specify which are
21 the ones that are completed and which are the one --?

1 MR. SHAHKARAMI: I'm sorry?

2 COMMISSIONER JACZKO: The three that are completed?

3 MR. SHAHKARAMI: The three - I have the list. Alex, do you
4 remember those?

5 MR. MARION: Yes. Bear with me a second. I'm Alex
6 Marion. One, we have Task Working Group #4 on Communications.
7 That's considered closed. I'm taking up valuable time here. I'm missing
8 the other one. Bear with me a second.

9 COMMISSIONER JACZKO: That's okay. We can move on.

10 MR. MARION: We'll get back to that.

11 MR. SHAHKARAMI: We are confident that we are on closure
12 path with the remaining problem statement in 2008. Although we expect
13 delays for the ISG for risk informing and fuel cycle facilities.

14 Again, I want to really elaborate that the collaboration and working
15 on this issue gives me a very optimistic view that we're going to come to
16 closure. So, lots of progress has been made on this problem statement.
17 We haven't done a final sign off. So, we're making progress. Let me go
18 ahead with conclusions on page 11.

19 We see the need to maintain the project steering committee with
20 this industry involvement and support throughout this year and possibly
21 into next year. It is significant commitment of resources, but critically

1 important as I said earlier. The pilot project will validate the interim staff
2 guidance and Ron Jones is going to be talking about that.

3 This is of highest importance and significant to us. It will
4 demonstrate the effectiveness of licensing process plus addressing the
5 industry concern on regulatory uncertainty in the timely application of
6 Digital I&C system. The Task Working Groups must continue to refine
7 and enhance the ISGs until they are technically sound, practical to apply,
8 and initiate an appropriate level of detail for regulatory evaluation and
9 reviews.

10 We recommend continuation of the project management structure
11 for identifying issues and moving them to resolution to create a stable,
12 predictable and timely licensing process with realistic guidance.

13 And that concludes my presentation. With that, I would like to turn
14 it over to Mr. Ron Jones.

15 MR. JONES: Thank you. Good morning. As Amir said, my
16 name is Ron Jones. I'm Senior VP with Duke Energy over Nuclear
17 Operations. I have responsibility for Duke's three nuclear plants along
18 with our centralized support organization and major modification
19 organization. I appreciate having the opportunity to discuss our
20 experience in pursuing the digital upgrade for Oconee's reactor protection
21 and engineered safeguards system with you all today. Slide two.

1 The Oconee units have been in operation for over 30 years. The
2 existing analog RPS/ES systems are original plant equipment and while
3 they're fully reliable today, we are pursuing replacement systems to
4 preclude future problems.

5 We've selected the AREVA TELEPERM XS digital protection
6 system for the replacement. This is the first U.S. plant replacement;
7 although the system has been successfully installed in European nuclear
8 stations both in reactor protection and plant control systems. We've
9 submitted a license amendment to obtain approval of changes to the
10 Oconee licensing basis and technical specifications to support this new
11 system. Page three.

12 We plan to install the system on the first Oconee unit in the fall of
13 2009, with the remaining two units following in the fall of 2010 and 2011
14 respectively. Duke's been pursuing this upgrade for several years and the
15 systems for the first unit are actually fabricated at this point.

16 Parallel with the licensing submittal, we have significant work
17 underway in preparing for the installation, testing and operational use of
18 the systems. Factory acceptance testing will be conducted in fourth
19 quarter of this year with system delivery in early 2009. For this reason, we
20 need a timely review of the submittal so that we can prudently plan for the
21 first installation in the fall of 2009. Slide four.

1 This project is one of several Digital I&C upgrades that Duke is
2 undertaking. We constantly assess the health and the reliability of our I&C
3 systems and project the appropriate timeframe to upgrade them before
4 they become unreliable or difficult to maintain.

5 We've considered refurbishing some of these systems by
6 re-engineering circuit boards and replacing other components in the
7 systems; however, we've concluded that this will be shortsighted and that
8 would leave us with 40 year-old technology and no real performance
9 gains.

10 Therefore, we've decided to pursue digital technology which we
11 believe will enhance reliability and nuclear safety. The inherent ability of
12 digital systems to monitor their own health, to self detect failures and
13 operate correctly even with certain failures will provide significant
14 improvement in the performance of these important safety functions. Slide
15 five.

16 We've made a substantial investment in our digital implementation
17 strategy to address the unique technical, quality and regulatory
18 requirements of this technology. We want to be in a position to upgrade
19 our I&C systems across our fleet such that we stay ahead of any potential
20 operational problems as these systems age. We've worked closely with
21 AREVA to prepare this licensing submittal striving to be completely

1 responsive to the NRC guidance for digital submittals.

2 We found that some of the advanced technical features of these
3 systems have been a challenge to accept under the existing regulatory
4 guidance. We applaud the work of the NRC to ensure that the regulatory
5 guidance keeps pace with the development of innovative features that
6 truly make these systems more reliable and safer than their analog
7 counterparts. Slide six.

8 We certainly appreciate the efforts of the NRC and NEI working
9 together under the Digital I&C project plan to create a viable path forward
10 for digital upgrades while preserving all elements of nuclear safety.
11 Indeed, we believe the RPS/ES submittal will benefit from the interim staff
12 guidance that has been published, particularly the ones dealing with
13 communication issues and cyber security.

14 We remain hopeful that the pending guidance for the licensing
15 process will also be helpful. Frankly, so far we are still seeing a licensing
16 process that seems to be more of a detailed design review rather than a
17 regulatory review. In fact, we are providing information that we would not
18 have been able to provide if we were not so far along in this project.

19 And so I'll conclude with this point. The industry needs a stable,
20 timely and predictable licensing process without undue burden to gain
21 confidence in undertaking the much-needed modernization of our I&C

1 infrastructure. There are many folks sitting on the sideline now and
2 monitoring Oconee's project to monitor its success before they decide to
3 go forward with their own particular projects.

4 We believe that continuing to operate the legacy analog systems
5 beyond their prudent life cycle is a greater risk than upgrading to digital
6 technology. We strongly endorse the efforts of the NRC and the industry
7 to resolve these barriers to implementation so that we can move forward
8 with these important safety improvements. Thank you.

9 MR. LUCAS: Good morning. I'm Mitch Lucas, Vice
10 President of Nuclear Engineering and Support for Luminant Power. I'm
11 responsible for the new plant work at Comanche Peak. It is my privilege
12 this morning to present the new plant perspective on the joint NRC and
13 industry Digital I&C issue resolution efforts. I'll spend a few minutes
14 discussing feedback from the new plants, including the vendors. Slide
15 one.

16 The last 18 months have been extremely challenging for both the
17 NRC and the industry working in parallel on several issues. These
18 challenges were met head on and many issues have been resolved
19 successfully and should result in a stable and predictable licensing
20 environment for new plants. We appreciate the ongoing proactive efforts
21 of the NRC.

1 Hard work by the industry and the NRC resulted in the issuance of
2 several interim staff guidance documents to provide much-needed clarity
3 in several Digital I&C areas and lays the foundation for future work. The
4 industry is currently working on developing guidance documents; some for
5 NRC endorsement to ensure consistency and interpretation.

6 In the human factors area, industry draft guidance documents on
7 computerized procedures, minimum inventory and the ongoing efforts on
8 the manual operator actions are a few examples.

9 In the diversity in depth area interim staff guidance provides
10 much-needed clarity on adequate diversity, manual operator action and
11 effects of common cause failure.

12 In the highly integrated control room communication area interim
13 staff guidance provides clarity in several key areas affecting detailed
14 integrated control room designs. The interim staff guidance removes any
15 guesswork on the part of the new plant vendors and provides valuable
16 guidance. This helps the industry, both vendors and licensees.

17 The guidance complements the Standard Review Plan in many
18 areas by providing added clarity. This coupled with industry guidance
19 documents will help ensure consistency and interpretation and should
20 result in improvements in vendor and utility submittals and NRC review
21 time.

1 We do recommend that the NRC work to provide consistency in
2 interpretations and reviews among various NRC divisions on new plants,
3 vendor and utility submittals. Slide two.

4 The interim staff guidance and industry white papers will help new
5 plants better understand NRC expectations and requirements. It will also
6 help new plants and new plant vendors be better prepared when dealing
7 with the NRC during their design certification process and when
8 responding to requests for additional information pertaining to new plant
9 and vendor submittals.

10 In general to date, new plants have not identified conflicts with
11 issued guidance. Our industry continues to develop methodology to
12 determine the acceptability of manual operator action times to be used in
13 diversity and defense in depth evaluations as an alternative to the 30
14 minute criteria. This methodology is critical for new plants.

15 We thank the NRC for their continuing efforts to address this issue.
16 We, the industry, and the NRC need to work together to clearly define the
17 requirements for Digital I&C submittals, levels of detail and ITAAC closure
18 methods. Clear understanding and identification of the documentation
19 necessary for ITAAC closure is important to new plants since near final
20 Digital I&C design is a prerequisite for simulators. Slide three.

21 As new guidance is used over the next few years, it is important

1 that we continue the feedback mechanism through the joint NRC/NEI
2 Digital I&C Steering Committee. Actual implementation of the new
3 guidance may result in identifying the need for new or additional
4 clarification. Pilot projects will help validate effectiveness of the issued
5 guidance and build confidence in the process.

6 Mitsubishi has volunteered to participate in a pilot project to validate
7 the manual operator action times under full scope USAPWR simulator in
8 Pittsburgh. This would be very beneficial to new plants since it would help
9 validate the methodology for manual operator actions. We as a
10 community of new plant vendors and owners strongly recommend that the
11 Digital I&C Steering Committee remain in place to ensure guidance is
12 adjusted where necessary based on industry feedback and pilot project
13 results. Slide four.

14 The joint NRC and industry-focused efforts will result in safe and
15 reliable implementation of the digital technologies in new plants, improved
16 safety, reliability and human performance in new plants and stable,
17 predictable and timely licensing processes for new plants.

18 Improved guidance with consistent interpretation will result in terms
19 of resources and time for both new plants and the NRC. Efficiency
20 improvements such as reduced number of RAIs, adequacy of vendor
21 submitted information, a lesser number of regulatory misinterpretations,

1 minimal redesigns and minimal inconsistencies among staff reviewers.

2 This will all result in savings, both for the industry and the NRC.

3 In conclusion, Luminant power strongly endorses the joint NRC
4 industry efforts to identify and resolve Digital I&C issues to ensure a
5 stable, predictable and timely licensing process for new plants. These
6 efforts significantly help the continued development of new plants in the
7 United States.

8 MR. SHAHKARAMI: Mr. Chairman, this concludes our
9 formal presentation.

10 MR. MARION: If I may, I have the response to
11 Commissioner Jaczko's question. The three ISGs that were completed
12 as--

13 COMMISSIONER JACZKO: Those are just the three ISGs?

14 MR. MARION: Right.

15 COMMISSIONER JACZKO: I always wondered if there were
16 something different than those three. I guess we have that list
17 somewhere.

18 MR. MARION: Well, the three that were completed at the
19 time that we developed the presentation material were cyber security,
20 treatment of single failures as part of diversity and defense in depth and
21 communications. Now, there are a couple -- possibly three ISGs that were

1 due to be issued towards the end of this month and I don't know what the
2 current status of those are.

3 COMMISSIONER JACZKO: We'll ask that -- the staff might
4 be able to do that.

5 CHAIRMAN KLEIN: Well, thank you very much for that
6 feedback. Obviously, we'll hear from the staff a little bit later from their
7 perspective. Thank you very much for those updates and we'll begin our
8 questioning with Commissioner Lyons.

9 COMMISSIONER LYONS: My thanks to all of you for
10 excellent presentations. I think it was of the order of perhaps three years
11 ago, maybe two and a half years ago that the Commission heard from
12 industry really serious concerns about the status of the regulatory
13 framework for Digital I&C. And at that point I think if I remember a quote,
14 it was a statement that the regulatory position on Digital I&C could well be
15 the long pole in the tent on new plant construction.

16 I think all of you have really answered this, but I'd like to be very
17 sure that I'm understanding correctly. Is it your view that Digital I&C is
18 now receiving the appropriate degree of emphasis from the staff and that
19 the working relationships between staff and industry are well established?

20 MR. SHAHKARAMI: I'll go ahead and answer that. I think
21 we as an industry and NRC recognize that we can't wait until we get all the

1 formal documentation out there so we took on issuing the interim
2 guidance. I think that's going to help the process, especially with the pilot
3 plant. But I think we need to be open and if something just doesn't work
4 because ISG said so, we need to be able to check and adjust that as
5 appropriate.

6 I think we should stay tuned with our project plan. I don't think
7 we're going to have a lot of issues with keeping up with this technology. I
8 think since a year-and-a-half ago when we started this and today there is
9 a big difference and I'm very optimistic that staying with the project plan,
10 resolving issues and being connected throughout this process will make
11 us successful.

12 COMMISSIONER LYONS: I appreciate that. Comment to
13 the staff, too. My appreciation for their role in responding. Certainly, my
14 appreciation to industry, too. Another question which would come from
15 meetings of perhaps of a year or two ago. There was some suggestion -
16 at least as I interpreted it from industry - that perhaps digital systems
17 needed to be looked at somewhat differently than traditional analog
18 systems from the perspective of safety.

19 I just wanted to affirm, I hope, that there is agreement on the part of
20 industry that we still need to maintain the independence of redundant
21 safety channels that we have demanded in the analog world. And again, I

1 believe that's well established now. That's for either Alex or Amir.

2 MR. MARION: Yes, it is. It is.

3 COMMISSIONER LYONS: A question probably to Mitch.

4 You mentioned the need to move ahead with simulators. And that had

5 been -- when the discussion had been of the long pole in the tent --

6 simulators was one of the major concerns. With the progress that's being

7 made now, do you anticipate being ready for simulator orders and roughly

8 in what time frame do you anticipate the first simulators being ordered?

9 MR. LUCAS: It varies with the company that's planning to

10 build on what their time frame is for it, but I believe they're ready and I

11 believe you'll see simulators --

12 COMMISSIONER LYONS: Do you think you will be ready to

13 specify those stimulators?

14 MR. LUCAS: Yes.

15 COMMISSIONER LYONS: That certainly positive. A

16 question for Ron. You mentioned that the system being proposed for

17 Oconee is used in a number of plants, particularly in Europe. Could you

18 comment a little bit on the performance of that system? Have there been

19 problems identified and corrected? Or has it been essentially

20 trouble-free?

21 MR. JONES: I don't have the most recent data on

1 performance. My rough count shows that there about 13 reactor
2 protection systems installed across the globe. There's another 14 that are
3 in the planning process; three of those being Oconee. The data I had
4 seen from a couple years ago when we were having some original
5 discussions with the NRC on the Oconee submittal showed extremely high
6 reliability from the international systems that had been installed.

7 I don't recall that there was a single failure at that time that
8 prevented the system from performing a safety function and there's more
9 lower level, single channel type issues; things that the machines are
10 designed to detect early and immediately alert the operator of and take
11 action to remove that channel from service. Extremely high reliability.

12 COMMISSIONER LYONS: And then finally I had a question
13 really for any of you. I can well imagine that the training required of
14 operators is going to have to change significantly as you move towards a
15 fully digitized control room. And certainly, the operators need to have the
16 same-- or I would anticipate have the same level of understanding of
17 what's actually -- what the system functions are that are being performed.

18 But I would think they also need a new appreciation of the digital
19 interfaces, the types of problems that could potentially occur and the types
20 of awareness that they need to develop. I was just curious if any of you
21 could comment how your training programs will require modification or

1 how we're looking at changes in training programs as you move toward
2 Digital I&C?

3 MR. LUCAS: We implemented a digital turban control
4 system, so we have so some experience at Comanche Peak with that.
5 We involved operators through the whole design phase and through the
6 testing phases and then we implemented -- as you said it's different
7 training for digital controls. One other thought -- that was our first system
8 to go in like that. We had some concerns that maybe the operators
9 wouldn't like that and I think maybe they were a little wary of it, but it's so
10 much better than the analog system.

11 In the old analog system, if they needed to adjust power and they
12 hit the button to adjust power up a little bit, it might jump 5 megawatts.
13 Right now, they can set a half a megawatt and it smoothly goes to that.
14 It's far superior.

15 In addition to that that was our most unreliable system and it's
16 extremely reliable now. We made some mistakes going through that, too,
17 but I think for the operators it was not a hard transition. I think what it did
18 for them is they said, "When are we going to do everything else?"

19 COMMISSIONER LYONS: I guess my concern, Mitch, is
20 that, yes, as long as the system works perfectly, I would anticipate just
21 what you described. But I would think that the operator has to have a

1 slightly different sense of awareness of what could happen if the system
2 doesn't work perfectly.

3 MR. LUCAS: Yes, we've actually been through scenarios like
4 that with them. They have a response plan for a problem with the control
5 system where they manually trip the turbine and the reactor. So, they
6 have responses planned and trained for even if the digital system didn't
7 operate the way they expected.

8 COMMISSIONER LYONS: I'd be interested in comments
9 from anyone else.

10 MR. JONES: Just commenting on Oconee, for example.
11 Oconee is over 30 years old, all three units. It's probably one of the more
12 digital nuclear plants out there nowadays, though, compared to other units
13 across the United States.

14 We've undertaken a digital automatic voltage regulator for all three
15 units for the main generator at Oconee; digital AFIS system, automatic
16 feed water isolation system; digital integrated control system or ICS
17 System; digital stream mods, which basically replaces a lot of monitoring
18 and also valve controls out on the secondary side of the plant with digital
19 systems; digital turbine control and digital control rod drive control system.

20 Oconee is -- and the operators at Oconee are very familiar with
21 what digital looks like and we're also very familiar with the changes in

1 training because there is a different training approach on a digital system
2 with an operator then there was with the old analog systems that we're all
3 familiar with in the last 30 or 40 years.

4 Operators are trained -- I think probably one of the bigger
5 challenges with digital systems is there so much information there and
6 available to the operator at their fingertips. It's extremely critical to
7 prioritize that information for them on the front end so that when they see
8 certain alarms come in they know that's a critical and it does have
9 something to do with the operational aspect or reliability of this machine
10 versus some of the others, which are simply status indicators more for the
11 engineering folks.

12 So, we've worked through that. The Oconee digital system has
13 been very successful with that and the operators are extremely
14 comfortable with them. They like the digital systems much more than the
15 old analog systems. A big part of that is just overall reliability. And then
16 the other big part is they're very fault tolerant. If a channel fails, they know
17 it's going to fail before it fails as opposed to being surprised by an alarm
18 that says now it has fully and completely failed.

19 So, a lot of the systems we put in are, of course, multiprocessor
20 constantly comparing inputs to validate and verify them and taking steps
21 to alert operators when something's starting to degrade well before it

1 impacts any operation of the plant.

2 MR. SHAHKARAMI: I just want to give you another insight. I
3 think there is a difference between operating units and new units because
4 the people that are getting educated today walk in to work with new plants
5 all know its digital. You can't even go back and teach them the analog
6 system. I get a new college student coming to my office and amazed with
7 the way we used to run this unit.

8 So, I think going forward it's easier than operating units because for
9 current operators we need to teach them one, forget about that analog,
10 get the system and then get them engaged. In our Exelon fleet we have
11 gone digital EHC, digital feed water. We are in process of doing a variable
12 speed pump on a boiler on a reactor recert.

13 They get engaged right up front with the selection visibility and
14 testing, but I think the fair question would be after it's done just go ask
15 them their view on the ease of operation, the capability of monitoring and
16 taking action. Almost every one of the system after six months or seven
17 months will go to the control room and just challenge the chief manager
18 and they really appreciate the system much more than they did before
19 with analog.

20 COMMISSIONER LYONS: I appreciate those answers. I'm
21 out of time. The main gist of my question, though, had been what

1 happens when -- is the attention to potential failure modes in the system?

2 I think some of you addressed that. Thank you, sir.

3 CHAIRMAN KLEIN: Commissioner Svinicki?

4 COMMISSIONER SVINICKI: Thank you for that courtesy,
5 Mr. Chairman. As you've indicated, I'm stepping into the middle of a
6 dialogue that's been ongoing between the staff and the industry for some
7 time. I appreciate the questions of Commissioner Lyons which are very
8 informative. I know he spent a lot of time personally on this issue.

9 I do have one question for this panel. I think all three of you,
10 perhaps in different terms, made reference to the need to come to closure
11 on the appropriate level of information that needs to be available. I think
12 one of you talked about what's available, what will be reviewed and what
13 needs to be docketed. And there was also a discussion of design
14 verification - if I have this term right - versus the regulatory review.

15 If any of you would like to comment on coming to closure on that
16 issue of this what information is needed, what will be the appropriate level
17 of review. Is there any sense that you can give of where that dialogue
18 stands right now and where the level of agreement or disagreement might
19 be?

20 MR. MARION: If I may, it's an area of active dialogue.

21 Fundamentally, the issue comes down to the extent of which the licensees

1 need to provide documentation to the NRC staff reviewers so they can
2 make a finding. And if I might take just a few seconds and walk through
3 the process.

4 These changes that involve Digital Instrumentation and Control
5 affect the technical specifications at the plant. And as such, they require
6 NRC review and approval. The licensee will submit a package of
7 information that explains the change, the effect of that change or the
8 impact of that change on the licensing basis of the plant and any
9 associated regulatory commitments.

10 The expectation from the licensee is that the NRC will review the
11 application within the context of the plant licensing basis and the
12 regulatory commitments that are affected and how the licensee is going to
13 continue supporting the new changes to the licensing basis as well as the
14 commitments.

15 We suggest that independent design review is something that's
16 come up because that's an observation that we have in some of our
17 interactions with the staff. We don't have the time for an independent
18 verification of the design. I don't think the NRC has the resources to
19 provide that kind of a review and we need to get to a common
20 understanding of what the expectation is from the staff relative to these
21 submittals.

1 That's something that's under active discussion and I think we're
2 making progress, at least getting to a point of seeing a place in time where
3 we will have an understanding, but we're not there yet. And it's critically
4 important because it applies in all areas -- or will apply in all areas where
5 license amendments are issued in the future.

6 COMMISSIONER SVINICKI: Thank you. Did anyone else
7 want to comment on that?

8 MR. SHAHKARAMI: Ron mentioned that given that their
9 amendment has taken so long, they would not have been able to provide
10 information that has been asked now ahead of time and the only reason is
11 because they haven't implemented it, but they've been working on this for
12 years.

13 MR. JONES: That's correct. We are to the point now where
14 the detailed system design is fully complete and the system is actually
15 built. It's not really practical for a utility retrofitting a plant, though, up front
16 to make a commitment of in this case close to \$100 million for three units
17 and actually build the systems and face licensee uncertainty at that point.

18 We've got to have some assurance - the utilities will have to have
19 assurance early on that the process is very defined, very black and white
20 as to what does need to be reviewed as part of the review process; what
21 does and what can be verified afterwards for example during the

1 installation of the system, during the subsequent testing that occurs.

2 Right now, from my personal perspective, that line is not clear. It
3 will need to be very clear for future safety related digital system upgrades
4 by other utilities.

5 COMMISSIONER SVINICKI: Thank you. Thank you, Mr.
6 Chairman.

7 CHAIRMAN KLEIN: Amir, I have questions in the order of
8 presentation, so you get to go first. One of the questions I have is we've
9 often discussed in the United States we have 104 reactors. We have 104
10 different ones. I guess I'd like to hear what you're doing to get
11 standardization in the Digital I&C from the industry's perspective?

12 MR. SHAHKARAMI: I think on certain applications we must
13 pursue a standard design. When you look at the boiling water reactor, I
14 don't think we have to go to five or six different vintage designs. I think the
15 design is there, but there are some specificity to some of the unique
16 design that we choose years back that is hard to create the
17 communication with the existing systems.

18 I'll just go back and give you an example in Exelon. Nine years ago
19 when we established on our strategy toward Digital I&C, we anchored
20 everything toward our control room being modern. That means every
21 piece that I would upgrade it would end up communicating with the control

1 room design.

2 And over the years, that basically vanished because the cost of
3 doing that was so huge that we installed just going after what really meant
4 for the ease and obsolescence issue. I think the only way we can
5 standardize if everybody has that thought process that we would have a
6 modernized control room to anchor that and then try to use the same
7 standard upgrade toward that vision. Otherwise, if we wanted to do
8 piecemeal I have a hard time to see that we're ever going to be
9 standardized.

10 CHAIRMAN KLEIN: I think as we go forward standardization
11 is very important, so I would strongly encourage the industry to
12 self-encourage standardization because my guess is -- on this side of the
13 table if we see a diversion pattern, I would strongly encourage our staff to
14 give guidance for standardization. I think I would strongly encourage you
15 all to take a look at that because if you don't, we will. We really need to
16 look at that issue.

17 MR. LUCAS: Can I just add to that? That's one thing that we
18 look real hard at when we're considering a digital change is we want to go
19 with what has somebody else already done. For one thing, it's not a
20 complete unique design for us, so we don't go through all that expense.
21 We get to learn from the other lessons from the other plants. So, that's a

1 key thing for us.

2 CHAIRMAN KLEIN: I had a question on you later, but I'll just
3 go ahead and ask it now. Are you getting pretty good feedback and
4 cooperation from other countries on what they've done?

5 MR. LUCAS: Most of the vendors are connected with some
6 other countries and what they've done. I can tell you just personally with
7 Mitsubishi that they're definitely looking at what they've already
8 implemented in Japan. So, I think there's good communication there and I
9 know with AREVA it's the same way.

10 CHAIRMAN KLEIN: Well, Amir, you commented on when
11 Commissioner Lyons' asked a question about inflexibility in terms of we
12 need to stay flexible. And so I assume from your perspective are both
13 industry and the NRC working pretty well and being flexible on interim staff
14 guidance?

15 MR. SHAHKARAMI: Yes. I'll tell you we're not driving at all
16 to do administrative changes to ISG. We are more interested in – we do
17 the pilot and we see assurance of actually making something happen so
18 we can adjust that. In our last steering committee -- Mr. Grobe and I
19 talked about that issue. Basically, there's a willingness to go make that
20 change, yes.

21 CHAIRMAN KLEIN: Well, Ron, I know on the existing fleet

1 you're sort of taking the lead on Digital I&C for the Oconee plant. In
2 looking at the Oconee plant in this instance a B&W Unit and there's not as
3 many of those. Is there anything unique to Oconee that has any impact
4 on that? Are the lessons being learned pretty well across the board for all
5 the other plants?

6 MR. JONES: I think the digital lessons learned, you can
7 lump them into two categories. One large bucket would be the generic
8 stuff across not just the B&W plants but the nuclear fleet as a whole in the
9 United States. When we were talking a little bit earlier about
10 standardization, the platform that we're using for the ES/RPS at Oconee,
11 the TELEPERM platform is a standard platform. It's used not just for
12 reactor protection system, but for other digital systems.

13 In fact, we have it in some non-safety digital systems at Oconee.
14 With the existing nuclear fleet, though, 104 reactors, it's 104 different
15 reactors to one degree or another. A TELEPERM platform that you apply
16 at Oconee, for example, for reactor protection system, if you take that
17 same platform and apply it at Crystal River 3 or any other B&W unit it will
18 look slightly different as far as the inputs that are going into it, for example.

19 And then the demand that you have on the outputs as far as the
20 design for that plant; what needs to be controlled and triggered. With the
21 new plants, obviously, we have an advantage. They can look exactly

1 alike.

2 Lessons learned also have been at a very site specific level, too.
3 With three units, for example, we talked about our first unit going in the fall
4 of 2009. The second unit doesn't go in until a year later. That's intentional
5 on our part so that we can take any lessons learned on the front end
6 related to installation, improvements and test procedures, whatever. And
7 make sure we have adequate time to build that in before we put it in on
8 the second unit. That's the general philosophy we follow with our
9 non-safety digital updates also is to separate them by a period of time.

10 CHAIRMAN KLEIN: Thanks. Commissioner Jaczko?

11 COMMISSIONER JACZKO: I had a couple of questions.
12 Just following up a little bit on the comment that Commissioner Svinicki
13 made about the idea that we're doing detailed design reviews. I won't
14 spend a lot of time on that right now, but I think I'm still not exactly clear
15 what the issue is here that we're talking about. So, perhaps at another
16 forum we can explore that more or if we have another round. It wasn't an
17 issue that I intended to get into.

18 One question that I had this 30-minute issue has been recurring
19 since the beginning. We've been doing several of these meetings and
20 each time we talk about the 30-minute problem and each time I think
21 concern is expressed that industry doesn't like the 30-minute time frame

1 and at the same time we hear that we really need to get these things
2 resolved. We need to have a solution to these problems.

3 I find that there's somewhat of a contradiction, I think, there
4 because part of that is using the guidance that we have out there. Right
5 now, the 30 minutes is, I guess, it's in the diversity and defense in depth
6 issue. I think, Mr. Lucas, you mentioned that is -- resolving that issue, in
7 other words, finding an alternate methodology to look at the 30 minutes is
8 critical for the new reactors.

9 So, I guess the specific question I have right now is what approach
10 is being used in the submittals that we have right now? Is it assuming the
11 methodology and the guidance that assumes that if you don't have an
12 action that can be taken within 30 minutes then you have the defense in
13 depth?

14 MR. LUCAS: I believe the way the guidance as I understand
15 it was 30 minutes would be kind of a point where you knew that was going
16 --

17 COMMISSIONER JACZKO: I don't --

18 MR. LUCAS -- but it didn't rule out something other than 30
19 minutes. What we're working on is a methodology to show that anything --

20 COMMISSIONER JACZKO: I guess my question is what is
21 the approach that was used with - we have seven submittals in front of us

1 for new reactor applications. What approach was used in those
2 submittals?

3 MR. LUCAS: Most of those from my understanding - I didn't
4 see all those, but most of those are not going to have the detail on the
5 instrument control systems as part of that. So, that's still outstanding
6 ITAAC issue with digital. That would be my understanding. I didn't see all
7 the applications.

8 COMMISSIONER JACZKO: Perhaps the staff can comment
9 on that, too, as we get to the second panel. Again, I think at some point
10 we just need to make decisions about these and find criteria and evaluate
11 applications based on these criteria. We have criteria out there. We have
12 the branch technical position 19 that goes back to '97, which may have
13 some improvements and possible improvements that we can make, but at
14 some point we've got applications in here.

15 We have to have criteria that we are reviewing these against. We
16 have hearings that have been noticed whenever we notice hearings.
17 Interveners are required to come in and file contentions right away. Any
18 time we come in and we make a change with a position that we are
19 reviewing something, modifications are made throughout the process that
20 is another opportunity then for interveners to file new contentions. They
21 have every right to do that because the process is constantly changing.

1 So, having these things done up front, having these issues dealt
2 with up front is only going to be, I think, beneficial in the process. I guess
3 I'm somewhat concerned that we haven't really made more progress on
4 dealing with that particular issue.

5 MR. LUCAS: I think I left with the wrong impression on that.
6 I think we're working very well on that. I think no matter what time you
7 pick, there should be a methodology to show that's acceptable. I think that
8 methodology is what we're working together on. I'm more positive than
9 that.

10 MR. SHAHKARAMI: I just want to add. We have three task
11 forces that are working on that specific issue and there is a guidance we
12 provided performance based. So, we're working through that. It's not that
13 we -- we have a time line, but we try to put more detail and requirement in
14 it and the staff has been very open to work with us on that.

15 COMMISSIONER JACZKO: Well, good. That's good to
16 hear. One question I had, Mr. Jones, perhaps you can shed some detail
17 on this for me. As I was going through this, my staff was helping me
18 prepare some information. One of the things that they indicated was that
19 in the Oconee submittal was that you didn't follow the IEEE standard for
20 validation and verification.

21 And that has, I think, has made it a little more difficult for staff to

1 review that particular submittal. Can you comment on the approach that
2 you used for the validation and verification and why you chose to do
3 something different than the IEEE standard?

4 MR. JONES: I can't comment on the specifics of the
5 approach. I'm aware of that issue, though. My understanding is we had
6 dialogue beginning about a year or so ago with the staff to let them know
7 that that was what was going to be used by our vendor. So, it didn't come
8 in this submittal as a surprise to folks is the way I would put it. We can get
9 more technical information to you if you'd like.

10 COMMISSIONER JACZKO: Again, we often hear that we
11 need these things to be resolved so everybody's looking at the pilot
12 projects. And so, we generally put guidance out, develop guidance, have
13 standards so that it can facilitate our review. If we deviate from those, it
14 makes the reviews more complicated.

15 So, I guess I would hope that in the future when we have these
16 meetings that we can discuss these kind of things because I think these
17 are the kinds of things we want to try and get resolved here so that we can
18 move forward on this. Again, I think having standards is important and
19 following them makes the staff reviews a lot more straightforward. I have
20 one more quick question if we're going to do another round.

21 CHAIRMAN KLEIN: We'll do another round. Commissioner

1 Lyons?

2 COMMISSIONER LYONS: I'll pass on another round. I
3 appreciate the answers we've heard. I appreciate the discussion and
4 appreciate the fact that we have the strong industry Commission working
5 groups. I'll pass.

6 CHAIRMAN KLEIN: I guess, Mitch, I had one for you; your
7 comment in your presentation. You commented on the consistency
8 across NRC divisions. Could you give us some examples of where we
9 have not been consistent? And number two; what do we need to do to fix
10 it?

11 MR. LUCAS: I'm not sure I can give examples on that, but
12 there's a lot of different branches that work cyber security, new plants and
13 then the submittals for the existing fleet. We just want to make sure that
14 there is consistency and how the requirements are interpreted amongst
15 those various ones.

16 MR. MARION: If I may, I can provide an example and that
17 was on Cyber Security. We developed an industry guidance document,
18 NEI-0404, submitted it to the staff and we were working with the New
19 Reactors Organization as well as the security organization within the NRC.
20 We received approval from those two organizations and then we had to
21 deal with the licensing process associated with how a utility would use that

1 guidance document and the submittal.

2 The effort at obtaining uniform NRC concurrence became a little
3 more challenging at that particular point. The Office of Nuclear Reactor
4 Regulation didn't necessarily agree with the acceptability of the document
5 for a license application, if you will, as compared to the position we
6 received from the other two organizational units.

7 However, that took a little time, a little effort, a lot of discussion and
8 we were able to work through that. But that's an example where we
9 received different opinions, if you will, from different organizations within
10 the NRC.

11 CHAIRMAN KLEIN: Had - I guess, had NRR seen that? In
12 other words, I guess you're looking at new reactors and did that impact -
13 affect the existing ones? I guess I'm not sure why --

14 MR. MARION: I'm not familiar with the details and the timing
15 of who was engaged or which organizational unit was engaged at what
16 particular time. I do know that new reactors and security had the benefit
17 of reviewing the document well in advance of NRR at the time. Why that
18 occurred, I don't know. It's resolved now.

19 CHAIRMAN KLEIN: Okay. Commissioner Jaczko?

20 COMMISSIONER JACZKO: Just two questions. One, to
21 what extent are you looking at the situation we had at Honeywell. They

1 have a digital control system that was used in part of their design, part of
2 their process control system. They had a problem there with an
3 interruptible power supply. I'll go into some details. It provides an
4 example of a situation in which we have a digital system that by all
5 accounts performed properly.

6 Now, essentially what happened was they lost power and then
7 when the system restarted it essentially reset a series of valves because
8 they never factored in a reboot, so to speak. Every time it rebooted it
9 thought you're starting from the beginning, so everything goes back to
10 some initial condition while the plant wasn't in that condition at the time.
11 Again, it's one of those digital software failures that are the kind of things
12 we're trying to identify. It had in the event -- it led to a small release of
13 HF.

14 To what extent are you looking at that and incorporating that in your
15 operating experience and looking at those kind of examples?

16 MR. MARION: We are in the process of developing or
17 finalizing, I should say, a white paper that involves a comprehensive
18 evaluation of over 300 events involving digital systems. Our current
19 schedule is to have that paper finalized and make it available towards the
20 end of May.

21 COMMISSIONER JACZKO: Will Honeywell be one of them

1 in there?

2 MR. MARION: Let me introduce Ray Torok from EPRI. He
3 has the lead in developing that paper for us.

4 MR. TOROK: I'm Ray Torok from the Electric Power
5 Research Institute. I'm the EPRI project manager on that project. I think
6 the event you're talking about was actually the fuel reprocessing plant or
7 fuel handling plant, something like that. We haven't looked specifically at
8 that one. We've looked at - as Alex said - 322 events from operating
9 nuclear plants.

10 There are a number of them that are similar to this event, though, in
11 terms of problems caused by reboots and what not. So, they are included
12 in what we looked at. Those are, I guess, what I would consider learning
13 curve events. We've seen a number of those and looking at those as part
14 of pre-op testing and so on is becoming more and more standard practice.
15 Does that answer your question?

16 COMMISSIONER JACZKO: Sure. Thank you. Maybe you
17 can stay because my next question I think we might need you. I was
18 reading with tremendous interest the paper that you had done with EPRI
19 talking about how we deal with the PRA and the perspective of digital
20 systems. Digital systems are somewhat different from analog systems.

21 If you happen to hit --if you do the reboot every time it's generally --

1 unless there's some other kind of software problem in there, it's going to
2 reboot the same way every time and that error you will have each time if
3 you don't change software and change the program. So, it's somewhat of
4 a different approach than what we've traditionally taken for dealing with
5 the analog control system.

6 So, I guess I have just one comment in general on where you think
7 we are with looking at these issues and how we can incorporate this kind
8 of thing in the PRA and what the current state of the art is right now and is
9 this something that -- one of our working groups is on PRA and I tend to
10 think from a risk informed perspective that may be the working group that
11 should get the fewest resources because it will be the most difficult and
12 the one that may not provide the most information and the most
13 usefulness. You don't have to comment on that editorial comment, but --

14 MR. TOROK: It turns out discussion of the issue of assigning
15 failure probabilities to digital equipment is a very long discussion that we
16 really don't have time for today. But as you point out, there is no accepted
17 process for selecting a failure probability for digital equipment.

18 However, we believe that there are still a number of valuable risk
19 insights that can be derived from risk analysis. Even if you have to make
20 reasonable assumptions about failure probabilities and then look at
21 sensitivity studies to see how much difference that makes. And in the

1 work we've done, it looks like there are a number of good insights you can
2 draw even without knowing precisely what the failure probability might be.

3 COMMISSIONER JACZKO: Is this something that you see
4 say in the next five years; us having enough information to be able to get
5 to the point where we can develop regulatory guidance or we can really
6 incorporate this into our regulatory process? Or will this be interesting
7 information that will inform design and development of systems perhaps?
8 How do you see that moving forward?

9 MR. TOROK: I think that -- one of the things we're working
10 on right now is trying to relate various digital system design features which
11 are used to improve system reliability and provide protection against
12 digital failures and digital common cause failures and so on. We're trying
13 to relate those types of design measures to estimates of system failure
14 probability.

15 And I think you can do that in a qualitative sense and that's enough
16 to get very useful risk insight, so we're proceeding with that. The bottom
17 line is I think we will be able to derive risk insights that are useful even
18 without precise knowledge of failure probabilities.

19 COMMISSIONER JACZKO: Thanks. And, certainly, if
20 anyone else wants to comment on that. Thank you.

21 CHAIRMAN KLEIN: Well, thank you very much for your

1 comments. Like Commissioner Lyons indicated, when we heard the long
2 pole in the tent might be the Digital I&C, we were all a little bit surprised.
3 So, I'm glad we're making the progress that we are and hopefully when
4 that first simulator may be ordered this year it will be for the right plant and
5 for the right time and we'll keep things moving. So, thank you for your
6 comments today. Appreciate it.

7 MR. SHAHKARAMI: I appreciate the opportunity. Thank
8 you.

9

10 PANEL 2:

11 CHAIRMAN KLEIN: Well, as you just heard we heard a good
12 presentation from the industry today and so now we're looking forward to
13 hearing from the staff's perspective. Any comments before we start?
14 Luis?

15 MR. REYES: Good morning, Chairman and Commissioners.
16 The staff is ready to brief the Commission on Digital Instrumentation and
17 Control. Last time we briefed you was last July. There were several
18 issues that the Commission had interests on at that time.

19 One was our skills inventory in the technical subject area. We'll
20 update you on that. We have good progress on that. The second one is
21 written guidance. You heard this morning earlier from the presentation.

1 We'll go through the list of the written guidance we have. And the other
2 one is the exchange with all the stakeholders and we're going to talk to
3 you about how many public meetings we have had in going through this
4 progress.

5 We have a lot of information to cover, so I'm just going to turn it
6 over to Jack. Jack Grobe is, among other things, the Chairman of the
7 Digital Instrumentation and Control Steering Committee. So, with that,
8 Jack.

9 MR. GROBE: Thank you, Luis. Good morning, Mr.
10 Chairman and Commissioners. We're excited to be here today to report
11 significant progress in the area of Digital Instrumentation and Control.
12 Slide two, please.

13 First, I'm going to plan on discussing Steering Committee activities
14 and summarizing some external interactions that the staff has had in the
15 Digital I&C area.

16 Next, Rick Croteau will briefly address the four issued interim staff
17 guidance documents. There was a little confusion earlier between
18 problem statements and interim staff guides. In the case of
19 communications, there's only one interim staff guide that addresses one
20 problem statement that's extremely complex in the diversity and defense
21 in depth area.

1 There's one interim staff guide that addresses multiple problem
2 statements. So, it's tough to compare problem statements in ISGs and
3 we'll get into that in a little bit in detail.

4 Rick's the Deputy Director of the Division of Engineering in the
5 Office of Nuclear Regulatory Research. Then Pat Hiland will describe the
6 use of the ISGs today in an ongoing topical report review as well as a
7 licensing action as well as some recent operating experience including
8 three specific events; one that Commissioner Jaczko referred to. Pat's the
9 Director of the Division of Engineering in the Office of Nuclear Reactor
10 Regulation.

11 Mike Mayfield will discuss our ongoing activities in the area of risk,
12 operator actions and fuel cycle. Mike's the Division Director for the
13 Division of Engineering in the Office of New Reactors.

14 And finally, I'll wrap it up and we look forward to your questions.
15 Slide three, please.

16 The Steering Committee is comprised of five senior executives from
17 the Office of NRR, NRO, Research NMSS and NSIR. The role of the
18 Steering Committee is to integrate the activities across the agency as well
19 as to effectively interface with all our stakeholders. There's seven task
20 working groups; six are led by managers, one by a senior staff member
21 and there's over 50 staff and managers involved in those seven Task

1 Working Groups. Slide four, please.

2 Regarding human capital. We've hired four senior level advisers
3 since the last meeting we had with you. Those will be assigned: one in
4 NRR, one in NRO and two in Research. One of those was an internal
5 candidate. One was from the aerospace industry, one from naval reactors
6 and one from the automotive industry. We're very excited about the staff
7 that we've been able to add in this area.

8 We're in the final stages of developing a charter for a technical
9 advisory group and the four senior level advisers will comprise the
10 members of that TAG. On net, we've hired more than 20 new staff in the
11 Digital I&C area. Two-thirds of those have been experienced staff;
12 one-third from school. We continue to recruit in this area, but we've made
13 great progress in bringing in new staff.

14 With respect to training, the Office of New Reactors as well as the
15 Office of Nuclear Reactor Regulation have developed a five-day training
16 course in conjunction with the Technical Training Center. There's been
17 two sessions delivered of that course. Commissioner Lyons provided
18 opening remarks at one of those sessions and the next session is in the
19 fall of this year.

20 In addition, we sent staff to vendor specific training on different
21 platforms to ensure that our staff is fully aware of the technical details of

1 the applications that we're receiving.

2 In addition, in November we conducted an internal workshop on the
3 four issued interim staff guides at that time for our staff. That workshop
4 was attended by over 50 technical staff and managers from the
5 headquarters as well as regional offices.

6 With respect to the Graduate Fellowship Program, recently we've
7 announced there were three recipients of graduate fellowships for
8 pursuing advanced degrees. Two of those are in the Electrical
9 Engineering area focusing on Digital Instrumentation and Control and one
10 is in Human Factors. All three of those individuals will be contributing to
11 this area in the future. Slide five, please.

12 Since our last Commission meeting in July of 2007, there's been
13 four public steering committee meetings and 28 meetings of the Task
14 Working Groups. These are all public meetings involving all of our
15 stakeholders. The four interim staff guides that have been issued to date
16 present a clear, well understood and predictable regulatory position in the
17 areas that they address. We refer to these commonly as the express lane
18 for licensing processes.

19 In the development of those interim staff guides, we considered the
20 research that's been completed, the international and domestic operating
21 experience. We had extensive industry input as well as our past

1 regulatory experiences.

2 The interim staff guides are not the only option. The staff are going
3 to discuss the Oconee application in a little more detail later, but the
4 Oconee application has a number of areas where it deviates from the
5 guidance and that's fine. It's just going to take a little additional time to
6 review the application.

7 We've also established a fuel cycle Task Working Group. That's a
8 significant improvement because the needs of the fuel cycle aspects of
9 our licensing business was not clearly defined and we now have clear
10 problem statements in that area.

11 The project plan has been updated in March and we've considered
12 four industry white papers in minimum inventory of controls and
13 instrumentation, electronic procedure use, operator actions and
14 consideration of common cause failures. Slide six, please.

15 This slide lists the four issued interim staff guides and the dates
16 they were issued. They resolve - these four interim staff guides resolve 10
17 of the 25 problem statements. We're going to discuss these in a little bit
18 more detail later.

19 COMMISSIONER JACZKO: We heard three earlier. Is that -

20 MR. GROBE: Three are included in that 10.

21 COMMISSIONER JACZKO: What about the other seven?

1 Are they resolved from the staff perspective and not from the industry
2 perspective?

3 MR. GROBE: There's two phases in the project plan: one is
4 a short term phase and one is a longer term phase. In the short term, we
5 committed to get predictable guidance out there for use by the industry in
6 these 10 areas that guidance has been issued and is solid. We anticipate
7 incorporating this into our regulatory infrastructure.

8 That will take some time because that's a very public process. It
9 involves formal Q&A, comments and responses to comments, as well as
10 review by the Committee to Review Generic Requirements, the Advisory
11 Committee on Reactor Safeguards. So, that's a very time-consuming
12 process. It could be that some of the ongoing activities result in more
13 refined guidance by the time we issue those final documents. The ISGs
14 are solid now.

15 COMMISSIONER JACZKO: The three that were referenced
16 as being resolved. Those have been through kind of the full panoply of --

17 MR. GROBE: The interim staff guides do not go through a
18 formal --

19 COMMISSIONER JACZKO: We heard that there were three
20 issues that were resolved. Now you're telling me that there are 10 issues.
21 Am I going to hear a different answer -- I heard a different answer in the

1 first panel. I'm trying to figure out what the difference is between those.

2 MR. GROBE: The industry would prefer additional flexibility
3 and would prefer that we revise the interim staff guides. Flexibility is an
4 anathema to predictability. These guides provide a clear predictable path
5 that everybody understands. It could be that there's an opportunity to
6 provide additional flexibility when we get to the final, it will be either Reg
7 Guides or NUREGs or Standard Review Plan revisions; things of that
8 nature.

9 One good area to think about this is the area of operator actions,
10 whether or not you can take credit for operator actions in lieu of hardware
11 diversity attributes. We're just now developing the interim staff guide on
12 operator actions and how to consider evaluating operator actions in a
13 digital age, digital context. So, it would be premature to consider the
14 applicability of operator actions as a hardware replacement until we get
15 more comfortable with the licensing process for reviewing operator
16 actions. This is all a process.

17 The 10 that have been issued are solid, predictable, well
18 understood by the industry and they're in use today. Slide seven, please.

19 This slide lists the ongoing interim staff guides that will resolve the
20 remainder of the problem statements. The first two listed probabilistic risk
21 assessments that focuses for new reactor application reviews. The

1 licensing process is focused on operating reactor licensing reviews.
2 Those two are in final draft. They've been commented on extensively by
3 the industry. Those will resolve an additional five problem statements. In
4 all, 15 of 25 are being addressed to date. Slide eight, please.

5 We have set up a series of regular meetings with the Advisory
6 Committee on Reactor Safeguards Subcommittee on Digital
7 Instrumentation and Control. That's led by Dr. Apostolakis. We've met a
8 couple times with the full committee. Our next full committee meeting is
9 this week.

10 We've had a series of additional meetings with the Federal Aviation
11 Administration, the National Aeronautic and Space Administration, the
12 Department of Energy and Naval Reactors to discuss digital issues.

13 Internationally, we have regular bi-laterals with our counterparts,
14 our regulatory counterparts in other countries, to focus on digital issues as
15 well as technical exchanges with the Nuclear Energy Agency and the
16 International Atomic Energy Agency. Boy, it was tough not to use
17 acronyms, let me tell you.

18 COMMISSIONER JACZKO: Commissioner Merrifield would
19 be proud.

20 MR. GROBE: Specifically focused on digital counterpart
21 exchanges. At this time, I'd like to turn it over to Rick Croteau and Rick's

1 going to go through the four issued digital -- excuse me; the four issued
2 interim staff guides.

3 MR. CROTEAU: Thank you, Jack. Slide nine please. I will
4 describe the four interim staff guidance documents issued for staff use
5 and give some examples of the types of issues addressed by those
6 guidance documents.

7 With respect to diversity and defense in depth, the main issue is
8 protection against common cause failures in digital systems. The same
9 software may be used in all divisions; therefore, one error may cause a
10 failure of all divisions of the system. It should be noted that common
11 cause failures are not considered single failures; however, diverse means
12 not subject to the same common cause failure is necessary to accomplish
13 the safety function. Slide 10, please.

14 As directed by the Commission in SRM-93-87, the applicant shall
15 assess the diversity and defense in depth attributes of the proposed
16 system to demonstrate that vulnerabilities to common cause failures have
17 been adequately addressed. The guidance reflects this direction.

18 Backup capability is necessary for digital systems to address
19 common cause failures that may occur. The backup system could be
20 automatic or manual. The interim staff guidance describes acceptable
21 attributes for an automatic diverse actuation system. Manual action may

1 be acceptable in lieu of automatic backup under certain circumstances.

2 One important consideration is the time available for the operator to
3 observe, diagnose and correct the action. The staff believes that it's
4 reasonable to credit manual operator actions that are not required for at
5 least the first 30 minutes. In some circumstances, it may be acceptable to
6 credit operator actions that are necessary in less than 30 minutes. We're
7 still working on that as it was discussed earlier and Mike Mayfield will add
8 more detail to that in a few minutes.

9 The interim staff guidance also gives specific examples of
10 acceptable diversity and defense in depth approaches. For example, it
11 states that if reactor protection system is designed with two channels of
12 one digital system and the other two channels are using a different digital
13 system, then that adequately addresses the diversity and defense
14 attributes and no automatic or manual backup is necessary. Other
15 examples are also included in the guidance. Slide 11, please.

16 The staff has also issued two guidance documents associated with
17 highly integrated control rooms. One document describes acceptable
18 approaches to communications among digital devices and systems. The
19 digital workstation will likely combine many functions, both safety and
20 non-safety, that were previously separated. The guidance document
21 describes how controls and indications from different divisions, either

1 safety or non-safety, can be combined into a single integrated workstation
2 while still maintaining separation, isolation and independence.

3 It also describes command prioritization to determine which
4 command is to be passed to the control device when conflicting multiple
5 commands come from different sources, including conflicting commands
6 for both safety and non-safety systems. Slide 12, please.

7 The guidance on human factors in highly integrated control rooms
8 provides information unacceptable approaches for the use of
9 computer-based procedure systems. It describes either the use of paper
10 or a safety related based backup procedure. As an example, the
11 guidance states that the operator should select the procedure and
12 execution of the steps. The computer system can recommend actions to
13 the operator, but the operator must be in control.

14 The document also provides guidance on a minimum inventory of
15 alarms, controls and displays that are necessary in the control room and
16 the remote shut down facility. Slide 13, please.

17 The guidance document has also been issued regarding
18 acceptable cyber security measures for safety systems. We already had
19 an existing regulatory guide that described an approach that is acceptable
20 to the staff for safety systems. There was also an NEI guidance document
21 describing a structured process for establishing cyber security program for

1 systems including safety systems, non-safety systems, security systems
2 and systems necessary for emergency response.

3 The interim staff guidance document includes a table comparing
4 the Reg Guide and the NEI guidance document along with clarifying
5 remarks in the table to provide clarifications between the two documents
6 and show how they mesh together.

7 The staff considers either the regulatory guide or the NEI Guide
8 along with the comparison table notes as acceptable approaches to
9 address cyber security for safety systems. There's also a new regulatory
10 guide being developed to go along with the cyber security rulemaking
11 that's ongoing.

12 That completes my discussion on the issued interim staff guidance
13 documents. Next, Pat Hiland will discuss experience in implementing the
14 staff guidance and some operating experience. Thank you.

15 MR. HILAND: Good morning, Chairman and Commissioners.
16 I'm going to discuss as you heard some of our current uses of some
17 interim staff guidance as well as some of the operating experience that
18 we've gained over the past several months.

19 Currently, we're reviewing the topical report for a Digital I&C priority
20 actuation and control module. Through use of software and hardware
21 logic, these devices control plant components from either safety or

1 non-safety related controls. The device must ensure when command is
2 generated from a safety system that command will have priority over
3 non-safety commands.

4 ISG-04 was used to clarify our reviews in the testing methodology,
5 the treatment of unused logic pins, the interface with other components
6 and systems and the operating experience with the device. Both the staff
7 and the vendor have found that the interim staff guidance is providing a
8 clear road map. Slide 15.

9 As discussed earlier, Duke has submitted a license amendment
10 request to replace the Oconee analog reactor trip system and engineered
11 safeguard protective system with a digital one. While the replacement
12 system will utilize an NRC approved microprocessor - that's the
13 TELEPERM you heard discussed - its specific application at Oconee will
14 be reviewed.

15 Design features will be evaluated against regulatory requirements,
16 the Standard Review Plan, and recently issued interim staff guidance
17 including ISG-01, cyber security; ISG 02, diversity and defense in depth;
18 and ISG-04, highly integrated control rooms communication issues.

19 Our early review indicates that the digital reactor trip system and
20 engineered safeguard protective system will meet many of the staff
21 positions in the ISGs, which will facilitate an efficient review. However, in

1 other areas the licensee has chosen not to follow the Institute of Electrical
2 and Electronic Engineers standard endorsed by our regulatory guides
3 which will require the staff to obtain additional information from the
4 licensee.

5 Past reviews of Digital I&C have necessarily involved extensive
6 work by the staff due to the introduction of this new technology. We now
7 have a draft licensing interim staff guidance that clarifies the in-office
8 review, the on-site audits and regional inspections. We plan to refine the
9 draft interim staff guidance for licensing during our review of the Oconee
10 application. Slide 16.

11 The NRC's operating experience program is recognized
12 internationally. Several years ago, we enhanced the collection, review
13 and follow up of operating experience. Daily events are screened to
14 evaluate the staff's response and information is disseminated to our
15 technical review groups.

16 We receive domestic operating experience data through the
17 Institute of Nuclear Power Operations and international operating
18 experience gained from the International Atomic Energy Agency and the
19 Nuclear Energy Agency's incident reporting system. We also actively
20 participate in the Nuclear Energy Agency's working groups on operating
21 experience.

1 In the June 2007 staff requirements memorandum, you directed the
2 staff to develop an inventory and classification of various digital equipment
3 and evaluate operating experience with Digital I&C in the nuclear and
4 other industries. Both are included in project plan for diversity and
5 defense in depth.

6 The Office of Research has reviewed Digital I&C system failures
7 from the nuclear, aviation, petrochemical, telecommunications and railroad
8 industries. The purpose was to use broad industry operating experience
9 to gain insights on diversity strategies and use and to benchmark or
10 validate the diversity strategies within the NRC's diversity and defense in
11 depth guidance.

12 Our review of the non-nuclear sector validated our concern with
13 common cause failures and that there was a high frequency of software
14 failures. Operating nuclear facilities provided limited information. Detailed
15 root cause is difficult to obtain from other industries. Results are
16 inconclusive with respect to identifying diversity strategies. There's just
17 simply not enough detail.

18 Failures often are repaired by simply replacing the failed
19 component or fixing the bug. The Office of Research will continue to work
20 on this. The Office of Research has selected a classification structure and
21 is developing an inventory of Digital I&C systems in use and will classify

1 them in terms of their complexity. The digital system classification could
2 be used to assign diversity attributes to systems based on their
3 complexity. Slide 17.

4 I've selected three operational events of interest just to give some
5 anecdotal information. One you heard Commissioner Jaczko raise. I
6 didn't list it, but it is the second one there. It's the domestic fuel facility.
7 But for the first two plant events that I've listed it highlights the importance
8 of operators fully understanding the off normal response of complex digital
9 systems.

10 Recently, a domestic boiling water reactor had a loss of a feed
11 water system event and subsequent reactor automatic shutdown that was
12 initiated by loss of a power supply to their digital feed water control
13 system. Several unexpected observations were made by the operators.

14 First, they didn't understand that the digital system when it lost its
15 power supply would fail, locking in a high level trip. That tripped the
16 turbine-driven feed water pumps and subsequently caused problems in
17 starting and running the motor driven feed water pumps.

18 Also, complicating the event were some tan colored displays that
19 showed up in the control room that the operators weren't trained on. It
20 turns out that what the tan color meant was the digital feed water system
21 had failed.

1 You heard Commissioner Jaczko refer to the Honeywell uranium
2 conversion facility and that event. Also, again, that plant event indicates
3 the importance of operators fully understanding the off normal response.
4 In that case due to the loss of the uninterruptible power supplies to their
5 digital control system once restarted or returned to a cold start condition
6 the operators were unaware that valves would close, things would happen
7 on a hot plant. A hot plant meaning when vessels were isolated they
8 would increase in pressure.

9 The third event, just to highlight, demonstrates a need to have a
10 clear understanding of the design functions that affect the safety
11 performance. In this event, a loss of offsite power transient was
12 complicated through replacement of the main generator protective relay
13 with a digital relay that was phase dependent.

14 This phase dependency resulted in a slower response. In the
15 foreign reactor the plant turbine generator can trip offline and supply
16 power to the station. In this case, that trip was too slow to do that. The
17 plant lost power as well as the voltage transient was significant.

18 Now with that, I'd like to hand it off to Mr. Mayfield and he'll discuss
19 some ongoing activities.

20 MR. GROBE: Mike, if I could just add one more thing on
21 operating experience. These systems are non-safety systems. Pat and

1 Luis and I have spent -- I was going to say many years, many decades,
2 several decades anyways, in the region doing operational safety
3 day-to-day oversight. And many of these systems were installed in
4 upwards of a decade ago and when they were installed in some cases it
5 would take nearly an operating cycle before the system was performing
6 adequately; feed water control systems, turbine control systems, things of
7 that nature.

8 The systems that we're looking at today are more complex than
9 those systems. They're going to be applied in safety systems. We can't
10 tolerate that kind of performance in a safety system digital control system.
11 So, it necessitates that there's information that can be learned from these
12 non-safety applications of digital controls systems. It necessitates a more
13 complex and comprehensive licensing review then would be for a
14 non-safety digital control system.

15 CHAIRMAN KLEIN: Just a clarification. I thought this last
16 one might have been Forsmark?

17 MR. HILAND: It was sir.

18 CHAIRMAN KLEIN: I though that was a safety system?

19 MR. GROBE: The particular relay that we're talking about
20 was in the switch yard.

21 CHAIRMAN KLEIN: But it impacted the safety side?

1 MR. GROBE: All of these are initiating events for things that
2 don't look good, but they're not part of the safety systems.

3 CHAIRMAN KLEIN: That's a fine line.

4 MR. HILAND: The safety systems responded.

5 MR. GROBE: Michael?

6 MR. MAYFIELD: Thank you. Staff's continuing to work with
7 the industry in a number of areas looking primarily at evolving issues.
8 Three areas are particularly relevant to these ongoing activities: Risk
9 informing Digital I&C, an alternative to the infamous 30-minute guidance
10 for operator action and Digital I&C aspects in fuel cycle facilities. On slide
11 18, please.

12 Looking first at Risk Informing Digital I&C. In January 2008, the
13 staff provided draft interim staff guidance dealing with the staff review for
14 Digital I&C in PRAs for new reactors. Let me emphasize its for new
15 reactors. The draft interim staff guidance provides general guidance on
16 how the staff should review Digital I&C PRAs including software failure,
17 common cause failure and uncertainty analysis associated with new
18 reactor Digital I&C systems.

19 The interim staff guidance does not modify any Digital I&C related
20 acceptance criteria or regulatory requirements. Staff continues to work
21 with stakeholders to determine if existing risk assessment methods that

1 are commonly used by the industry are adequate to risk informed
2 decisions regarding diversity and defense in depth or manual operator
3 actions.

4 A public meeting was held on March 21st to discuss industry goals
5 for diverse actuation systems and proposed industry white papers on risk
6 informing efforts. In addition to these activities, the NRC's Office of
7 Nuclear Regulatory Research has a program underway to study methods
8 for assessing risks associated with Digital I&C systems. If I could have
9 slide 19, please.

10 Manual operator actions continues to be an area of significant
11 interest for the industry as you heard this morning. The industry has
12 prepared a white paper on a methodology to determine acceptability of
13 operator actions. The staff has reviewed this paper and provided an initial
14 set of comments to the industry.

15 The Human Factors Task Working Group has the lead on this issue
16 and is meeting monthly with stakeholders to discuss this and other human
17 factor issues. The staff is working on developing an analytical method
18 coupled with physical verification for demonstrating that manual operator
19 actions can be reliably completed within the expected time frame in lieu of
20 automated actions during common cause failures coincident with a design
21 basis event.

1 If this methodology is found to be acceptable, we would provide an
2 interim staff guidance on manual operator actions by the end of July 2008.
3 Slide 20, please.

4 A separate Task Working Group was established to address the
5 unique aspects of Digital I&C for fuel cycle facilities. Task Working Group
6 7 was formed in October 2007 and has since held six public meetings.
7 The Task Working Group plans to make an interim staff guidance
8 available by April 30th of 2008.

9 Problem statements have been finalized in five areas, namely cyber
10 security, diversity and defense in depth, independence of control
11 measures used as items relied on for safety. That doesn't exactly roll off
12 the tongue. Highly integrated control system communications and
13 software quality. The ongoing Task Working Group efforts are aimed at
14 defining independence of control measures used as items relied on for
15 safety.

16 Staff has benefited from the process of developing the integrated
17 safety assessments that are now required for fuel cycle facilities in
18 evaluating Digital I&C systems. The results of the ISAs provide an
19 enhanced understanding by both the staff and the licensee on specific
20 contributions of each control system application to the reduction of overall
21 risk for the facility.

1 Staff is also closely following the cyber security efforts looking at
2 the rulemaking - I'm sorry; the cyber security rulemaking for applicability to
3 the fuel cycle facilities. With that, I'll turn it back to Jack.

4 MR. GROBE: Thanks, Mike. Before I wrap up, I just wanted
5 to make a comment that the three gentlemen at the table here as well as
6 Jennifer Uhle from Research and Scott Morris from NSIR and Joe Giitter
7 from NMSS have actually made my job quite easy leading the Steering
8 Committee. The teamwork that's been necessary has been extraordinary
9 and they've delivered that.

10 Alex commented on what he perceived was a lack of teamwork
11 between NRR and NRO in the cyber area. In fact, that wasn't a lack of
12 teamwork. It was an issue that was driven by the differences in the
13 licensing processes under Part 50 and Part 52. The guidance that they
14 were working on was cyber security guidance for new reactors. The new
15 reactor process includes the COL as well as ITAACs. There is no ITAAC
16 concept in Part 50, so the licensing process is different and we're treating
17 those differently. So, necessarily the standards need to be a little bit
18 different in the two areas.

19 We clearly have some additional interim staff guidance to issue.
20 Concurrent with that, we're going to be converting these interim staff
21 guides into the permanent necessary infrastructure and that results in

1 different documents in different applications. In some cases, it's industry
2 standard. In most cases, it's our internal documents which would be
3 NUREGs, the Standard Review Plan, Reg Guides; things of that nature.
4 All of that work is ongoing today.

5 If in the course of the activities on the one topical report we have
6 under review and we have a couple of licensing actions, including Oconee
7 under review, we identify some lack of clarity in the interim staff guides,
8 we'll update those as necessary. But we believe right now that they're
9 ready to move forward into the finalization in our regulatory infrastructure.
10 With that, we're ready to answer any questions. Luis?

11 MR. REYES: Chairman and Commissioners, those are our
12 prepared remarks and we're looking forward to your questions.

13 CHAIRMAN KLEIN: Well, thank you very much for a good
14 overview and a good detailed presentation and some clarification,
15 although I'm a little confused on Forsmark, but I'll come back and ask Jack
16 to clarify that a little bit later.

17 One of the things I guess I'd just like to start off is congratulate you
18 on your human capital activities. I think all of us have been concerned
19 about hiring and training and retraining and getting people in the human
20 capital area. It sounds like you've done a good job on that area. So, my
21 compliments on that. Commissioner Lyons?

1 COMMISSIONER LYONS: Well, let me add my
2 compliments, too. I think it's clear that both the staff and certainly the
3 management has taken this area very, very seriously and made immense
4 progress over the last year or two years. It's very evident, the number of
5 public meetings, the issuing of the interim staff guidance. As the
6 Chairman just mention, the hiring, the training that was discussed. All that
7 is just very, very impressive.

8 I was a typically interested to hear that we are using the NRC
9 Graduate Fellowships, Pat, in a very appropriate way and I'm just very
10 glad to hear that.

11 Maybe a general question in this area of hiring and training. You
12 certainly describe substantial progress. Is there a plan as to how we go
13 into the future that's been laid out as to what types -- you made a lot of
14 progress in staffing? Are we where you want to be? Do we need to go
15 further? Is there a plan to get there?

16 MR. REYES: If you look at what we did in this particular
17 area, we saw we had a significant increase in the skills needs which we
18 didn't have in house. We had to put a lot of effort to do that. Now, we're
19 going to be more in our traditional process, which is a strategic workforce
20 plan that will include these individuals.

21 We'll have an inventory of all our skills and then we will manage like

1 we manage any other inventory of skills; expected work load versus
2 expected needs. The answer to your question is we're going to continue
3 to hire in this area like we're doing in the others. We're very close to
4 where we need to be. The workload will dictate the amount of skills we
5 need there.

6 COMMISSIONER LYONS: A question for Pat on your slide
7 17 which ties in with the question I was trying to ask of our industry panel,
8 too. You talked about the importance of the operator's understanding off
9 normal events. I know the Chairman wants to specifically discuss
10 Forsmark, but I was trying to raise that question maybe in a clumsy way
11 with industry as well.

12 It seems to me that as one moves to a more digitized control room
13 with more and more of the decisions made in a routine way within the
14 software that you're running at least a very real problem that the operators
15 are less prepared to deal with an off normal event. I was curious if you
16 could expand on that a little bit more?

17 And specifically are we taking this type of consideration into
18 account as we look at how we will license operators moving into the
19 future? It just seems to me we should be demanding a little bit more of
20 operators going into the future.

21 MR. REYES: From our previous operators.

1 MR. HILAND: Well, Commissioner Lyons, I know that you're
2 familiar with our operating experience program. I'll just talk a few minutes
3 to try and walk a path. The events I mentioned go to our technical review
4 groups. We have some 25 to 30 different technical review groups that
5 consist anywhere between four to eight, 10, 12 individuals depending on
6 the topic. We have a specific and we've had for several years now, a
7 specific technical review group in the instrumentation and controls area.

8 Every 12 months -- and they do one at six months, but every 12
9 months we go back and we look at those review groups and what their
10 recommendations are. And you can very well have a recommendation
11 from the technical review group on instrumentation and control, which
12 people from our operator licensing also sit on this technical review groups
13 that could say enhance the operator licensing program area and the
14 instrumentation and control or possibly we could feed that back into our
15 inspection program.

16 All of those programs are tied together at the technical review
17 group level, at the technical staff level. We review that on a yearly basis.
18 That's as far as I can go.

19 MR. REYES: Let me talk to you conceptually on the
20 licensing for the next generation. I think there's a lot of things that are
21 parallel with the analog instrumentation. Because you look for multiple

1 sources of the parameter information to determine where the pressure is
2 changing the way it should be, level is changing the way it should be, et
3 cetera, et cetera. How you get there is different with the digital. We are
4 going to have to make sure that the licensee's training and our
5 assessment of that training covers those angles.

6 If you look at the first event that Pat talked about on the feed water
7 system, that's the second time it happened in this country. The same
8 event. Two boilers had the same problem in less than a year. The same
9 thing. Lost power to the controller. It went tan in color. The operators
10 didn't know what that meant. You just change the location of the plant.

11 There are some things that are starting to come up that perhaps
12 are different in terms of the training and therefore the examination of those
13 individuals to make sure they can handle it. But conceptually, you're
14 looking for the same things. Information to the operator who can
15 determine that it was the right information, instrument fails, et cetera, et
16 cetera. How do I get the confirmation of my actions?

17 The emergency procedures, the emergency actions are going to be
18 similar. You just need to make sure you can assess it properly.

19 COMMISSIONER LYONS: Well, conceptually I very much
20 agree with you. You're just hearing my concern that as long as the digital
21 systems are working as planned and as the industry panel said the

1 operators are going to love it. It's going to make their job a lot simpler.

2 The plant is going to run a lot more smoothly.

3 In my mind, it's going to be almost essential that the operators
4 understand, if you will, the analog basis of the plant as well as the digital
5 basis and understand how the failure mechanisms, what types of failure
6 mechanisms at least to be sensitive to. And I think we're going to have to
7 demand a little bit more of the operators, which may be even counter
8 intuitive. In some sense they got the digital program -- they have the
9 digital system there in some sense do their thinking for them.

10 But I think if they fall into that trap of letting it do their thinking for
11 them, it will be very negative.

12 MR. REYES: It's a different way to get the information. I
13 think the industry this morning mentioned it. If you have four channels
14 with four analog readouts and one fails up or down, you have the other
15 three to check. In the digital display process they're going to be
16 co-located, except the processor should have given you a lot of notice
17 ahead of time that one parameter was starting to deviate.

18 You're probably going to have more time, so we're just going to
19 have to make sure the training and the examination process that checks
20 those knowledges gets to that point.

21 MR. GROBE: There's another lesson to learn here. This

1 really wasn't an operator training issue. Any well-run operating
2 organization has very close connectivity between the design organization
3 and the operations organization, such that as a modification --
4 modifications are being made all the time in these plants. As the
5 modification is developed, the operating organization understands the
6 ramifications of that modification; makes changes to the procedures,
7 changes to the training.

8 These were clearly designed-in features. When the system
9 behaves in this way, these actions are going to happen. The operating
10 organization wasn't sufficiently aware of that such that they had written it
11 into the procedures and trained appropriately on it.

12 The issue that we don't understand is how common cause failures
13 will manifest themselves. That gets right to the 30-minute issue. How is
14 the problem going to manifest itself? How long is it going to take the
15 operator to understand what's happening to be able to discern what are
16 the appropriate actions that he needs to take and then take the actions?

17 So, these should have been taken care of. They should never have
18 occurred if the relationship between design engineering and operations
19 was healthy and effective.

20 MR. REYES: If I could add more. If you look at the
21 Forsmark event, a separate part of the event that you're going to ask

1 about, the control room part of that event which is all updated -- that unit
2 was updated with digital instrumentation. It raises a lot of issues about
3 testing after installation. Testing and making sure the operators
4 understood that. So, we have a lot of work to do.

5 COMMISSIONER LYONS: Well, I'm over my time and I do
6 appreciate those answers. I do understand, Jack, as you pointed out that
7 to the extent that common cause failure modes and diversity and defense
8 in depth are truly maintained through the design process. The type of
9 concern that I'm raising probably shouldn't occur. I still think the operator
10 better be aware of the possibility.

11 MR. REYES: As you know, part of our examination is what
12 we call casualties and how you handle casualties. So, we just have to
13 make sure we do it the right way.

14 MR. GROBE: Plant casualties.

15 MR. REYES: Yes. Well, they're casualties if they don't pass.

16 CHAIRMAN KLEIN: Commissioner Svinicki?

17 COMMISSIONER SVINICKI: Thank you. I'd like to start by
18 thanking the staff who spent extensive time with me last week to try to
19 bring me up to speed on these issues. Any gaps in my knowledge from
20 here on out are fully my own and not the staff's fault.

21 I also want to compliment you in looking at the materials that were

1 provided to me. I didn't need to be persuaded in the complexity of this
2 issue and the challenges here, but in looking at the Task Working Groups
3 and how they've broken out the problem set, I compliment you and your
4 industry collaborators that it's very complete.

5 I think you've taken something that had the potential to be of such
6 complexity that it's difficult to think how you'll break it down and begin to
7 embark upon the confidence-building measures that are needed to move
8 into the digital future. So, I compliment all of you on what appears to be a
9 complete and a very logical way of breaking this down and beginning to
10 embark upon that.

11 I wanted to return for a moment to the operating experience issue.
12 Mr. Hiland, you had commented on the challenges here in building a
13 foundational knowledge in operating experience. Root causes you
14 mentioned specifically are very difficult to diagnose. Perhaps this is
15 getting to Commissioner Jaczko's question of the prior panel, but it is how
16 do we -- these are my terms now -- how do we move beyond the
17 anecdotal when it comes to building the foundation that we need for
18 operating experience and getting to CCFs and diagnosis? Do you have
19 any notional construct for that? Not that the anecdotes aren't very
20 relevant, but we need to increase our confidence to have something
21 broader than that. Do you have a framework for moving beyond the

1 anecdotal?

2 MR. HILAND: I mentioned in response to another question
3 the efforts that we took over the last couple of years to improve our
4 operating experience program. That was a direct response to the events
5 at Davis-Besse and our lessons learned. It turns out that I happen to
6 manage that transition to the new operating experience program at the
7 time. That program as I mentioned is held high regard in the international
8 community.

9 We presented it a number of times at international forum. We can
10 take the individual items that we get or we have a partner in the Institute of
11 Nuclear Power Operations also as far as evaluating the frequency of
12 events and those that are more significant or more competitive that would
13 be generic in nature and feed that back into both our inspection program,
14 our operator licensing program, our amendment review program and
15 industry.

16 Of course, we share our information with the public. The operating
17 experience has a website available to the public. They can go in and look.
18 So, that's the main area that I'm looking at. If anyone else would like to
19 add -- and research.

20 MR. CROTEAU: We also have some research to go after
21 some high value, non-nuclear data that we've identified and we're going to

1 look at that a little bit more. We're also working on some guidance to help
2 the folks evaluating the operating experience to look at what types of
3 things they should be asking. What do you need to look at? So, yes, we
4 are still working on that.

5 MR. REYES: The problem is with outside the U.S. --
6 information or outside the nuclear industry information. Within the nuclear
7 industry, the best thing we have is the licensees, root cause evaluation
8 and hours. Our inspection report, our inspectors will go through this in
9 detail. Two examples on the BWRs that were discussed earlier are good
10 examples.

11 We, in addition to the licensee, went through a very high level of
12 detail. We understand the whole issue. That gets collected through the
13 operating experience inventory. Getting that kind of level of detail from
14 non-nuclear industry events, we're going to have to seek just a few of high
15 value to get that detailed information until we build up inventory.

16 COMMISSIONER SVINICKI: I appreciate Mr. Hiland that you
17 acknowledge that digital is a bit of a new frontier in operating experience.
18 Patches are easy to do. It's something we're all very accustomed to in
19 downloading updates to software and that the ability to capture events and
20 then diagnose them is a challenge in digital. I appreciate that you're all
21 focused on that. Thank you, Mr. Chairman.

1 CHAIRMAN KLEIN: Well, my first question is - I'll save the
2 Forsmark for the second one. My first one is on Human Capital. On the
3 Human capital standpoint, first, I think we should probably thank Admiral
4 Donald for training a good person in Digital I&C that she's gotten from
5 naval reactors.

6 MR. REYES: We've got FAA. We've got GM. You gave us
7 a task and we delivered.

8 CHAIRMAN KLEIN: I think it's really good because I think
9 the people you've been recruiting bring a lot of information. Is there any
10 challenge integrating them into the regulatory environment?

11 MR. REYES: Well, Commissioner Svinicki can probably
12 relate to this. Learning our vocabulary is, of course, something new for
13 some of them, but none that I'm aware of. They're highly technical people
14 who are excited about the challenge we have in front of us and they're
15 already contributing.

16 CHAIRMAN KLEIN: Well, my operating experience slide that
17 Pat started off with on 17 on the foreign power reactor. Could you tell me
18 -- that's a fine line because that system that failed directly impacted the
19 safety system? I'm confused as to why it wasn't a safety system.

20 MR. GROBE: We'll go back and double check and make
21 sure that we understand the design correctly and get that to your technical

1 assistant. Almost all the systems we've been talking about today, whether
2 it's generator control, turbine control, feed water control are direct
3 precursors to events. They feed into the initiating event frequency.
4 They're not actually part of the safety systems of the plant.

5 Now, there are certain aspects in feed water control, for example,
6 the feed water isolation valves are part of the safety system for
7 containment, but the actual running of the pump is not part of the safety
8 system. For example, if the feed water pump trips there's inputs to various
9 safety control systems, but that's the limit of the extent. So, I believe this
10 relay was not actually part of the safety system, but it fed into how rapidly
11 the generator would trip which affected -- actually, it affected the safety
12 analysis for the plant.

13 CHAIRMAN KLEIN: I think we might have --

14 MR. UHLE: Jennifer Uhle from the Office of Research. I just
15 want to -- now that Jack said those final words, I'm pretty redundant here,
16 but in general there was work that was going on in the switch yard that
17 was not properly tasked out and coordinated and so there was a fault in
18 the switch yard initiated in the switch yard which is not the licensee's area.

19 At any rate, then there was a failure of a non-safety -- Jack's
20 exactly right -- a non-safety relay that then caused a large voltage drop of
21 an extended duration then propagated to the safety systems with the

1 uninterruptible power supplies causing the loss of two out of four diesels.

2 We are getting more information on this. The further information
3 about the safety system design and lessons learned is not yet publicly
4 available. Tom Koshy, who is the Branch Chief in the Office of Research,
5 will be attending a lessons learned task force discussion in a couple of
6 weeks through NEA. So, we have been engaging with NEA and as soon
7 as we find out more information then we'll come back and brief you in
8 more detail.

9 MR. REYES: If I could add to that. In Europe in this
10 particular country, those relays -- what they did is they should have put the
11 reactor to work like an island. Generators should have provided the house
12 loads and they would have stayed in that loop. In the U.S., it would have
13 separated from the grid. Just different strategies because our approaches
14 are different.

15 But in either case, whether it was in Europe or here, those are
16 non-safety related components that have some protective actions for
17 protection of the equipment, not necessarily of the cooling of the core. But
18 they do -- their failures are transients, are challenges on the safety
19 system. No question about that.

20 CHAIRMAN KLEIN: I guess from my perspective what I saw
21 was a digital change system that quickly impacted a safety system.

1 MR. REYES: The same thing with feed water. Feed water is
2 non-safety related, but you lose feed water, you have a transient right
3 there.

4 CHAIRMAN KLEIN: Thanks. Jack, from your perspective of
5 having worked on the Digital I&C interfaces, anything that we need to do
6 to encourage standardization?

7 MR. GROBE: I think it was Ron that addressed this at some
8 level. Standardization with the current operating fleet is very complicated
9 because the plants are designed so differently. Even the ones that are the
10 same are different. But standardization for new plants -- maybe Mike can
11 expand on this, but I think that's something we really need to focus on
12 because it will dramatically streamline the process. Mike, did you have
13 anything you wanted to add?

14 MR. MAYFIELD: The industry has plainly gone to some
15 lengths to bring about standardization across the particular design center.
16 Within the staff, I have the two branches that are responsible for it. One of
17 the earlier concerns about inconsistency across the organizations -- the
18 branches meet regularly with their counterparts in NRR. There's a
19 technical consistency Office Instruction that both the NRR and NRO
20 issued jointly.

21 So, we go to some lengths internally to make sure we're applying

1 things consistently and for the new designs it's actually very
2 straightforward because there's such a push for standardization within the
3 design centers.

4 MR. CROTEAU: I would add that the issuing of ISGs and
5 updating the guidance is a form of rough standardization because it lays
6 out exactly what we think is an acceptable approach. If someone comes
7 in and says this is how we meet this approach, it is somewhat
8 standardized.

9 CHAIRMAN KLEIN: Commissioner Jaczko?

10 COMMISSIONER JACZKO: I guess on that topic, I would
11 say I disagree. I don't think people are. I think this is one of the
12 fundamental challenges we always have as a regulatory body is we come
13 up with an approach and then a licensee comes in and wants to do it
14 differently. So, I certainly applaud the approach and I think the way to do
15 that is to make people use the interim staff guidance and raise the
16 threshold for what is an alternative approach. And I don't think we do a
17 good enough job at that. I think that's where we are now.

18 We're continuing to talk about how we're going to address issues of
19 getting around this 30-minute criteria. That was in an interim staff
20 guidance on diversity and defense in depth which we have put out and
21 went through extensive discussions with industry and that approach is not,

1 I guess, been found to be acceptable.

2 So, on that, I guess I would follow up with a point. Rick, I think you
3 said when you talked about your slides. You used a term that I have not
4 heard in this particular approach before or this issue before which was you
5 said it may be necessary for operator actions to be credited in less than
6 30-minutes. Can you clarify a little bit by what you meant by "necessary"
7 in that context?

8 MR. CROTEAU: I guess what I intended to say is it may be
9 acceptable to credit them in less than 30 minutes.

10 COMMISSIONER JACZKO: There's no situation right now
11 from a safety perspective where there's a reason why we would have to
12 credit them?

13 MR. CROTEAU: Not that I'm aware of.

14 COMMISSIONER JACZKO: It's just a different approach and
15 it may be acceptable.

16 MR. CROTEAU: It may be acceptable and that's one of the
17 things that we are still working on.

18 MR. REYES: In lieu of diversity, you mean?

19 MR. CROTEAU: Yes, in lieu of an automatic diversity
20 system.

21 MR. GROBE: It's important to recognize that the interim staff

1 guides are not requirements. For example, in the case of Oconee, that
2 system has been evolving over the past couple of years. The original
3 design of the system had three substantial operator actions in less than 30
4 minutes. In the latest submission, it only has one action necessary and
5 there has been additional hardware changes made to the design. That
6 action actually has to occur within two minutes, which is a very short
7 period of time, but it's a very simple action. It may be acceptable.

8 COMMISSIONER JACZKO: As I said, I think --I think, Jack,
9 you described that there's the highway and then there's the county back
10 roads approach. Sometimes, I guess, what we're hearing is that maybe
11 you can get from Point A to Point B taking the back roads sometimes. But
12 certainly it creates challenges for us sometimes.

13 One issue that I wanted to ask specifically about. This was in the
14 ACRS letter. They made a statement. Again, this was commenting on the
15 interim staff guidance on the diversity and defense in depth. It seemed to
16 raise some questions about the staff's ranking, I guess, of potential
17 spurious trips and actuations. I'm wondering if it's an issue that may be a
18 little bit detailed at this point, but if somebody wants to comment on where
19 the staff -- how the staff is looking at that particular - if you're familiar with
20 the issue.

21 MR. CROTEAU: Well, at a high level. When we were trying

1 to highlight that a failure to actuate was of more concern to us than a
2 spurious action because a spurious actuation, the system is functioning in
3 its safety mode. The ACRS questioned whether that was valid if you had
4 partial spurious actuations, how would you deal with that. We are taking a
5 look at that. It was not like we were ruling out spurious actuations as of
6 any concern. It's just a failure to actuate was of a greater concern to us.

7 COMMISSIONER JACZKO: And so at this point, though, the
8 staff is examining?

9 MR. CROTEAU: Yes, we are.

10 COMMISSIONER JACZKO: Okay. I guess I'll go back to a
11 comment that was made. On this issue of the interim staff guidance for
12 the PRA and the use of Digital I&C in the PRA. Mike, you may have
13 commented on this. You made a comment you stressed that this is really
14 only for new reactors. I'm wondering if you could explain to me what the
15 significant differences would be of new reactors versus incorporating
16 these kinds of things for existing reactors.

17 MR. MAYFIELD: I think you can do it for the existing fleet
18 with time. The emphasis right now is for new reactors because there is a
19 requirement in Part 52 to submit a PRA or to have a PRA. So, the staff is
20 faced today with dealing with that. We've looked at them twice; once for
21 the ABWR and once for the AP1000. There was concern raised by the

1 industry that they were done differently. Yes, they were.

2 We've learned from what we did with the ABWR and we applied
3 those lessons when we reviewed the AP1000 and it took the reviewers to
4 a somewhat different place. So, there was concern and I think legitimately
5 from the industry that we try and be more consistent as we start looking at
6 the rest of them. We've taken that to heart. We may not end up agreeing,
7 but we agreed with the point. And so the staff is working with the industry
8 to see what we can do in that area.

9 COMMISSIONER JACZKO: I guess one of the things I
10 always find myself somewhat confused whenever I come to these Digital
11 I&C meetings. We heard a little bit earlier from Mr. Torok. I think I said
12 his name correctly. What we'd be looking at trying to accomplish with the
13 risk information is qualitative and not really getting to a level of quantitative
14 evaluation mostly probability of failure rates or whatever; some kind of
15 analogy for that. In that case, I guess I'm a little bit unclear as to how
16 we're actually incorporating this kind of information into the PRAs which
17 are inherently quantitative and not qualitative.

18 MR. MAYFIELD: The approach is not to get down into the
19 details of specific component failure rates. Rather, the systems are
20 treated as a set of, if you will, black boxes and they look at the PRA and
21 the failure of those systems to make sure they don't create a unique

1 challenge that would elevate the risk from the facility. So, that you can
2 then stay with qualitative assessments. I agree with Ray that you can
3 draw good risk insights from that level of qualitative assessment.

4 COMMISSIONER JACZKO: So, you assume failure of the
5 system and what are the impacts on that?

6 MR. MAYFIELD: What are the impacts and you look very
7 closely at the diversity and defense in depth to make sure that the
8 coupling of failure of that system with diverse means for dealing with it
9 doesn't create a unique challenge.

10 COMMISSIONER JACZKO: Okay. Thank you.

11 CHAIRMAN KLEIN: Commissioner Lyons?

12 COMMISSIONER LYONS: I wanted to ask a question
13 related to the consideration, which is still ongoing at the Commission level
14 to come up with a test facility for Digital I&C and human machine interface.
15 Again, the Commission is still in the voting process. I have to admit I was
16 disappointed that there was no interest from outside organizations in
17 developing a joint facility. I was particularly very surprised that DOE did
18 not share that interest because I thought I had been told otherwise
19 previously.

20 I'm surprised EPRI had no interest, but nevertheless it will be
21 interesting to see how the Commission moves ahead on that vote. That

1 also ties into another concern I've had which is how the agency will deal
2 with the need for simulators as we move toward digitalized control rooms.
3 I was wondering if any of you could comment on the path forward for the
4 agency's use and development of simulators for training our own staff.

5 MR. REYES: We have a challenge in our 2010 budget that
6 may not help us resolve this as much as we can, but there are several
7 options and unique opportunities that we never had before. If you go back
8 to the current approach we have with our current staff, we used to train
9 our staff by renting simulator time of TVA.

10 COMMISSIONER LYONS: I know we did.

11 MR. REYES: Then eventually after TMI we required
12 everybody to have a simulator and, of course, we acquired some
13 ourselves. So, now we're starting from a different place where these
14 facilities are going to have their own simulators to start with. In fact, the
15 simulators are being built before the facilities are being built because they
16 have to train their people. We have several options to do that including
17 partnering with several entities. So, we haven't come up to the
18 Commission yet.

19 We're brainstorming what is the best option on how to move
20 forward. But you could envision a partnership with an entity where the
21 simulator is used for our training, but may be used for somebody else's

1 training, too. Seven days, 24 hours a day. It's a lot of time that we're
2 probably not going to consume all the time. So, there are some leverage
3 approaches that we're thinking about how to best do this to maximize the
4 investment.

5 COMMISSIONER LYONS: How soon does this decision
6 need to be made and is there a plan to have a paper coming to the
7 Commission proposing alternatives to meet whatever schedule is
8 required?

9 MR. REYES: Of course, it's being driven by how quickly the
10 new plants are going to be operating. If you believe that the early plants
11 being proposed are going to be on line on 2015, 2016, that brings you to
12 the point that the utilities are going to start training -- hiring and training
13 their staffs around the 2012 timing. You heard today that the simulators
14 are being ordered this year. In some cases in order to have them
15 functioning for 2012.

16 If you believe that schedule, we should be giving you an approach
17 on our 2010 budget. That's not in the cards right now because of some of
18 the challenges of the work we have. So, I'm not answering your question
19 because I don't have an answer. We're talking conceptually on how to
20 address the issue, but we haven't -- it's not budgeted in terms of recruiting
21 the staff or the investment.

1 COMMISSIONER LYONS: Just speaking personally, I'm
2 again out of time. I would be very interested in a Commission paper that
3 would outline how as an agency we will move ahead including looking at
4 options as you've described. This is to me a very, very important issue.
5 Renting time on simulators while indeed that is an option, it would need to
6 be obviously managed and handled carefully.

7 CHAIRMAN KLEIN: As a follow up on the simulators, when
8 we look at our training facility in Chattanooga. That's a very large facility.
9 A lot of big rooms and variety. Does it look like from what you've seen
10 today that we could have a generic simulator that you can load multiple
11 softwares on and do the training on a smaller system than we have in
12 Chattanooga?

13 MR. REYES: Well, yes, because in today's environment you
14 don't need a mainframe computer. You can have a very small computer
15 located in a different state and you just connect to a display anywhere and
16 you can do it. So, technology today allows us to do a lot of things. What
17 you have to decide upon is what level of training our staff needs. What I
18 mean by that, forget about the device driving, do we need to have identical
19 panels.

20 If you have five designs in the U.S. that are being proposed, do we
21 have to have five arrangements for those five types of control rooms? Or

1 does the level of knowledge you want to impart to our staff is just
2 understanding how the systems work, et cetera, et cetera, but not a
3 perfect understanding of the layout. You need to understand that if you
4 have the general knowledge -- if you have the general knowledge, you will
5 have the licensee's facility to get acquainted where all the panels are
6 located.

7 So, in theory, if we agree that what we need to give our staff is an
8 SRO level knowledge, but not a specific facility knowledge in terms of the
9 display, then you can do it with one display for a lot of designs. If we
10 believe we need more than that, then -- so, we have to make a decision.

11 How do we want to train our people? Do you want to train to SRO
12 level knowledge without having to know exactly where each control is
13 located? If that's the case, we can do a lot of leveraging. You still have
14 the simulator from the licensee where we observe and we can use.

15 CHAIRMAN KLEIN: Thanks. Commissioner Jaczko?

16 COMMISSIONER JACZKO: I don't have any questions, but I
17 would just comment on the issue of the simulators. I certainly agree with
18 Commissioner Lyons. I think it's important for the Commission to have a
19 paper on this and perhaps it's something we can do with the SRM for this
20 meeting.

21 I would say that I'm very reluctant to have an approach where we're

1 renting time because I don't know that we can guarantee that there will be
2 time available for us to rent. I think that would be the biggest drawback.
3 While I appreciate we may wind up with a facility that's not fully utilized,
4 everything that I hear is that facilities that would be out there that might be
5 available will be staffed as much as they can for efficiency and cost
6 perspectives.

7 So, we would probably have to make sure that we do have our own
8 capability to do that because I'm not sure that someone's going to let us
9 use theirs or that there will be time in which to do it or will be like we did in
10 TVA where we won't be on the hot shift.

11 MR. REYES: They have to train more people than we do, so
12 their time is not going to be available for anybody else.

13 COMMISSIONER JACZKO: That was all. Thank you.

14 CHAIRMAN KLEIN: Well, I'd like to thank you for the
15 presentation and also the industry for their comments. Obviously, a lot of
16 work yet to go, but on behalf of my Commissioners, I think that we have
17 made a lot of progress and more to come, but appreciate all of your hard
18 work. Again, it's nice to have a new Commissioner on board. Meeting
19 adjourned.

20 (Whereupon meeting was adjourned)