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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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JOINT MEETING OF THE FEDERAL ENERGY REGULATORY COMMISSION  
AND THE NUCLEAR REGULATORY COMMISSION ON GRID RELIABILITY

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WEDNESDAY  
MARCH 16, 2010

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The Commission convened at 1:30 p.m.,  
the Honorable Gregory B. Jaczko, Chairman,  
presiding.

NUCLEAR REGULATORY COMMISSION  
GREGORY B. JACZKO, CHAIRMAN  
KRISTINE L. SVINICKI, COMMISSIONER

FEDERAL ENERGY REGULATORY COMMISSION  
JON WELLINGHOFF, CHAIRMAN  
PHILIP D. MOELLER, COMMISSIONER  
MARC SPITZER, COMMISSIONER  
JOHN R. NORRIS, COMMISSIONER

1 BRUCE MALLET, NRC

2 PANEL 1

3 DAVID MATTHEWS, NRC

4 DAVID R. NEVIUS, NERC

5 KEITH O'NEAL, FERC

6

7 PANEL 2

8 DAVID ANDREJCAK, FERC

9 DAVID L. SKEEN, NRC

10

11 PANEL 3

12 GERRY W. CAULEY, NERC

13 REGIS BINDER, FERC

14 SCOTT MORRIS, NRC

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1 CHAIRMAN JACZKO: Welcome everybody.

2 First of all, I want to welcome our  
3 colleagues from the Federal Energy Regulatory  
4 Commission.

5 I think this is now the fifth time that we  
6 have met together as Commissions, and I really  
7 think it has been a great opportunity for all of us  
8 to get together.

9 We had an opportunity just to talk  
10 privately earlier and just to talk about some of  
11 the challenges we face as regulators.

12 I think these meetings have been a great  
13 opportunity for us to bring together our staffs and  
14 the Commissions, themselves, to work on issues of  
15 overlap.

16 I think the collaboration and cooperation  
17 has been tremendous.

18 We certainly appreciate the work that you  
19 have done and the work you've done to help us on a  
20 couple of significant issues.

21 One of the things I wanted to highlight,  
22 specifically, is the significant progress that we

1 have all made on dealing with issues and our  
2 coordination in the areas of cyber security.

3 This is certainly a significant issue for  
4 us as an agency, and I think as a nation, to deal  
5 with threats from cyber security, our nuclear  
6 facilities, and how that impacts the reliability of  
7 the bulk-power system.

8 Last September the NRC and the FERC updated  
9 the Memorandum of Agreement which we have  
10 which will facilitate our interactions on areas of  
11 mutual interest including, as I said, the issues  
12 dealing with cyber security.

13 Just this past December, the NRC and NERC  
14 were able to finalize a Memorandum of Understanding  
15 that will coordinate our roles and responsibilities  
16 specifically with respect to some aspects of cyber security.

17 These are two of the many examples of the  
18 way that we've worked well together, and I think  
19 these meetings have been an opportunity for us to  
20 demonstrate the work that we are doing together and  
21 how we collaborate and cooperate.

22 I appreciate all of you being here and I

1 will turn it to Chairman Wellinghoff, if you want  
2 to make some comments.

3 CHAIRMAN WELLINGHOFF: Thank you, Chairman Jaczko.

4 I appreciate it very much and it's a  
5 pleasure to be here.

6 I have with me my Commissioners that we've  
7 had an opportunity to be with you a number of times  
8 before, our almost annual meeting and hopefully we  
9 can make it annual.

10 I've got Commissioner Spitzer, Commissioner  
11 Moeller, and our newest Commissioner member as  
12 well, Commissioner John Norris who joined us  
13 recently.

14 It is a pleasure to be here today and thank  
15 you for hosting this, I appreciate it very much.

16 I am looking forward to today's  
17 presentations and opportunity to look at the  
18 coordinated lines of responsibility that we have  
19 with respect to issues like operational cyber  
20 security realms.

21 I understand today we'll have staff  
22 presentations regarding NERC reliability standards,

1 and that standard NUC-001-2 which requires  
2 coordination of nuclear plant generation operator  
3 and transmission facilities and allows for safe  
4 operations and shut down of nuclear plants as well  
5 as reliable operation to the power grid.

6 We'll also, as I understand, review the  
7 progress of the efforts of the industry and the  
8 Commission to establish real-time situational  
9 awareness to aid in understanding both normal  
10 operating conditions and anomalies in the power  
11 grid.

12 Lastly, I understand, we will hear the  
13 staff's report of where the line of demarcation  
14 was drawn between the nuclear power plant and power  
15 grid equipment for cyber security standards and  
16 authority between our two Commissions.

17 I am very interested today to hear the  
18 presentations from all of our panels and again,  
19 thank you very much for having us here.

20 CHAIRMAN JACZKO: Before we start, Commissioner  
21 Svinicki I don't know if you would like to make any  
22 comments.

1 COMMISSIONER SVINICKI: I would just join you,  
2 Chairman Jaczko, in welcoming our colleagues here today and  
3 I think we are certainly able to fortify both of our  
4 regulatory objectives.

5 We impact some of the same regulated  
6 entities.

7 Where we can coordinate I think the work of  
8 both Commissions is advanced.

9 Thank you.

10 CHAIRMAN JACZKO: If our other Commissioners would  
11 like to make any comments.

12 COMMISSIONER SPITZER: Wonderful to see federal agencies  
13 working in harmony.

14 Thank you.

15 CHAIRMAN JACZKO: With that, we will turn it over  
16 to Bruce Mallett who will begin with the staff  
17 presentations. I'm sorry.

18 The way I thought we would work the  
19 meeting, we will have -- after each topical  
20 presentation, we'll have several presentations on  
21 each of the three topics that we have, and then  
22 have an opportunity for comments from -- questions

1 from the Commissioners, and then we will go through  
2 each panel that way, until we are finished.

3 MR. MALLETT: Thank you.

4 Good afternoon Chairman Jaczko and Chairman  
5 Wellinghoff and Commissioners.

6 The staff is going to talk to you today  
7 about the activities, as you said Chairman Jaczko,  
8 that we've conducted in cooperative agreements  
9 during the past couple of years since we met  
10 before.

11 I think you will see that when we talked  
12 about the activities that at least all three  
13 organizations that are represented will show you  
14 that there has been good progress, as you said, in  
15 this cooperation.

16 Especially in enhancing security and safety  
17 of nuclear power plants and in the reliability of  
18 the power grid.

19 This is the fourth meeting, I believe of  
20 this type as we were discussing yesterday Chairman,  
21 and you will note as you said we have made much  
22 progress in some of these areas and I hope you will

1 see that I truly believe, as you, that the  
2 cooperation amongst all of our agencies is vital to  
3 our success in this arena.

4 As you said, we will conduct this meeting  
5 using three panels.

6 The first panel will talk about an update  
7 on planning for new reactor facilities and impacts  
8 on the transmission and reliability standards.

9 The second panel will talk about  
10 reliability standards and grid reliability  
11 assessment and event assessment.

12 The third will finish up talking about  
13 cyber security.

14 So, I will start by trying to pronounce  
15 some of these names and introducing the first  
16 panel.

17 We have, to make it exciting for you,  
18 switched up the order on the first panel.

19 We didn't want you to get too comfortable  
20 on the other side of the table.

21 Our first speaker will be David Matthews.

22 David is the Director of our Division of

1 New Reactor Licensing in the Nuclear Regulatory  
2 Commission.

3 The second speaker will be David Nevius.

4 David is a Senior Vice President of the North

5 American Electric Reliability Corporation.

6 The last speaker for this first panel will

7 be Keith O'Neal.

8 Keith is the Director of the Division of

9 Reliability Standards in the Federal Energy

10 Regulatory Commission.

11 With that I will turn it over to David

12 Matthews.

13 MR. MATTHEWS: Good afternoon, Chairman.

14 Excuse me.

15 With that, I will start over.

16 Good afternoon Chairman and Commissioners.

17 By way of providing additional introduction

18 to today's discussions, I intend to provide a quick

19 regulatory perspective of the important role of

20 off-site electrical power and transmission systems

21 as they relate to nuclear reactor safety.

22 Followed by an update on the new reactor

1 applications that have been submitted for review  
2 within the NRC.

3 A quick projection, very quick, of possible  
4 future activity.

5 Slide 2, please.

6 The requirements and importance of off-site  
7 power and grid reliability can be summarized by  
8 observing that the preferred source of power for  
9 safely shutting down a nuclear reactor during  
10 normal evolutions or in response to unanticipated  
11 events, is the off-site power and transmission  
12 system.

13 While there are, of course, sources of  
14 emergency on-site power to accomplish safe  
15 shutdown, regardless of the particular design, the  
16 NRC staff evaluates each applicant's information on  
17 the design and analysis of the off-site system for  
18 providing that preferred power for nuclear power  
19 plants.

20 Slide 3, please.

21 This graphic reflects the 18 combined  
22 license applications, "combined" meaning construction

1 and operating applications, that have been  
2 submitted to and docketed for review by the NRC.

3 There are 13 of those applications that are  
4 under active review at this time.

5 The reviews of five of the applications  
6 have been suspended at the request of the  
7 respective applicants.

8 If approved, the licenses that may emanate  
9 would authorize the construction and operation of  
10 up to 22 reactor units.

11 Each of which would be capable of  
12 potentially supplying in excess of 1000 megawatts  
13 of generating capacity.

14 The 13 applications under review are  
15 relying on, or referenced is the term we use in the  
16 regulation, five different large light-water cooled  
17 designs.

18 All of the referenced designs are also in  
19 the process of being reviewed for original design  
20 certification, or are designs that were previously  
21 certified that are in the process of being amended.

22 As of this date, there are two early site permit

1 applications expected to be submitted within this  
2 calendar year with no designation yet of a chosen  
3 technology or design.

4 At this time, no additional combined  
5 license applications are expected to be submitted  
6 to the NRC for review before 2012.

7 The four projects that were down selected,  
8 and that is the term DOE uses, by DOE for possible  
9 loan guarantees are among those under active review  
10 at this time.

11 Those are the Vogtle Project, the Summer  
12 Project, the South Texas Project, and the Calvert  
13 Cliffs Project.

14 As you are likely aware, the owners of the  
15 Vogtle 3 and 4 Project recently received  
16 conditional loan guarantee commitment letters from  
17 DOE.

18 With that, I believe the next presenter  
19 will be David Nevius of NERC.

20 MR. NEVIUS: Thank you Dave, and thank you for the  
21 invitation to appear again before this joint meeting.

22 I've been here several times both speaking

1 for myself and supporting Rick Sergel, our former  
2 CEO.

3 I wanted to start by congratulating the  
4 Chairman for his selection of ties today.

5 I just recognized that the one my wife  
6 bought me is similar to the one that you have on  
7 and it is very nice.

8 This first topic of planning for new  
9 reactors and necessary transmission and reliability  
10 standards is very broad.

11 I will touch on part of it.

12 I am going to touch briefly on several of  
13 these topics that relate to the integration of new  
14 nuclear power plants reliably into the bulk-power  
15 grid.

16 Second slide.

17 As several of you know, NERC produces an  
18 annual long-term assessment of the reliability of  
19 the North American power grid.

20 Several years ago I met with the Chairman  
21 and his staff to discuss the latest long-term  
22 assessment of some of the issues that you had

1 questions on.

2       These assessments discuss projected  
3 electricity supply and demand, they evaluate  
4 transmission system adequacy and reliability  
5 issues, and discuss other key issues and trends  
6 that could affect future grid reliability.

7       Our 2009 long-term assessment cited these  
8 five issues as significant to the future  
9 reliability of the bulk-power system.

10       Several of them, obviously are of  
11 particular important to the NRC and to nuclear  
12 licensees.

13       Of these issues, the ones with the greatest  
14 potential to have an impact on the integration --  
15 the reliable integration of new nuclear plants into  
16 the system are the projected significant increase  
17 in variable generation and the transmission  
18 planning and siting and construction of required  
19 new transmission lines.

20       Next slide.

21       Approximately 260,000 megawatts of new  
22 nameplate renewable capacity is projected to be

1 added over the next ten years with roughly 96% of  
2 this comprising wind and solar power.

3       Though not all of this capacity may come  
4 into fruition.

5       It represents a significant shift in the  
6 resource mix for North America.

7       Keep in mind that the effective capacity at  
8 the time of system peak for these variable  
9 resources ranges from as little as 8% up to about  
10 25%.

11       This shift represents a significant change  
12 from capacity dominated resources to energy only  
13 resources, thereby changing the way we have to plan  
14 and operate the bulk-power system to maintain its  
15 reliability.

16       Next slide.

17       Electric system demand generally peaks in  
18 late afternoon in the summer, while land-based wind  
19 energy is not persistent during the day.

20       With its output typically peaking in the  
21 early morning and late evening hours.

22       It's this limited availability of wind

1 capacity at the time of system peak versus it's  
2 generally high availability during off-peak hours  
3 along with rapid ramp rates for this type of  
4 capacity, both up and down, that can impact the  
5 operation of nuclear units.

6 Areas with increasing concentrations of  
7 wind capacity, I would point to Texas as one of  
8 those areas, are carefully studying these impacts  
9 on the planning and reliable operation of their  
10 systems.

11 NERC devoted a special report to this  
12 subject called accommodating high levels of  
13 variable generation last April, which contained a  
14 number of recommendations for electric system  
15 planners, operators, and for research and  
16 development activities.

17 NERC is studying the implications on  
18 bulk-power system reliability of integrating large  
19 amounts of variable generation, namely there are  
20 three significant factors or requirements.

21 The accurate forecasting of wind  
22 generation, the increased system flexibility from

1 resources such as demand response and enhanced  
2 designs of conventional generation, and improved  
3 interconnection standards to ensure variable  
4 resources can contribute to bulk-power system  
5 reliability.

6 Next slide.

7 One of the other issues that can affect the  
8 reliable integration of new nuclear units into the  
9 bulk-power system is transmission.

10 Two years ago I addressed the joint meeting  
11 of your two Commissions on this topic of planning  
12 for new reactors and made a number of points,  
13 including the need for thorough impact studies,  
14 that is new units are not just plug-and-play  
15 generators.

16 That transmission is difficult to site and  
17 had been lagging behind demand and capacity growth.

18 Finally, that large unit sizes, up to as  
19 much as 1600 megawatts for a single unit, place  
20 additional requirements on the grid in terms of  
21 circuit breaker duty and the combined effects on  
22 grid stability.

1 I am pleased to report that more  
2 transmission is being planned than in previous  
3 years.

4 Many of these additions are needed to  
5 improve reliability and integrate new renewable  
6 resources.

7 In addition, those planning to add new  
8 nuclear units as well as those planning upgrades of  
9 existing units are taking into account the  
10 transmission issues that we talked about several  
11 years ago and are including specific information in  
12 their applications to the NRC that address those  
13 issues.

14 Thank you very much and I look forward to  
15 your questions.

16 MR. O'NEAL: Good afternoon.

17 Chairman Jaczko and Chairman Wellinghoff  
18 and Commissioners.

19 It is my pleasure to be here today to  
20 provide an update to the reliability standard  
21 development process since our last joint meeting  
22 two years ago.

1 My name is Keith O'Neal, I am the Director  
2 of the Division of Reliability Standards within the  
3 Office of Electric Reliability.

4 Today I will provide a review of FERC's  
5 role in establishing mandatory reliability  
6 standards and a brief review of NERC's reliability  
7 standard regarding nuclear plant interface  
8 coordination.

9 Next slide, please.

10 The Division of Reliability Standards  
11 monitors the development of revised -- of new and  
12 revised reliability standards, as well as  
13 recommends development of new or modified  
14 reliability standards in order to protect and  
15 improve the reliability of the bulk-power system.

16 The reliability standards apply to users,  
17 owners, and operators of the bulk-power system.

18 Once approved by the Commission, these  
19 reliability standards become mandatory and  
20 enforceable to help ensure bulk-power system  
21 reliability.

22 The Commission does not write the

1 standards, or the revisions to the standards.

2 In July 2006, the Commission certified the  
3 North American Electric Reliability Corporation, or  
4 NERC, as the electric reliability organization, or  
5 ERO.

6 A major role of the ERO is to develop and  
7 propose new or revised standards to the Commission.

8 Next slide, please.

9 Upon receipt of the proposed standards, the  
10 Commission can either approve the standards or  
11 remand them back to the ERO.

12 In many cases the Commission has approved  
13 proposed standards and at the same time, directed  
14 improvements.

15 While the Commission does not have the  
16 authority to write reliability standards, they can  
17 direct that a standard be modified or a new one be  
18 developed to serve the public interest in providing  
19 for bulk-power system reliability.

20 Next slide.

21 Electricity generated from nuclear power  
22 plants is a significant part of the bulk-power

1 system.

2 It is, therefore, important for grid

3 reliability.

4 Proper coordination between nuclear plant

5 operators and grid operators that provide

6 interconnection and black start services to the plant will

7 result in efficient, safe, and reliable operations.

8 At the time of our last joint meeting, the

9 ERO had filed with FERC for its approval nuclear

10 plant interface coordination reliability standard

11 NUC-001.

12 In response to this filing the Commission

13 established docket RN08-3 and issued a notice of

14 proposed rulemaking or NOPR on March 20, 2008

15 proposing to approve the standard.

16 The Commission posted NOPR for stakeholder

17 comment through May 13, 2008.

18 The industry comments pointed out a few

19 minor issues with the draft standard.

20 Before issuing a final rule, FERC staff

21 consulted with NRC staff about the concerns

22 expressed and comments.

1           Coordination between FERC and NRC staffs,  
2 for instance discussing the definition of "coping  
3 time", helped to improve the clarity in the  
4 development of the standard.

5           Next slide, please.

6           A final rule, Order 716, was issued on  
7 October 16, 2008 that addressed industry comments and  
8 approved NUC-001 with directives for several  
9 modifications.

10          The Commission directed NERC to modify  
11 requirement R9.3.5 to clarify references to coping  
12 times and off-site power restoration.

13          The Commission also directed NERC to  
14 require that integrated entities provide  
15 documentation of its arrangements including  
16 appropriate procedures and protocols ensuring that  
17 its business unit perform the functions under  
18 NUC-001 that would otherwise be met by separate  
19 entities.

20          Next slide.

21          On August 14, 2009, the ERO submitted a  
22 petition seeking Commission approval of Version 2

1 of the nuclear reliability standard, NUC-001-2.

2 To the ERO's approved reliability standards  
3 development process, modifications of NUC-001 were  
4 developed to address the Commission's directives.

5 The Commission concluded that the changes  
6 appropriately addressed the directives and approved  
7 Version 2 of the nuclear reliability standard on  
8 January 21, 2010, Docket RN09-10.

9 Version 2 will become effective on April 1,  
10 2010.

11 One change among several was its  
12 determination to increase clarity by not using the  
13 term "coping time".

14 We look forward to continuing interagency  
15 coordination efforts by our respective staffs as  
16 necessary.

17 Thank you again for your time, and I would  
18 be happy to answer any questions.

19 MR. MALLETT: This concludes our discussion of  
20 this first panel topic on new reactors and transmission line  
21 standards.

22 CHAIRMAN JACZKO: Thank you for those

1 presentations.

2           Jon, I thought I would turn to you and to your  
3 Commissioners if you would like to begin with  
4 questions.

5           CHAIRMAN WELLINGHOFF: Just for the panel overall,  
6 this issue raised the integration of variable resources into  
7 the grid and how it may impact the new proposed nuclear  
8 units for the whole panel.

9           What are the major challenges you see with  
10 that integration issue given --

11           Let me set a little background here, on the  
12 wind we've got, I was mentioning to my colleagues  
13 earlier at lunch, we had somewhere in the  
14 neighborhood of 9900 megawatts of wind that was  
15 integrated in the grid in 2009 there is projections  
16 to continue to escalate that level of development  
17 of wind over time.

18           Mr. Nevius, I think you mentioned 200  
19 gigawatts over some period of time.

20           In addition to that, there are areas of the  
21 country that in certain regions are approaching 20%  
22 wind as a percent of peak load, SPP is one area

1 Bonneville is another, Texas I think when they get  
2 to their 18 gigawatts built out relatively soon  
3 they will be over 8%.

4 If I could have the panel address how that  
5 variable resource may impact the ability to put on  
6 these large nuclear units.

7 MR. NEVIUS: Thank you for that  
8 question, Mr. Chairman.

9 I think the primary factor is during  
10 off-peak times when the wind is blowing the hardest  
11 and you get the maximum energy output of wind  
12 generation, you may have too much generation for  
13 the amount of load that you have on the system.

14 The wind is there if you have to absorb all  
15 of that wind generation, it may mean backing down  
16 other generation, which could include nuclear  
17 generation.

18 For a number of reasons, that is not  
19 something that one would like to do.

20 So, there are a lot of studies going on,  
21 especially within Texas, to look at this issue  
22 because they are approaching that point where being

1 able to accommodate and absorb wind generation  
2 off-peak could become an operational issue.

3 The other issue has to do with the  
4 rapid ramp rates, when the speed of the wind  
5 changes quickly, especially if a lot of your wind  
6 energy is coming from a single area and the wind drops  
7 off or the wind picks up, either way.

8 Having sufficient reserves -- other  
9 reserves on the system to move up and down to  
10 absorb those changes -- the ramp rates changes that  
11 occur.

12 It is being studied and looked at to  
13 accommodate it, but the terms of the impact on  
14 nuclear units you get to the point where you have  
15 too much wind, if you will, or more wind than you  
16 have load, plus the nuclear, you would have to look  
17 at the possibility of backing off nuclear off-peak.

18 CHAIRMAN WELLINGHOFF: Gentlemen, any other  
19 comments?

20 MR. MATTHEWS: I will just offer that at this point  
21 in time we don't require the combined license applicants or  
22 the operator actors to address information on issues of

1 regional capacity reserves, area protection schemes, and  
2 capacity capabilities among the regions.

3 We do look to FERC and NERC to be the  
4 ultimate responsibility with regard to those  
5 issues.

6 Certainly we have a review activity which  
7 ensures that there is constant coordination between  
8 the nuclear plant operators and their regional grid  
9 operators to ensure that such events, if they were  
10 to ensue, are anticipated and can be handled in an  
11 appropriate manner with regard to the, if you will,  
12 the inertia of the nuclear units with regard to  
13 their ability to follow load.

14 MR. O'NEAL: I would just add that I agree with  
15 what Mr. Nevius was saying from NERC, it is an important  
16 issue and I think it does highlight the need for frequency  
17 response and a need to look at that issue and determine what  
18 we need to do. In particular, it could play into what a new  
19 standard might look like.

20 CHAIRMAN WELLINGHOFF: I know they are backing  
21 down coal units in Texas, I was down there recently and  
22 discussed this with Chairman Smitherman of the Texas

1 Commission.

2           What are the actual operating difficulties  
3 if you have to back down a nuclear unit, can  
4 anybody enlighten me on that?

5           MR. MATTHEWS: I would probably not be the best  
6 one to enlighten you on that.

7           I think we might best turn to either David  
8 Skeen or someone from Office of Nuclear Reactor  
9 Regulation to address that, or we could wait until  
10 they are here on the panel.

11          CHAIRMAN WELLINGHOFF: If there's another panel,  
12 we can do that.

13          Alright, then I think that's all I have.

14          Gentlemen, questions?

15          COMMISSIONER MOELLER: Thank you Mr. Chairmen.

16          We heard an anecdote last week from our PJM  
17 market monitor where there were a couple of  
18 companies that actually want to shut down coal  
19 plants but aren't allowed to because they are  
20 needed for reliability purposes.

21          The fact is the transmission system in that  
22 area is not robust enough to handle a shutdown of

1 major coal facilities.

2 My concern is going forward with a new  
3 reactors, do you think there is sufficient interest  
4 and focus on the need for transmission expansion to  
5 allow these reactors to essentially be absorbed  
6 into the grid, we talked about it a little bit two  
7 years ago but we are getting closer.

8 Your comments on that from any of the  
9 panelists would be welcome.

10 MR. NEVIUS: I think -- Commissioner, I think the  
11 attention to the transmission side of the equation has  
12 really picked up.

13 There was a joint workshop that NRC and  
14 NERC participated in several years ago where we  
15 talked about the challenges of citing new  
16 transmission and how it may take longer to get a  
17 new one line built than it would be to get the nuclear  
18 unit licensed and built.

19 I think the awareness has been raised  
20 considerably.

21 Both with respect to adding new units and  
22 also upgrading existing units.

1           There was a situation up in New England  
2 where folks learned after the fact about something  
3 called a single source limit, where the single  
4 largest contingency was limited to 1200 megawatts.

5           Yet, when Seabrook was upgraded to  
6 1240 megawatts there was a time -- there were times  
7 when the grid was not able to handle Seabrook  
8 operating at that new uprated value.

9           So, I think the attention has been raised.

10          In that particular workshop we had a  
11 gentleman from Southern Company talk about the  
12 transmission in reinforcements needed with the two  
13 new Vogtle units which are planning to go ahead.

14          While there wasn't a lot of transmission  
15 needed, they had to replace 35 circuit breakers  
16 because of short circuit duties and add a new  
17 substation, and they had this planned out over a  
18 seven-year phased-in project.

19          It is a lengthy time that it takes to do  
20 the proper reinforcements, to study the impacts on  
21 the grid, especially if you're putting in units  
22 that are up to 1600 megawatts.

1           You have to look at the overall grid  
2 stability impacts.

3           I think the intention has been raised and I  
4 think people are paying attention to it much more  
5 than they were three or four years ago.

6           COMMISSIONER SPITZER: If I could follow-up on the  
7 discussion on transmission.

8           We had two years ago fairly in-depth  
9 analysis of the unique circumstances with regard to  
10 nuclear -- the discussion has been a little  
11 broader.

12          Following up on Commissioner Moeller's  
13 question, we have been playing catch-up on  
14 transmission and it was a recognition by Congress  
15 in 2005.

16          Do you have either subjective opinions or  
17 objective criteria to determine how much catching  
18 up we succeeded in doing in the last five years,  
19 and how much more needs to be done?

20          MR. NEVIUS: In our long-term reliability  
21 assessment that we issued last fall, we talked about a  
22 significant increase in the planned addition of

1 transmission.

2 I think it was something like 11,000 miles  
3 were going to be planned to be added over the next  
4 several years, that is a significant increase over  
5 what had been the annual edition to transmission.

6 We really went through a valley for a  
7 number of years where very little transmission was  
8 being built compared to the load growth and growth  
9 in generation.

10 So, it has picked up considerably.

11 I think we say that over the analysis of  
12 the past 14 years show that the siting and construction of  
13 transmission will need to significantly accelerate  
14 to maintain liability over the coming 10 years.

15 Actual miles constructed roughly average  
16 about 6000 miles a year, recent five year plans  
17 indicate increasing the amounts that exceed this  
18 average by quite a bit.

19 It is picking up but there is still plans  
20 and those plans have to materialize and the siting  
21 has to be done and the construction done to bring  
22 them to fruition.

1           There is still some challenges ahead not  
2 only in the citing, but in cost allocation issues  
3 as well.

4           That always has been a major factor in  
5 determining the addition of new transmission, who  
6 pays?

7           COMMISSIONER SVINICKI: I think my colleagues have  
8 covered the topics that I would've raised.

9           I appreciate, Mr. Nevius, that you say  
10 we've advanced on our planning for additional  
11 transmission, but I would note that again, for the  
12 Vogtle applications, they have begun some limited  
13 work authorization activities at the site there.

14           This is a case where I don't know if we  
15 don't, as Commissioner Spitzer said, if we don't  
16 catch up enough time we will have disjointed  
17 activities here.

18           The EPR is the technology selection for the  
19 Calvert Cliffs application since it is not possible  
20 to see one under construction in the U.S., I had  
21 the opportunity to travel over to France and meet  
22 with my French regulatory counterparts about it.

1           Of course, France has a tremendous nuclear  
2 program and I was asking my colleague, a  
3 Commissioner from France, about whether or not  
4 public acceptance issues stayed very high.

5           He said that there is somewhat of a  
6 recognition, and again, the EPR is 1600 megawatts.

7           You know it is big when you go to see it,  
8 but when you see it under construction it is a  
9 tremendously large unit and that is a tremendous  
10 increment of capacity to put on a transmission  
11 system, and what my colleague indicated to me was  
12 the transmission siting and planning and they have  
13 a very elaborate public discourse that they engage  
14 with communities.

15          That process is beginning to be -- there is  
16 a focus on how long it takes to license and  
17 construct and bring online a nuclear unit, but I  
18 think they are coming to understand that the  
19 transmission issues may require more extensive  
20 planning and time frames.

21          It sounds like between NERC, FERC, and NRC  
22 we are at least focused on this problem, but I

1 observed the transmission issues really more as an  
2 outsider just through trade press and others.

3 It seems like the siting issues there are  
4 extensive, so it is not possible to bring a nuclear  
5 unit online without the right transmission.

6 I look forward to continued dialogue  
7 between our Commissions and with all of our experts  
8 on this.

9 I think it is very important, thank you.

10 CHAIRMAN JACZKO: Thank you, Commissioner  
11 Svinicki.

12 I had just two questions. One, Dave you had a  
13 nice slide showing a lot of the potential new  
14 projects which are tied to combined  
15 operating licenses.

16 What I will perhaps call a shadow new  
17 reactor, or addition to the grid -- it's probably  
18 not a shadow, but it's another path that's a little  
19 less obvious -- we have one unit under construction  
20 at Watts Bar, which would add a new unit potentially  
21 as early as 2012, and we also have a significant  
22 amount of power uprates that are being considered.

1           We have gone through with the boiling water  
2 reactor fleet adding new power to the grid through  
3 uprates at those facilities, and now what we're  
4 looking at is potentially the pressurized water  
5 reactor fleet adding power to the grid.

6           The question I would have to any of the  
7 panelists who want to comment, it seems we  
8 certainly have good awareness of those new units  
9 being considered for licensing right now, but are  
10 we equally aware and equally considering those  
11 units that are either existing and being uprated,  
12 or something like Watts Bar Unit 2 that is really  
13 under a very different process and could actually  
14 see power under the grid in a fairly short period  
15 of time?

16           MR. NEVIUS: I believe we are, again, this is not  
17 to say we should relax and take our eye off the ball.

18           I think it is important that we keep a high  
19 level of attention on the transmission grid  
20 requirements for the addition of these units,  
21 because it's not just one unit at Watts Bar, it's  
22 the unit at Watts Bar, it's the Vogtle units, it's

1 all of them in combination and that's why some of  
2 the broad-based regional and interregional studies  
3 of grid stability are so important modeling the  
4 system accurately.

5 We learn all the time when events occur  
6 where our modeling needs to be improved.

7 Doing that modeling, evaluating the impacts  
8 of all of these new units is critically important.

9 MR. MATTHEWS: I will just offer that certainly as  
10 part of the power uprate applications, for example,  
11 a revisiting has to take place with regard to the application's  
12 presentation of revised information that might have to be  
13 provided with regard to issues we have been discussing  
14 today.

15 So, that's an element, even though I didn't  
16 mention it because I was focused on projects yet to  
17 be in terms of operating, power uprates  
18 involve that kind of review, of course, in terms  
19 of whether some of those analyses that have been  
20 previously submitted in support of the original  
21 license need to be revisited.

22 That is done and the operating license

1 review that will have to take place relative to  
2 Watts Bar activity will engage at that point with  
3 the applicant on those issues.

4 CHAIRMAN JACZKO: Thank you for those  
5 presentations.

6 I said I had a question -- second question  
7 or perhaps a simple one and this may be a  
8 difference in jargon.

9 You mentioned in response to Chairman  
10 Wellinghoff the need for frequency response.

11 Mr. O'Neal, can you explain what that is?

12 MR. O'NEAL: Frequency deviates per load when  
13 there's a mismatch of load in generation, and it has to  
14 be -- it has to be constantly looked at by the operator --  
15 by system operators in order that it  
16 doesn't get too far out of line  
17 and if there's not enough frequency  
18 response in terms of megawatts of generation that  
19 can respond as Mr. Nevius was talking about, in a  
20 quick amount of time you can run into a reliability  
21 problem, and so that is the concern with frequency  
22 response.

1           There is a current frequency response  
2 standard.

3           It does a reasonable job, and I know there are  
4 drafting teams that are looking at changes to  
5 actually make it better.

6           CHAIRMAN JACZKO: Dave, generally, do we look at  
7 frequency response as much or are we more concerned with  
8 voltage support for nuclear facilities?

9           MR. MATTHEWS: Principally, voltage support.

10          I might add that since I've had a moment to  
11 reflect on Chairman Wellinghoff's question, as a  
12 generalist, I'll just suggest to you, that nuclear  
13 units are considered base-load generating units,  
14 they are not load-following units.

15          So, I think you implied and I will say  
16 directly, they are the last resort for any  
17 generation reduction with regard to a situation  
18 associated with maintaining grid stability.

19          MR. NEVIUS: I could add just a word to the  
20 frequency response issue.

21          We have seen over a number of years that  
22 when a generating unit or several generating units

1 trip off for some other reason, that the system  
2 frequency deviates more for the same number of  
3 megawatts lost than it had in previous years.

4 There are a number of factors related to  
5 this. We studied this issue back in 1993, made some  
6 recommendations about governor controls, about  
7 having adequate reserves on the system to be able  
8 to absorb that like a shock absorber.

9 From the perspective of the nuclear plant,  
10 when the system frequency goes down, your  
11 circulating water pumps slow down.

12 There is a point at which the unit will  
13 trip because the flow is too little, so this is  
14 where it really affects a nuclear plant.

15 Certainly, they're there to support the  
16 system in terms of voltage and frequency, but  
17 they're also dependent on system voltage and system  
18 frequency.

19 So, it's a two-way street.

20 MR. MALLETT: If I could jump in on the question  
21 from Chairman Wellinghoff since we started to answer.

22 When -- the impact on nuclear plants, when

1 you do reduce load is really -- the plant operates  
2 much better, with less risk if it stays steady.

3 If you start changing power levels, then you  
4 enter a more risk significant situation and we  
5 would rather not have that.

6 We would rather stay in a balanced steady  
7 power situation with the nuclear units.

8 CHAIRMAN JACZKO: Thank you. Any follow-up  
9 questions?

10 CHAIRMAN WELLINGHOFF: So, only way that works is  
11 if the nuclear plant is in fact truly base-load from the  
12 standpoint of economic dispatch.

13 In other words, that it's your cheapest  
14 unit on the system.

15 If it's not your cheapest unit on the  
16 system, you are paying much more for that unit than  
17 you otherwise would want to because you have other  
18 units out there that otherwise could come into the  
19 stack, from an economic dispatch perspective; is  
20 that correct?

21 MR. MALLETT: I'm not the expert on economics in  
22 that situation, but I was simply saying that when you do

1 reduce power on the nuclear unit it does impact the risk  
2 that you take with operating the unit.

3 As far as the considerations of economics  
4 for base-load I'm not an expert on that.

5 CHAIRMAN JACZKO: I think Jack will bail you out.

6 MR. GROBE: The name is Jack Grobe, one of the  
7 Deputy Directors in the Office of Nuclear Reactor  
8 Regulation, there's a number of issues that go into changing  
9 powers at nuclear power plants.

10 Power is not infrequently adjusted, a few  
11 megawatts to deal with equipment issues.

12 For example testing of valves, changing of  
13 rod patterns in the core, but those are just a few  
14 megawatts.

15 More significant power changes introduce  
16 things like what Bruce was saying, those require a  
17 lot of equipment manipulations and it introduces  
18 the potential for human factors concerns.

19 Human errors, things of that nature.

20 We don't consider ourselves that much with  
21 the economics, we focus strictly on the safety of  
22 the plant.

1           From a safety perspective, it also  
2 introduces changes in the dynamics of the core,  
3 because the neutrons that create fission also  
4 burn or destroy poisons in the core and the  
5 fission of the uranium nucleus creates poisons.

6           There is a unique balance that goes back  
7 and forth when you make power changes to building  
8 in of poisons and burning out of poisons and  
9 different things of that nature.

10          So, it changes the dynamics on how the fuel  
11 burns and this affects the efficiency in the fuel  
12 economy for the operator.

13          Not a concern of ours, but it creates  
14 instabilities in the way, not unsafe instabilities,  
15 but just changes in the way the core behaves.

16          So, all of those things introduce the  
17 opportunity for perturbations to the safety of the  
18 core from the standpoint of the way the operators  
19 have to respond.

20          CHAIRMAN JACZKO: Thank you.

21          I think that leads us nicely into our next  
22 panel which will talk more in detail about some of

1 these reliability issues and the grid reliability  
2 assessments and event analyses with some of the  
3 existing units.

4 We will change out the seats and will begin  
5 with the next set of presentations. (Panel Changes)

6 MR. MALLETT: As you said, Chairman Jaczko, this  
7 panel will talk about reliability standards and grid reliability  
8 efforts.

9 It also talks about some of the things you  
10 mentioned in the beginning of the cooperation we  
11 have had since we last met, that I'm quite proud  
12 of, between our two organizations due to the  
13 staff's efforts.

14 Let me introduce the panel members.

15 We are down to two for this panel.

16 It is Mr. David Andrejack who is the  
17 Director of the Division of Bulk-power Systems at  
18 the Federal Energy Regulatory Commission.

19 Then Mr. David Skeen who is currently our  
20 acting Director of our Division of Engineering in  
21 the Nuclear Regulatory Commission.

22 Both experts in their own right and I think

1 you'll appreciate what they have to say.

2 MR. ANDREJACK: Thank you, Bruce.

3 Mr. Chairman and Commissioners, good  
4 afternoon.

5 My name is David Andrejack and I'm the  
6 acting Director of the Division of Bulk-power  
7 System Analysis in FERC's Office of Electric  
8 Reliability.

9 I will present an overview of FERC's  
10 capabilities for monitoring and analyzing events  
11 that affect the safe, reliable operation of the  
12 bulk-power system.

13 Next slide, please.

14 The largest blackout to affect the United  
15 States occurred on August 14, 2003.

16 It affected more than 50 million people in  
17 both the U.S. and Canada.

18 Nine nuclear reactors tripped off-line in  
19 the U.S. and seven more in Canada tripped off as  
20 well.

21 After this blackout, Congress passed the  
22 Energy Policy Act of 2005 and gave FERC authority

1 over the reliability of the bulk-power system.

2 Included in EPACT 05 was section 1839.

3 This section directed the Secretary of  
4 Energy and FERC to study and issue a joint report to  
5 Congress on the steps that must be taken to  
6 establish a system to make available to all  
7 transmission owners, and regional transmission  
8 organizations within the Eastern and Western  
9 interconnections real-time information on the  
10 functional status of all transmission lines within  
11 such interconnections.

12 The system could give a near instant  
13 picture as to the health of the transmission  
14 system.

15 This monitoring is essential to industry in  
16 helping to prevent blackouts.

17 Prototype of such a system has been created  
18 in FERC's Office of Electric Reliability.

19 My staff monitors real-time conditions to  
20 provide situational awareness on the bulk-power  
21 system and analyzes events and disturbances as they  
22 occur.

1           We also provide technical analysis of  
2 emerging issues that may affect the bulk-power  
3 system for the Commission.

4           Next slide, please.

5           The prototype, which is known as  
6 reliability monitoring center, or RMC, is shown  
7 here.

8           The bifurcated center is where we receive  
9 and analyze secure data feeds from NERC, the  
10 reliability coordinators, and other sources.

11           The information that we receive is  
12 voluntarily provided to us in a geospatial format  
13 from all areas across the country.

14           Through these screens we can monitor near  
15 real-time conditions on all parts of the bulk-power  
16 system.

17           The RMC consists of two rooms, the  
18 conference room on the left allows us to conduct  
19 briefings and presentations while the control room  
20 shown on the right, has restricted access and  
21 allows us to protect confidential information.

22           We also have various commercial software

1 packages for system monitoring, modeling, and  
2 simulation in the secure room.

3 These rooms are connected by an intercom  
4 and privacy windows.

5 Next slide, please.

6 This screenshot shows an example of one of  
7 the items we monitor.

8 Through this display, NERC provides us with  
9 a high-level overview or snapshot of the health of  
10 the bulk-power system.

11 This slide shows the area control error  
12 display, or ACE.

13 ACE is a measure of the generation to load  
14 balance for each balancing authority.

15 The colors indicate the current balance  
16 between load and generation.

17 We also have a number of displays from  
18 reliability coordinators that provide us with  
19 high-level overviews of their systems.

20 They provide important operational measures  
21 as identified in the joint report to Congress and  
22 have historical trending capabilities. The date is provided over

1 secure Internet connections with confidentiality agreements, which  
2 was also noted in the joint report.

3 It is important to note that no data is  
4 stored at FERC, nor do we have operating control  
5 over any power system component.

6 Next slide, please.

7 During a system event, we pull together  
8 information from a variety of sources to build a  
9 complete picture of the situation and provide  
10 analysis.

11 In addition to the displays from NERC and  
12 the reliability coordinators, we have access to  
13 mapping applications, databases, and other  
14 monitoring tools.

15 This screenshot provides an overview of the  
16 bulk-power system substation that may have come  
17 into question and can help identify equipment that  
18 may be involved with an operational issue.

19 Next slide, please.

20 Staff regularly reviews status reports that  
21 include projected loading and reserves,  
22 informational planned and unplanned generation and

1 transmission outages, weather forecasts, and other  
2 relevant items.

3 We also coordinate with the electricity  
4 sector, information sharing and analysis center  
5 operated by NERC's situational awareness staff.

6 We review, monitor, and assess these  
7 notifications both during normal working hours,  
8 evenings, and weekends with emergency Blackberry  
9 coverage.

10 During event analysis mode, we utilize our  
11 visualization screens to review trending of  
12 historical data to construct pre-event conditions.

13 During events, we participate in emergency  
14 conference calls with NERC, other government  
15 agencies, including the NRC and industry.

16

17

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22

1           We also have regular reviews with items  
2 that occur with industry.

3           Staff provides relevant breaking reports to  
4 the Chairman, Commissioners, and senior staff that  
5 includes descriptions, locations, system element  
6 impacts, customer interruption numbers, and other  
7 relevant issues.

8           We do this without intrusion into the  
9 system operator's realm.

10          Thank you for the opportunity to provide  
11 insight into FERC's capability for situational  
12 awareness, and our event analysis process.

13          At the conclusion of Mr. Skeen's presentation I  
14 will be happy to address any questions or issues  
15 you may have.

16          MR. SKEEN: Good afternoon Chairman Jaczko,  
17 Chairman Wellinghoff, and the Commissioners.

18          I'm pleased to be here this afternoon to  
19 talk to you today and give you a little bit of an  
20 update on the joint activities of both the NRC,  
21 FERC, and NERC have undertaken over the last two  
22 years to support not only nuclear power plant

1 safety, but also bulk-power system reliability.

2 Next slide, please.

3 What I will try to cover in my presentation  
4 will be, first the NRC's interactions with both  
5 FERC and NERC since the last joint Commission  
6 meeting was held in April of 2008.

7 Then, also, our participation in the  
8 development of the grid reliability standards that  
9 affect nuclear power plants.

10 Our involvement in the joint investigations  
11 of grid related events that affect nuclear power  
12 plants, also our interactions with FERC and NERC  
13 when we are reviewing requests for power uprates, as  
14 well as enforcement discretion requests that we get  
15 from nuclear power plants.

16 Finally, I will talk a little about our  
17 ongoing communications that we have concerning grid  
18 conditions.

19 Next slide, please.

20 Following the April 2008 joint Commission  
21 meeting, the NRC staff received a few action items  
22 from the NRC Commission to follow up on.

1           We were directed to continue to work with  
2 FERC and NERC on the critical infrastructure  
3 protections standards that are related to the  
4 continuity of power for nuclear power plants.

5           We work closely with our counterparts in  
6 FERC and NERC to provide comments on the draft CIP  
7 standards and we have continued our close  
8 communication with FERC and NERC through regularly  
9 scheduled quarterly meetings to discuss areas of  
10 common interest since that time.

11           Also, we were directed to share with FERC,  
12 the lessons we learned from the experience we had  
13 with the comprehensive reviews that the Department  
14 of Homeland Security had performed for the nuclear  
15 sector.

16           That was at our nuclear power plants.

17           We met with the FERC staff and provided  
18 information in the background that we had on the  
19 comprehensive review program, the  
20 role of the NRC as well as other  
21 federal agencies in that program and the type of  
22 information and work products that could be

1 expected during those reviews.

2 Then, next, due to the interest that was  
3 expressed by one of the FERC Commissioners at that  
4 meeting about our enforcement process, we were  
5 asked to go meet with our FERC counterparts and  
6 explain how the NRC enforcement process works and  
7 to share information with our FERC counterparts.

8 Finally, we were also asked, this was  
9 shortly after the Florida blackout event in 2008,  
10 when we had this meeting, the  
11 NRC staff was asked to coordinate and  
12 work with FERC and NERC on the follow-up of the  
13 investigation of that event.

14 And we did that as well.

15 Next slide, please.

16 So, we've continued to work very closely  
17 with FERC and NERC as we have moved forward over  
18 these last two years.

19 We provided comments and met with FERC  
20 several times during the development of the grid  
21 reliability standards that are important to nuclear  
22 power plant safety from a grid interface

1 perspective.

2 That included standards such as -- just a  
3 short list, the generation of load balancing,  
4 emergency preparedness and operations, modeling  
5 data and analysis, transmission operation,  
6 transmission planning, and the voltage and reactive  
7 power standards.

8 More recently, as you heard in the previous  
9 presentation, the NRC staff did work closely with  
10 NERC on working on the Revision 2 -- we call in  
11 NUC-001, the nuclear plant interface coordination.

12 That was certified by FERC in January of  
13 this year.

14 Currently, we are participating in --  
15 there's a governing board for the National  
16 Institute of Standards and Technology's smart grid  
17 interoperability panel.

18 We have a member on that governing board  
19 that represents the relevant federal agencies, and  
20 that's an NRC staffer that does that.

21 The purpose of the panel is to participate  
22 in the ongoing coordination and harmonization of

1 the standards development for the smart grid.

2 In addition to that effort, the smart grid  
3 has now become a standing topic for our quarterly  
4 meetings that we have with FERC and NERC staff,  
5 that is basically just to ensure that the three  
6 organizations stay informed of any progress in the  
7 development of the standards as we move forward on  
8 the smart grid.

9 Next slide, please.

10 As I mentioned earlier, the NRC staff  
11 participated with FERC and NERC in developing the  
12 lessons learned out of the February 2008 Florida  
13 blackout event.

14 That actually tripped off two of our units,  
15 the Turkey Point Units 3 and 4 in Florida.

16 The staff reviewed the details of the event  
17 and determined in the final analysis that the  
18 Turkey Point Units had functioned as designed given  
19 the grid conditions that they saw, and so they did  
20 trip off as expected.

21 There was no further regulatory action for  
22 the NRC to take in that particular investigation.

1           Out of doing this investigation, however,  
2 we gained valuable experience from the evaluation  
3 that we performed and we agreed to coordinate in  
4 the future with FERC and NERC when other grid  
5 related events like this occur that could affect  
6 our nuclear plants.

7           The staff has also worked very closely with  
8 FERC and NERC during the 2008 hurricane season,  
9 that is basically to ensure that when the  
10 hurricanes come through, if we lose any nuclear  
11 units because of that our concern is to get offsite  
12 power restored to those units as soon as feasible.

13           So, we have had very good communications  
14 back and forth with FERC and NERC in getting that  
15 done.

16           Next slide, please.

17           Many of the nuclear plants in the U.S. have  
18 requested an increase in their license power limits  
19 over the last few years.

20           The NRC reviews these requests to determine  
21 whether the plant can meet all of our license  
22 requirements at the higher power level.

1           Our review requires us to take a look at  
2 the up-to-date understanding of the reliability of  
3 the grid in the vicinity where the plants' off-site  
4 power originates.

5           The licensee provides us with the  
6 information by getting it first from the grid  
7 operator who, of course, follows the NERC standards  
8 in providing that information.

9           In addition we sometimes receive requests  
10 from our licensees for relief from enforcement of  
11 our regulations for various particular reasons.

12           These requests sometimes are made during  
13 periods of extreme weather, and our licensees may  
14 cite the grid conditions as a factor in their  
15 request for the discretion from enforcement.

16           In those cases, we always -- we have a  
17 standing rule to contact FERC and NERC to first  
18 verify that the grid conditions that the licensee  
19 tells us are in fact what is out there.

20           That is part of our review as we do our  
21 enforcement discretion.

22           Next slide, please.

1           So for the grid monitoring, we continue to  
2 monitor the grid on a daily basis here at the NRC.

3           We provide a grid status report and post it  
4 on our internal website that we share with our  
5 regional counterparts in the four regions -- the  
6 four NRC regional offices.

7           Of course, any unusual grid condition that  
8 we receive, we contact FERC and NERC and talk our  
9 way through that to make sure we all understand  
10 what is going on.

11          This effort has been very useful in  
12 identifying potential stressful conditions on the  
13 grid in the various regions.

14          And has provided the NRC additional  
15 confidence that the nuclear plants can continue to  
16 operate safely through the peak summer months.

17          With that, that's the end of my  
18 presentation.

19          I look forward to any questions you may  
20 have.

21          CHAIRMAN JACZKO: Thank you Dave, I guess two  
22 Daves, if you will start with questions.

1 CHAIRMAN WELLINGHOFF: First of all, I do want to  
2 say, Gregg, I don't know if you and Commissioner  
3 Svinicki have seen our reliability monitoring center, but if  
4 you haven't, please we would love to have you tour that.

5 I know a number of your staff has seen it,  
6 but anybody from the Commission that is interested,  
7 we will make that offer.

8 We're very proud of what Dave has done and  
9 what Joe McClellan and his team have done to put  
10 that together, and we are constantly improving it.

11 We think it is a tremendous asset and we  
12 want to be able to share it with agencies like  
13 yours to be able to make full utilization of it.

14 CHAIRMAN JACZKO: Thank you, I appreciate that.

15 I think the last time I visited we had a  
16 brief walk through, I think the last time we had a  
17 FERC meeting.

18 I think when we do the next one it will be  
19 in your house and I think that would be a nice  
20 thing to do.

21 I don't know if Commissioner Svinicki has  
22 seen it.

1           COMMISSIONER SVINICKI: I did have the opportunity  
2 to tour through it with Mr. McClellan himself, so I had the  
3 expert there and it was very helpful.

4           Maybe next year, if we have new colleagues  
5 they can avail themselves of that opportunity.

6           CHAIRMAN WELLINGHOFF: We would love to do that  
7 with them.

8           A couple of questions, one with respect to  
9 the 2008 Florida blackout, you indicated Mr. Skeen,  
10 that Turkey Point plants 2 and 4 tripped.

11          MR. SKEEN: 3 and 4, yes.

12          CHAIRMAN WELLINGHOFF: 3 and 4.

13          When they tripped I assume there was no  
14 issue with respect to their safe and successful  
15 shutdown.

16          That was facilitated with the on-site  
17 backup generators.

18          MR. SKEEN: That's right with the diesel  
19 generators that they have providing emergency power.

20          They were on emergency power for a while.

21          CHAIRMAN WELLINGHOFF: It's an area that I'm not  
22 familiar with.

1           So, what then is required to have them  
2 successfully shut down?

3           MR. SKEEN: If we lose off-site power?

4           CHAIRMAN WELLINGHOFF: Yes.

5           MR. SKEEN: The plant immediately trips, the  
6 reactor trips, all the rods go in, it shuts off the  
7 reaction.

8           At that point you have decay heat that you  
9 have to get rid of.

10          Our emergency core cooling systems have to  
11 come up and run, we have a lot of pumps that move  
12 water through to cool the core.

13          So, that happens with emergency power.

14          In Turkey Point's case, they have diesel  
15 generators, emergency diesel generator that come  
16 up, take on the loads of the pumps, and then the  
17 pumps cool the core down.

18          CHAIRMAN WELLINGHOFF: I have no idea of scale,  
19 what's the magnitude of that load that you have to meet to  
20 be able to safely shut a plant down?

21          MR. SKEEN: 5 megawatts.

22          CHAIRMAN WELLINGHOFF: So, a 5 megawatt generator

1 will do it then, okay.

2 That is for pumping, cooling pumping?

3 MR. SKEEN: That is for -- to make the valves  
4 actuate and have the cooling pumps come on and run  
5 and circulate the water through.

6 CHAIRMAN WELLINGHOFF: Great, thank you.

7 You talked about -- you do a grid status  
8 report prepared daily, you draw information from  
9 our reliability monitoring center, I assume, in  
10 part to help you with that report.

11 What other sources, if any -- ?

12 MR. SKEEN: Our source of getting the grid status  
13 comes directly through the licensees.

14 We don't come through NERC and FERC for  
15 that.

16 We monitor through that.

17 If we have questions, if there are adverse  
18 conditions, that's when we would call FERC or NERC.

19 CHAIRMAN WELLINGHOFF: Let me understand here.

20 You get grid status from the licensees so,  
21 for example, Southern Company would provide you  
22 with status of their grid where their nuke plants

1 are located on a daily basis, or how does that  
2 work?

3 MR. SKEEN: George is our branch chief of our electrical  
4 engineering branch.

5 MR. WILSON: We go to the ISO's, we go to New  
6 England ISO's website, PJM's website, Midwest ISO's website,  
7 and we actually go and to look at what they have their  
8 projected in the rolling reserves or if they have any alerts.

9 So, we actually go to the Independent  
10 System Operators and the Southeast Reliability  
11 Council. We'll go to SERC and get the information from the Reliability  
12 Councils and build up our own grid report based on that.

13 If things do change, that's when we will go  
14 to NERC and FERC and get the actual status going on  
15 right then.

16 We will contact your staff and get them to  
17 contact the ISO's or the local transmission  
18 companies to try to get that exact information, but  
19 we actually go to the ISO's websites and pull that off.

20 MR. ANDREJCAK: I might add that we do our own  
21 separate morning report internally where we're assessing  
22 both the resource adequacy and any transmission lines that

1 may or may be coming out on a plan basis.

2 Or if there's -- perhaps in this instance  
3 we've had a storm, multiple lines have been  
4 effected, we can better assess the system at that  
5 point, that's where we begin our coordination with  
6 the folks here.

7 CHAIRMAN WELLINGHOFF: So, do you share that  
8 report with the NRC?

9 MR. ANDREJCAK: No, that's an internal report only  
10 that we do.

11 CHAIRMAN WELLINGHOFF: That might be one area where we might  
12 be able to share more information potentially.

13 Gentlemen, any questions.

14 COMMISSIONER MOELLER: First, an observation then a question. We  
15 have a long way to go but I don't think we should forget that we have made a lot  
16 of progress in terms of reliability in the bulk-power system.

17 Compared to August 14, 2003, we can now go  
18 to either our reliability center or even if you're  
19 at the Midwest ISO, they can see things now  
20 instantly that they couldn't have seen in August of  
21 2003.

22 Again, we have made -- we have a long ways

1 to go, but we made a lot of progress, too, in terms  
2 of the transparency.

3 If you want to comment on that, feel free  
4 but the question is more along the lines of I'm  
5 afraid I see a day coming where because it is so  
6 difficult to site and construct and perhaps I have  
7 cost allocation for new transmission that we may  
8 have to in working with NERC, essentially order  
9 some transmission to be built for reliability  
10 purposes, and I'm just curious if the NRC has  
11 contemplated that scenario and if so how you might  
12 play a role in that.

13 MR. SKEEN: I don't know that the NRC has  
14 contemplated ordering more transmission to be built in this  
15 country.

16 As part of our review, when we get a  
17 license amendment request for a power uprate or a new  
18 license, one of the things we ask the licensee is  
19 will the grid support this.

20 So, it is up to the licensee to explain to  
21 us why the grid is sufficient to do that, from a  
22 safety standpoint.

1           Our safety review mandates that we make  
2   sure that the grid is able to support the plant  
3   when it comes on line.

4           Or that the plant is not such a large load  
5   that if it trips off it brings the rest of the grid  
6   down.

7           That is part of our review -- our licensing  
8   review when we go through that, but as far as us  
9   mandating what transmission has to be there, we  
10   don't do that part.

11           MR. ANDREJCAK: I might add that what I heard from the  
12   890 transmission planning conferences that were held here  
13   fairly recently that I had chances hit at the panel, it was very much  
14   recurring theme from both the renewables from the other  
15   folks in the room as well and it reminded me when I started  
16   with industry many years ago I still don't want to call  
17   myself an old-timer, but at the time that I was a young  
18   buck, one of the fellows said to me when I was very excited  
19   about the plans that we had just come out with in a very dry  
20   sense of humor, looked at me and said son, plans are great,  
21   doing is better.

22           We heard that at 890 transmission planning

1 conferences as well that folks really know that we  
2 have a need to get out there and get things done,  
3 at this point we're being very deferential --  
4 pretty much an understanding mode about how we are  
5 going to get that done but definitely things need  
6 to move forward.

7 COMMISSIONER NORRIS: Are there any issues unique to  
8 nuclear facilities that we should be paying attention to on  
9 interoperability standards?

10 MR. SKEEN: On the smart grid you're talking  
11 about?

12 As far as the smart grid goes, they  
13 don't directly impact nuclear power plants.

14 The smart grid is designed to make a more  
15 efficient use of electricity for consumers and  
16 industry, but as far as a nuclear power plant goes  
17 we have no communication with any of our safety  
18 related devices with the Internet, so there is no  
19 incoming communication we only have communications  
20 outward from our safety systems for indication  
21 purposes or something like that.

22 So, what we would see if there was a smart

1 grid event the most nuclear power plant would  
2 probably see, it would look like a loss of load  
3 event, it would trip the unit off.

4 If there was some kind of event that would  
5 cause a loss of load for the plant.

6 Having said that, not having a reliable  
7 grid if that comes to pass, that could be a concern  
8 for our nuclear plants, but today we don't see that yet  
9 and I think part of what the NIST panel is trying to  
10 come up with on the standards is how do we ensure  
11 that that continues to take place, that we can  
12 protect the grid from having the convenience of  
13 having smart grid and having the communications  
14 without having the problems or the potential bad  
15 effects of tripping the plants off line.

16 COMMISSIONER SVINICKI: Thank you.

17 I might just follow on Mr. Skeen -- to your  
18 response to Commissioner Norris on that, though.

19 NRC's involvement or representation on the  
20 NIST smart grid panel it is important for  
21 reliability issues, as you mentioned there, but  
22 also would you agree -- we are looking at what I

1 will call a system architecture that you described,  
2 although nuclear power plants might not have a real  
3 direct nexus with smart grid architecture.

4       Still and all maybe even principally also  
5 from a cyber security standpoint, we kind of need  
6 to know the overall system architecture so that we  
7 can be assured as a nuclear safety regulator that  
8 we are looking at issues of what is the  
9 conductivity of systems that are important to  
10 safety at a nuclear plant.

11       So again, maybe I feel that I am very  
12 pleased the NRC has the opportunity to have a  
13 representative on the smart grid panel, though we  
14 might not be the most vocal participant in the room  
15 I think it is important that we be in the room.

16       MR. SKEEN: I think you're exactly right  
17 Commissioner.

18       That was one of the reasons we wanted to  
19 make sure we had someone from NRC involved in this  
20 panel as the reliability standards are being  
21 developed.

22       It's actually someone from our Nuclear Security

1 and Incident Response group that's on that.

2 Cyber security piece is a very big piece of  
3 why we are having our involvement in that panel.

4 COMMISSIONER SVINICKI: Thank you for that, I just  
5 wanted to make sure that we got that onto the record.

6 Then, Mr. Skeen you mentioned that one of  
7 the coordination activities that was an outgrowth  
8 of the 2008 joint meeting of the two Commissions  
9 was that there was a discussion, or I think you  
10 said NRC shared experiences with FERC on  
11 enforcement.

12 What was the general outcome of that  
13 evaluation?

14 Was it a comparison of enforcement  
15 processes, or penalty levels, or remind me of what  
16 was the basis of that and what was the result of  
17 that comparison or sharing of experiences.

18 MR. SKEEN: I'm probably not the best one to  
19 answer this question since I'm not involved with our  
20 enforcement group, but my understanding was we shared how we  
21 do enforcement actions with FERC because they were looking  
22 into getting more into the act of taking enforcement for

1 grid issues.

2           So we shared how we do business, they were  
3 pleased to hear what we did and we heard some from  
4 their side of how they do business, and both sides  
5 said they had a better understanding of how the  
6 enforcement takes place.

7           MR. BOWMAN: Greg Bowman, Office of Enforcement. Just to echo  
8 what Dave said, we really just went and shared our enforcement process with  
9 FERC and that was pretty much the extent of our meeting with  
10 them.

11           COMMISSIONER SVINICKI: Is that a continuing  
12 coordination, or was it just the information was shared and  
13 it's not an ongoing activity?

14           MR. BOWMAN: I'm not sure that we have ongoing --  
15 we share, as Dave mentioned, if there's a discretion issue  
16 that are going on.

17           We do interact with FERC from that  
18 standpoint, I don't know that we have any ongoing  
19 sharing of enforcement knowledge.

20           We have the MOU for cyber security that is  
21 in place.

22           COMMISSIONER MOELLER: I believe that part of the context

1 was that you at the NRC have had a long, long standing  
2 tradition of being an enforcement agency.

3 We really became a major league enforcement  
4 agency with the passage of the 2005 Act, and we  
5 thought we had things we could learn from you in  
6 terms of how to do it right and I think it was a  
7 productive effort and that we should probably have  
8 done a better job of thanking the NRC for giving us  
9 their knowledge base.

10 So thank you.

11 COMMISSIONER SVINICKI: Thank you for that.

12 I was not trying to solicit that, I assure  
13 you.

14 I have one question and this may be more  
15 succinctly put to the next panel because they can  
16 talk about it in cyber security space, but we are  
17 coordinating well as two Commissions and with NERC,  
18 but would either of the Daves have a perspective on  
19 for our regulated entities, what do  
20 you think is their sense of how  
21 clear it is whose jurisdiction starts and stops  
22 where, and what do you think would be the regulated

1 community's perspective on how seamless the  
2 coordination is on these issues we're discussing  
3 today?

4 MR. SKEEN: You're right, it is a better question  
5 for the next panel.

6 I will say that starting off.

7 Clearly, I think the regulated community  
8 they may not be completely clear on whose  
9 jurisdiction is each component that we are looking  
10 at in the plants, and we're going to work through  
11 that.

12 I think you will hear more in the  
13 presentations in the next panel of how they are  
14 doing that.

15 MR. ANDREJCAK: I would add there's been a lot of  
16 efforts taking place across government, the smart grid task force  
17 is one I participate on.

18 There's been a lot of activity in trying to  
19 coordinate efforts.

20 It is a clear message coming out from us as  
21 far as what will be expected.

22 Is it totally clear at this point, I don't

1 think so because folks are still trying to get a  
2 better understanding of what the smart grid will  
3 entail, what cyber will entail.

4 What I will say from what we have seen from  
5 the reliability aspect, the biggest threat to  
6 reliability is non-compliance with the standards.

7 We want to make sure that we have very  
8 strong standards in place and I'm sure the next  
9 panel will be glad to talk about those standards.

10 COMMISSIONER SVINICKI: Okay, thank you.

11 Thank you, Mr. Chairman.

12 MR. MALLETT: I would like to add if I may, what I  
13 am hearing from the regulated community, at least the  
14 nuclear power reactor community, is that they would prefer  
15 to have one regulator and not have multiple regulators.

16 Given, if they can't have that, at least  
17 they would like us to have one set of standards  
18 that we all rely upon and are equivalent.

19 I think that is the area we are focusing on  
20 is to make sure we have one set of standards and  
21 that reliability doesn't trump safety in the  
22 operation of these plants.

1           COMMISSIONER SVINICKI: Okay, well you have teed  
2 that up well for your cyber colleagues, thank you.

3           CHAIRMAN JACZKO: If I could just turn back to  
4 smart grid.

5           First of all, I think -- I certainly think  
6 as Chairman Wellinghoff said there may be some  
7 value in the report that you produce and perhaps in  
8 the interest of trying to take advantage of the  
9 goodwill in our sharing information with you about  
10 our enforcement, perhaps I could solicit an offer  
11 to have you share your report on reliability that  
12 may be something that is useful to us.

13           It may be easier than the process we're  
14 going through now to generate some of that  
15 information ourselves.

16           Perhaps that is something we could do and  
17 we can certainly share with you the kinds of things  
18 that we're producing daily.

19           It is not tremendous and terribly  
20 sophisticated, it is more an outgrowth of the  
21 meetings that we have had in an attempt to have us  
22 have better awareness of the reliabilities and

1 again the potential impact that that may have on  
2 plant safety.

3 For instance, if there is activity going on  
4 with a transmission system that may lead to an  
5 alert in a particular area and the plant is  
6 planning to do some risk sensitive maintenance that  
7 may be something we would work with our licensees  
8 to see if that is something they could reschedule  
9 given the compounding risk significance of the  
10 potential for transmission or reliability transient  
11 and then something having because of the maintenance  
12 activity.

13 I think that maybe something that could be  
14 useful to you as well to see that.

15 On the issue of the smart grid, this is  
16 perhaps a simple question, but is one of the  
17 goals -- or potentially one of the outcomes of the  
18 smart grid increased reliability, potentially better  
19 management of load, or is it the potential for  
20 reduced reliability, or do people not know yet?

21 MR. ANDREJCAK: Smart grid, I think, at this point  
22 it is best described as everything in its best realm for

1 everybody.

2       It's improved communication to make maximum  
3 efficiencies at the lowest cost.

4       I know that sounds like a lot of buzzwords  
5 but really that is what you are hearing right now.

6       There is so much potential for what the  
7 smart grid can do for real-time operations, it is  
8 really limitless.

9       And if you think about all the magical  
10 things that take place on the grid regarding an  
11 instantaneous delivery of power, in lieu of firing  
12 up an additional generator somewhere if you can control  
13 things that are basically unknown to the consumer  
14 like defrost cycle on the freezer,  
15 if you can not have a conglomeration of  
16 those running at one time to reduce power output at  
17 a plant somewhere, your overall effect the cost  
18 benefit for the consumer.

19       There is really whole lot of conglomeration  
20 going in, but it also opens yourself up to threats,  
21 too because you can have an enemy that's subversive to  
22 the country that looks at turning all of those on

1 at one-time which could have a negative effect.

2 That is part of the cyber security things,  
3 again, we have to really get down, very strongly  
4 before we proceed.

5 CHAIRMAN JACZKO: You could have the potential to  
6 manage load rather than having to deal with the generation  
7 side, you can deal with the demand side and reduce defrost  
8 cycles on refrigerators rather than having to power  
9 down a coal unit.

10 MR. ANDREJCAK: By sending signals as well, things  
11 that benefit the consumer.

12 CHAIRMAN JACZKO: I appreciate that.

13 Dave if I could just ask you -- Dave  
14 Skeen -- sorry, a general question as well.

15 I remember one of the first public meetings  
16 we had as joint Commissions, the focus at the  
17 time for the NRC was improving our awareness of  
18 reliability and we had a meeting prior to the  
19 coming summer 2006 and one of the things were  
20 focusing on was the work we were doing to put in  
21 place some new, I think we had a temporary  
22 structure or some inspection mechanism to really

1 see that our licensees were preparing themselves  
2 for the summer months and the increased potential  
3 for grid instabilities that could have an impact  
4 on their safe operations.

5 Where would you say that we are today  
6 relative to where we were back in 2006 in our  
7 licensees awareness of these issues?

8 MR. SKEEN: That's a good question and you're  
9 right, we did do a every instruction at that time, that has  
10 now become a permanent inspection procedure, it is called  
11 the adverse weather procedure that we have.

12 That is done every spring by our inspectors  
13 and it's an inspection that we look at the  
14 power plant to say are you ready for the coming  
15 summer months, have done the things that you're  
16 supposed to do to be ready.

17 That has worked out very well.

18 We've seen that have really good effects in  
19 the industry.

20 MR. ANDREJCAK: I might add to that, we do have a  
21 reliability standard in place TOP001-1 R7 and requires  
22 generators to coordinate with transmission operators in the

1 event they do have a plant that is coming up for scheduled  
2 maintenance so it doesn't adversely affect the operation of  
3 the grid.

4 CHAIRMAN JACZKO: Again, thanks for a very  
5 interesting information and we will turn to our last panel  
6 on cyber security.

7 MR. MALLETT: The last panel, as we talked before,  
8 is going to discuss cyber security activities.

9 This is another area where we have had  
10 tremendous cooperation efforts and activities since  
11 we last met in 2008.

12 Our speakers, again, are experts but we  
13 don't have any David's on this panel.

14 Our first speaker will be Mr. Gerry Cauley,  
15 President and Chief Executive Officer of the North  
16 American Electric Reliability Corporation.

17 Followed by Regis Binder, the Federal  
18 Energy Regulatory Commission.

19 Last will be Scott Morris a Deputy Division  
20 Director in our Office of Nuclear Security and  
21 Incident Response in the Nuclear Regulatory  
22 Commission.

1 Gerry, please take it away.

2 MR. CAULEY: Thank you.

3 Chairman Jaczko, Chairman Wellinghoff, and  
4 distinguished Commissioners my name is Gerry  
5 Cauley, I am pleased to be speaking with you today  
6 on a subject of paramount importance to all of us.

7 The cyber security of our nation's  
8 bulk-power system.

9 Although I've only recently been appointed  
10 as NERC's President, my involvement in physical and  
11 cyber security extends back approximately a decade.

12 In that time, I've developed a deep  
13 appreciation for the complexity and unique  
14 challenges of protecting our nation's electricity  
15 infrastructure.

16 NERC has several important responsibilities  
17 in meeting these challenges and what I would like  
18 to touch on today is just a few of those examples.

19 Second slide, please.

20 The areas I touch on today include our  
21 overall mission and vision for ensuring that there  
22 is adequate protection of and mitigation of risk to

1 the bulk-power system.

2 Our action plan for identifying and  
3 prioritizing assets the most critical to be  
4 protected.

5 A new critical infrastructure protection  
6 policy that clarifies roles, responsibilities, and  
7 objectives.

8 Our next steps in addressing the well-known  
9 Aurora vulnerability.

10 Our plan for implementing the NRC/NERC  
11 agreement regarding oversight of cyber security at  
12 nuclear power plants.

13 Next slide.

14 In terms of our overall vision, it is to  
15 improve the reliability of the bulk-power system by  
16 fostering a culture of continuous learning and  
17 improvement by industry.

18 We also have roles as the self regulatory  
19 organization in promoting compliance excellence and  
20 enforcing compliance with our mandatory standards.

21 A key element of our vision is establishing  
22 policy level goals for the physical and cyber

1 security protection of our critical bulk-power  
2 system assets.

3       These security goals include facilitating  
4 proactive industry actions for the effective  
5 mitigation of security risks, establishing bright  
6 line criteria for identifying and prioritizing  
7 critical assets, working closely with government to  
8 ensure availability of actionable information on security  
9 threats, and promoting synergies between government  
10 and industry.

11       We will be continuing to engage in incident  
12 reporting, analysis, and feedback to the industry  
13 and communicating our collective industry efforts  
14 to government and the public.

15       Next slide.

16       NERC has recently completed its third  
17 biannual survey of the industry's identification of  
18 critical cyber assets.

19       The results of the first two surveys were  
20 reported to FERC as will be the latest survey which  
21 was just completed in January, as soon as the data  
22 has been analyzed.

1           We see improvements in the data, but need  
2 to continue working with industry to achieve a  
3 fuller understanding of the types of threats facing  
4 the bulk-power system.

5           We are now actively working on a revised  
6 draft standard for the prioritization of critical  
7 cyber assets into high, medium, and lower impact  
8 categories.

9           This ranking will be used to determine how  
10 our future security requirements will be applied to  
11 the bulk-power system.

12          This approach aligns well with our strategy  
13 of effective risk management.

14          The goal is to prioritize protection of  
15 cyber systems based on potential impacts to  
16 reliability, operability, and recoverability of the  
17 bulk-power system and to apply security controls to  
18 make sure that these potential impacts are  
19 addressed.

20          Next slide.

21          NERC has drafted a bulk-power system  
22 critical infrastructure protection policy statement

1 that will set forth guidance on critical  
2 infrastructure protection, threat detection, and  
3 response, system resilience, and restoration  
4 and recovery operations.

5 We expect this policy will be approved by  
6 our board later this year following a comment  
7 period by industry.

8 Next slide.

9 Turning to Aurora, in June of 2007, the  
10 NERC electricity sector information sharing and  
11 analysis center issued an advisory informing the  
12 electricity sector entities of a potential  
13 vulnerability known as Aurora.

14 Which if exploited, could result in  
15 physical damage to certain power system equipment.

16 Based on information available at the time,  
17 we believe that entities implemented mitigation  
18 measures that they considered to be appropriate.

19 Yesterday, NERC issued a new advisory to  
20 all NERC registered entities providing additional  
21 engineering details regarding both the nature of  
22 Aurora and effective actions to enhance mitigation.

1           We believe this approach of translating  
2   classified information from government sources into  
3   unclassified but protected information that is  
4   actionable by industry, is a good precedent going  
5   forward and a positive example of industry and  
6   government working together on a vital issue.

7           Turning finally to the NRC NERC MOU.

8           In December 2009, as the Chairman  
9   mentioned, NERC and the NRC signed an agreement  
10   regarding the oversight of cyber security at  
11   nuclear power plants.

12           This agreement, which was the result of  
13   very careful and thoughtful discussion by our two  
14   organizations, clarifies that the NRC is  
15   responsible for inspecting digital assets that can  
16   affect safety, security, and emergency preparedness  
17   at nuclear plants and enforcing applicable NRC  
18   cyber security standards.

19           The agreement also recognizes that NERC is  
20   responsible for inspecting assets that can affect  
21   the continuity of bulk-power supply and enforcing  
22   compliance with our cyber security standards.

1           NERC is currently working to develop a  
2 survey instrument for licensees to determine which  
3 systems and components within the plant should be  
4 excluded from the NERC critical infrastructure  
5 protection requirements on this basis.

6           We are rolling out that plan through a  
7 series of industry workshops coming up.

8           I will point out there are some members of  
9 the team that are working on this project to get  
10 the bright line demarcation within the plants, are  
11 here in the room today.

12           Thank you and I will look forward to your  
13 questions.

14           MR. BINDER: Good afternoon Chairman and  
15 Commissioners, my name is Regis Binder, I am with the Office  
16 of Electric Reliability at FERC.

17           Since the last joint meeting of the NRC and  
18 FERC, much progress has been made in the compliance,  
19 and monitoring, and enforcement of critical  
20 infrastructure protection especially cyber security  
21 standards on the bulk-power system, but much work  
22 remains to be done.

1 Today, I would like to give you an update  
2 on technical feasibility exceptions, critical asset  
3 determinations, cyber security standards in nuclear  
4 power plants, which I thought you might be interested in,  
5 and FERC's request to Congress for additional  
6 authority.

7 Next slide, please.

8 The concept of technical feasibility  
9 exceptions was authorized by FERC in Order  
10 #706 in January 2008, when the Commission approved  
11 the first mandatory cyber security standards for  
12 the bulk-power system.

13 The exceptions allowed the Commission to  
14 require security measures even though some  
15 companies had equipment that could not comply.

16 These companies would be able to obtain  
17 exceptions but with conditions attached.

18 Next slide, please.

19 For example, companies with exceptions  
20 would have to use mitigating measures to address  
21 the vulnerability, they would have to develop a  
22 plan for terminating the exception, and they would

1 have to prove the need for the exception during an  
2 audit process.

3 Next slide, please.

4 The mechanism to implement technical  
5 feasibility exceptions was approved by the  
6 Commission on January 21, 2010.

7 With the compliance required to  
8 address some Commission concerns.

9 Next slide, please.

10 Identification of critical assets as  
11 required by the cyber security standards has  
12 developed into an area of widespread concern.

13 The standards require companies to use a  
14 risk-based methodology to identify critical assets,  
15 such as generating plants for substations.

16 And to protect critical cyber assets that  
17 are essential to the reliable operation of those  
18 critical assets.

19 So, the identification of the critical  
20 assets themselves, the generators and substations,  
21 that drives which critical assets fall under the  
22 mandatory protection of the cyber security

1 standards.

2 Next slide, please.

3 The standard's drafting team formed by NERC  
4 to implement Order 706, has been working to propose  
5 changes to the cyber security standards that would  
6 require proper protection of the appropriate cyber  
7 assets.

8 NERC recently posted a partial draft of  
9 that standard, which CIP-002 Version 4, for public  
10 comment.

11 As Mr. Cauley mentioned, the posted  
12 standard would incorporate three levels of impact  
13 high, medium, or low and would require companies to  
14 protect all cyber systems that have the potential  
15 to adversely impact functions critical to the  
16 reliability of the bulk-power system.

17 Such functions would include under  
18 and over frequency protection, balancing load and  
19 generation, and controlling frequency and voltage.

20 The amount of cyber protection required for  
21 any given cyber system would depend on the  
22 potential impact that it and the bulk-power

1 facility that it controls could have unreliability.

2 Next slide please.

3 At the April 2008 joint NRC/FERC meeting,  
4 the application of cyber security standards in  
5 nuclear power stations was raised by the NRC staff.

6 Since that time, steps have been taken to  
7 address this issue, although work still remains to  
8 be completed.

9 In March of 2009, FERC issued Order number  
10 706(b) which stated that the balance of plant  
11 portion of a nuclear power station was subject to  
12 cyber secure standards enforced by NERC with FERC  
13 oversight.

14 However, plant owners could request  
15 exceptions for specific equipment if it were under  
16 the cyber security regulations of the NRC.

17 Since that time, NERC and the NRC staffs  
18 have completed a Memorandum of Understanding  
19 establishing a framework for cooperation on cyber  
20 security in nuclear power stations.

21 Some issues, such as details of the  
22 exception process remained to be finalized, but I

1 think a lot of work -- good work has been done so  
2 far and I would especially like to express  
3 appreciation to the NRC staff for the assistance  
4 they have provided to NERC in this effort.

5 Next slide, please.

6 On several occasions FERC staff has  
7 testified before members of Congress about  
8 shortcomings of the current method used by industry  
9 to develop new and modified reliability standards  
10 when addressing emergencies or matters of national  
11 security.

12 There are three specific concerns expressed  
13 by FERC staff.

14 Number one, the methodology takes a long  
15 time.

16 The process includes defining the scope of  
17 the issue to be addressed, forming a drafting team  
18 of volunteers, drafting a standard, posting the  
19 draft for comments, and addressing all comments  
20 submitted, conducting usually multiple ballots and  
21 obtaining NERC board approval.

22 Number two, the methodology is open to the

1 public.

2       While this is appropriate for most  
3 reliability issues, it is a problem with matters of  
4 national security.

5       Certain sensitive information should not be  
6 discussed in public before it is addressed in such  
7 a way as to close the vulnerability to national  
8 security.

9       Number three, the outcome is uncertain.

10       The drafting and balloting process may run  
11 its course and not result in a draft that  
12 adequately addresses the problem.

13       Neither NERC nor FERC have control over the  
14 resulting proposed draft.

15       The Commission can remand an inadequate  
16 proposal, but it cannot rewrite the proposal to  
17 address a concern.

18       NERC has developed an emergency action  
19 process that partially addresses some of these  
20 concerns.

21       In summary, I would like to just say that  
22 NERC, the electric industry, and FERC have made

1 progress on cyber security standards, but much work  
2 remains to be done.

3 If the approach incorporated in the  
4 recently posted CIP standards for identifying  
5 critical assets were adopted, it would result in  
6 significant changes and modifications to the other  
7 standards as well.

8 Thank you for your attention.

9 MR. MORRIS: Thank you Mr. Chairman, Chairman  
10 Jaczko, and Chairman Wellinghoff, Commissioners.

11 I appreciate the opportunity to be before  
12 you again today.

13 I had the opportunity two years ago or so  
14 when we last met.

15 I would like to give you today just a brief  
16 overview of the activities we have been involved in  
17 here at the NRC with respect to cyber security.

18 You may recall at the last meeting the NRC  
19 had proposed a series, a set of regulations for  
20 cyber security.

21 I'm pleased to report now that that  
22 regulation has been finalized, it was published

1 last spring and I will touch on that in a little  
2 bit more detail here in a subsequent slide.

3 Next slide, please.

4 slide two.

5 Quickly, want to talk about today the new  
6 regulations that I just mentioned, the guidance  
7 that went along with it, those are both activities  
8 that have been completed.

9 I would also spend a minute or two talking  
10 about where we are with respect to individual plans  
11 that have been submitted by individual licensees or  
12 nuclear power plant sites, and the associate  
13 schedule upon which they will be implementing their  
14 plans and be fully in compliance with our new  
15 requirements.

16 That is an ongoing activity as we speak.

17 Looking forward we are just at the  
18 beginning of developing our oversight programs that  
19 will have our inspection -- inspectors in the field  
20 looking at how each licensee has implemented the  
21 rules and the provisions of the security plans that  
22 we are in the midst of reviewing now, and then I

1 will touch briefly on some NRC perspectives on the  
2 development of the NERC MOU and a few other items.

3 Next slide, please.

4 With respect to the new regulations, I  
5 mentioned that they were finalized in March after  
6 being noticed in the Federal Register for 60 days  
7 they became effective.

8 The key element and you may know this, you  
9 may not.

10 It is a very performance-based rule. The  
11 ultimate performance objective of the rule is to  
12 ensure that our licensees are to be able to protect  
13 against adversary characteristics defined in what  
14 we call the design basis threat with high  
15 assurance.

16 The design basis threat is itself a  
17 separate rule that the NRC revised in 2007 that  
18 included in it for the first time in 2007 cyber  
19 attack, as something that our licensees have to be  
20 able to defend against with high assurance.

21 Again, it's a performance standard that  
22 ultimately the cyber security program that our

1 licensees implement have to be able to achieve.

2       As a consequence when you look at the rules  
3 that we just issued last spring, it defines within  
4 its scope the protection of systems associated with  
5 nuclear safety, nuclear security and emergency  
6 response.

7       Digital assets, I should say, associated  
8 with those three functions.

9       A key element of the rule include defense  
10 in depth, it is simply not good enough to have one  
11 barrier to an attack we require, by regulation,  
12 multiple barriers.

13       In addition, the application of a  
14 comprehensive set of security controls, I will  
15 speak about that briefly in another slide or two.

16       And finally, the rule required that each  
17 licensee submit to the NRC a comprehensive cyber  
18 security plan for how they will establish and  
19 maintain a cyber security program to be able to  
20 defend against the design basis threat of cyber  
21 attack.

22       Finally, the rule required rather than

1 specify a specific deadline by which they had --  
2 each licensee had to be in compliance with those  
3 regulations, rather required each licensee to  
4 submit the NRC for approval an implementation  
5 schedule that each licensee would be in compliance  
6 with the rule.

7 Next slide, please.

8 The regulatory guidance documents that are  
9 a companion to the regulation has also been  
10 completed.

11 The rule, itself, is very programmatic in  
12 nature.

13 The details of how best -- or how the  
14 NRC -- one way that the NRC would like to see the  
15 rule implemented is specified in some fairly high  
16 degree of detail in our regulatory guidance  
17 document which was issued just a few months ago.

18 A couple of things that I will point out  
19 about the regulatory guide, it's a document that  
20 was developed over the course of a few years in  
21 close collaboration with a lot of stakeholders not  
22 only internal, but other federal agencies and other

1 organizations that have cyber security  
2 in their portfolio of expertise.

3 In particular the regulatory guide includes  
4 a set of security controls that have been adapted  
5 from the National Institute of Standards and  
6 Technology, special publications that are focused  
7 on cyber security not only for information  
8 technology systems but also industrial control  
9 process control systems.

10 So, our Reg. Guide consistent with what  
11 NIST would suggest adapts those NIST controls for  
12 the particular use of the nuclear industry.

13 Those are all in the Reg. Guide now.

14 In addition, the regulatory guide includes  
15 a template of what a generic cyber security plan as  
16 an aid to our licensees, or applicants for new  
17 nuclear reactors as they develop the licensing  
18 document that they need to submit to the NRC for  
19 approval.

20 Finally, I would just offer one other  
21 comment on the control set themselves, and that is  
22 that the NIST controls that we utilized that form

1 the basis for the Control Set in the Reg. Guide, are  
2 out there and address the known universe of threats  
3 and vulnerabilities as they know them today.

4 So, those things evolve over time.  
5 and our regulatory guidance will also  
6 necessarily have to evolve over time.

7 But it's also why the rule is  
8 performance-based because we can't keep up with the  
9 regulations as quickly as the threats and  
10 vulnerabilities in this particular region.

11 Next slide, please.

12 Just a bit more on the site-specific plans  
13 that I mentioned, the rule required that each  
14 licensee submit the rule actually required the  
15 licensees submit them by November of last year  
16 which, in fact, did occur.

17 We received plans from all 65 sites that  
18 are unique to each -- the particulars of each site.

19 We are very much in the throes of  
20 conducting our detailed licensing reviews of those  
21 documents with an objective of completing all of  
22 those reviews on or before October of this year.

23 Once completed and we've approved them,

1 they will be incorporated as a condition of the  
2 operating license for each facility which will make  
3 them enforceable.

4 The provisions of those plans will be fully  
5 enforceable, and I would just point out that that's  
6 entirely consistent with how we regulate physical security as well.  
7 Physical security plans are also a condition of their operating license.

8 Next slide.

9 Implementation schedules, I mentioned that  
10 we didn't specify a hard and fast date by which all  
11 licensees had to be in compliance.

12 The principal reason for that -- there are  
13 a number of factors.

14 First and foremost, the number of digital  
15 assets that are present at each nuclear site is  
16 highly variable.

17 In fact, many licensees now are just  
18 beginning to retrofit some of the more significant  
19 frontline safety systems and operational control  
20 systems with new digital assets.

21 We gave the opportunity to the licensees to  
22 tell us how much time based on the scope of systems  
23 at their site how much time it would take them to

1 do the job right.

2 We're more interested in getting it done  
3 right than fast.

4 That being said, the dates that we got back  
5 were sort of all over the map so we are interacting  
6 now, as part of a licensing reviews, to understand  
7 why the licensees submitted some of the dates that  
8 they did so we can ensure ourselves that the dates  
9 that they are offering us are reasonable because we  
10 don't want any undue delays either.

11 There other factors, depends on the  
12 protective strategy that they elect to employ.

13 It depends on certain schedules for refueling outages.

14 There is a variety of factors that  
15 influence the ultimate implementation date.

16 Next slide, please.

17 Looking forward a bit, we are only now at  
18 the beginning stages of developing what our  
19 comprehensive oversight program will look like in  
20 cyber security.

21 Some early thoughts are that we would  
22 likely conduct some sort of a programmatic  
23 inspection to sort of as an initial inspection to

1 verify that each licensee in fact did establish an  
2 appropriate program consistent with the plan that  
3 we approve, but then moving forward it will be much  
4 more risk informed performance-based.

5 We will be looking for problems and  
6 licensee performance deficiencies and focus our  
7 inspections in those areas.

8 I will say that we won't do this in a silo,  
9 broad stakeholder input will be obtained in the  
10 development of our oversight process.

11 It is likely that we will pilot some of  
12 these inspections and sort of try it out and try  
13 to learn some lessons early on before we implement  
14 it nationwide.

15 Key interest to this panel is our  
16 interactions with NERC going forward in this area  
17 as they finalize, as their registered entities  
18 including the nuclear power plants -- incorporate  
19 the requirements of the NERC CIPs into their sites  
20 and that the NERC begins to go do spot checks and  
21 later audits.

22 I will speak to that just briefly on the  
23 MOU slide in just a minute.

1           Again, just to reiterate what Regis said or  
2 perhaps Gerry said, that the NRC's focus is on  
3 safety, security, and emergency preparedness --  
4 digital assets associated with nuclear safety and  
5 security and emergency preparedness, while clearly NERC and  
6 FERC are concerned about reliability.

7           But there is an overlap there and it is one  
8 that we recognize and it is one that the MOU  
9 through successful implementation will help us  
10 address.

11           So, on slide 8, the next slide, the MOU was  
12 published earlier this year.

13           Just to echo the sentiments of my  
14 colleagues here the process that we went through to  
15 get that document done was very collaborative, very  
16 effective.

17           We forged some new relationships, new  
18 understandings, and I think we've built a solid  
19 foundation for a strong working relationship going  
20 forward.

21           Gerry I think, mentioned the workshops that  
22 are coming up in late April and in early May, there

1 are four of them currently scheduled.

2 NERC went the extra mile to have four, one  
3 in each NRC region to enable more participation by  
4 not only our inspectors but also the plants in each  
5 of those regions which is a good thing.

6 The focus of those workshops, and the NRC  
7 staff will participate, will be to explain the provisions  
8 of the MOU first and foremost, but also to begin  
9 the work -- the very important work of  
10 understanding what is the bright line, what are the  
11 overlaps, what are the things that licensees should  
12 focus on to try to get the exceptions that Mr.  
13 Binder talked about through the process.

14 Finally, we will talk about how we intend  
15 to coordinate our inspections, audits, spot check  
16 activities going forward.

17 Clearly, information sharing is key to all  
18 of those things, effective information sharing.

19 On my final slide, I will mention just a  
20 couple of other things.

21 This is just a very, very short list of all  
22 the things we are working on internally to the NRC

1 with respect to cyber.

2 First and foremost is monitoring the  
3 threat.

4 We do that in a variety of ways, we have a  
5 full-time threat analysis branch here at the NRC  
6 and they look -- they're tuned to look for things  
7 in the cyber realm as well as the physical realm.

8 We go beyond that, we interact with DHS  
9 intelligence, the high track people, DHS, and a variety  
10 of other stakeholders to keep abreast of the  
11 changes to the threat environment.

12 Along those lines we participate in a wide  
13 range of intergovernmental activities.

14 Not only with FERC but also with our  
15 friends in the Department of Homeland Security and  
16 the FBI and any number of other agencies and that  
17 has all been very productive and we talk about  
18 everything from industrial control system  
19 protection to all kinds of things, integration,  
20 incident response, etc..

21 It is an area that has been productive for  
22 us and we intend to continue to do that.

1           We have stood up, within the last year, a  
2 cyber assessment team.

3           This is a group of people who, in  
4 response to newly identified threats or  
5 vulnerabilities can quickly come together, assess  
6 what the nature of that new threat or vulnerability  
7 is, try to assess its impact on our licensees and  
8 make a recommendation to NRC management on whether  
9 or not we need to provide that information overtly  
10 to our licensees or perhaps some other regulatory  
11 action.

12           That's been very hopeful.

13           I know there's questions on smart grid and I will be  
14 prepared to answer that, and Gerry mentioned some  
15 issues on Aurora.

16           What I would say is that in response -- the  
17 initial response to Aurora, the NRC and FERC and  
18 others, DHS in particular, worked very closely to  
19 identify mitigation strategies that are appropriate  
20 for that issue, and I'm proud to say that the  
21 nuclear sector, particularly the nuclear power  
22 plants, did a very good job in my assessment of

1 following up on that information that we  
2 provided and really stood up and implemented a  
3 whole range of mitigation strategies to deal with  
4 that, which we subsequently went out and verified  
5 at a couple of sites.

6 I think from a nuclear standpoint the  
7 nuclear power plants have postured themselves well  
8 in response to Aurora.

9 I can't speak for the rest of the energy  
10 sector, which is probably why the new information  
11 notice but I will stop here and take your  
12 questions.

13 Thank you.

14 CHAIRMAN WELLINGHOFF: Thank you, all of you, I  
15 appreciate the presentations and, Mr. Morris, I was very  
16 interested in your presentation learning more about what  
17 you've done on the NRC side on cyber security.

18 So I can understand a little more of this  
19 March 2009 Reg that the NRC issued, that applies  
20 to all plants not just the new licensees?

21 MR. MORRIS: Yes, sir, that is correct.

22 The regulation is actually non-specific

1 with respect to the licensees that it pertains to.

2 It is actually written in a generic way,  
3 such that it can be invoked by other regulations.

4 Currently, those cyber security regulations  
5 are invoked through, for all light water reactors  
6 that we license so that would include, not only  
7 operating fleet, but any new reactors.

8 In fact, all of the combined operating  
9 license applications that we have received today  
10 have submitted cyber security plans  
11 as part of their operating license application  
12 and those are also under review in addition to the  
13 operating plants.

14 CHAIRMAN WELLINGHOFF: So, tell me how that --  
15 those Regs and their compliance with those Regs as I  
16 understand it they have to come up with a compliance plan,  
17 submit that to you, and that is under varying deadlines  
18 depending upon the particular plant and their circumstances.

19 How does that relate to what you all did  
20 with respect to Aurora?

21 MR. MORRIS: George, you may want to -- George  
22 Wilson actually led the Aurora follow-up effort.

1           What I can say is that shortly after  
2   September 11, 2001, the agency issued a number of  
3   security related orders, another tool that we have  
4   to impose requirements on our licensees.

5           We issued six or seven different orders to  
6   nuclear power reactors on a variety of topics.

7           Two of which focus -- had elements of cyber  
8   in them, the details of them were not publicly  
9   available but what I can tell you is the licensee,  
10   our licensees took those orders seriously, took a  
11   number of actions that positioned them well to deal  
12   with the Aurora issue when it came up.

13           CHAIRMAN WELLINGHOFF: And you are able to keep  
14   that information secure in your communication to the  
15   licensee?

16           MR. MORRIS: Right, absolutely.

17           We have -- even though they are owned,  
18   almost all of them are private entities.

19           We have the ability to share sensitive  
20   information with them and keep it protected.

21           It is not national security information  
22   it's a special category set up.

1 CHAIRMAN WELLINGHOFF: That's what I'm trying to  
2 understand, that information that you're transmitting  
3 classified?

4 MR. MORRIS: It is not classified information.

5 CHAIRMAN JACZKO: We have our own statutory  
6 definition of protected materials, it's called safeguards  
7 information.

8 So, we have the ability to designate that  
9 information and the access control and handling for  
10 that is comparable in many ways to confidential  
11 national security information.

12 We require specific requirements to access  
13 that information.

14 MR. MORRIS: It's a special category of  
15 sensitive but unclassified information.

16 CHAIRMAN WELLINGHOFF: Okay, so then, these plans  
17 and the plans they are submitting to your ultimately, I  
18 assume, they would have swept in things like Aurora, but  
19 Aurora was an immediate threat so you had to act on it  
20 pretty quickly.

21 MR. MORRIS: Right, and as I said, the measures  
22 that licensees -- that our licensees had taken into response

1 to some of the other orders that we had issued had  
2 positioned them --

3 Would you like to comment on that, George?

4 George actually owned that process and  
5 actually had the opportunity to visit a few sites  
6 to verify their actions.

7 MR. WILSON: The industry had DHS work with the  
8 industry and the industry had implemented their own plans  
9 so what we did is went in and did a independent assessment  
10 or verification of what industry had performed including  
11 looking at a programmatic review, how they did cyber and  
12 also individually assessing systems to see if we could  
13 identify things that they had potentially missed.

14 As Scott said, we looked at two different  
15 plants and then after that we made a summary review  
16 and we actually shared it with FERC, NERC, and DHS.

17 Actually came here to the NRC and shared  
18 our results, how we did the assessment, and went from  
19 there.

20 We actually did an independent verification  
21 of their actions that they had developed in  
22 coordination with DHS and industry.

1           For those individual sites only, on-site  
2 only, looked at them on sight, though.

3           CHAIRMAN WELLINGHOFF: Mr. Cauley, if I could go  
4 to you.

5           Perhaps you could sort of compare and  
6 contrast what the NRC did and was able to do on  
7 Aurora and what NERC was able to do.

8           MR. CAULEY: I think what where we are getting to  
9 now is pretty much what I'm hearing they had done.

10          I think the challenge we had the first time  
11 around is -- the information at the time was  
12 classified and getting it into enough of the right  
13 hands in terms of management, executives, and the  
14 technicians would implement the changes we were  
15 challenged in getting the information out.

16          So it did get out, to some extent, but I  
17 think instead of 100 plus units we are talking  
18 thousands and thousands -- tens of thousands of  
19 units and facilities that this impacts, and I think  
20 our progress, as a result, my view is that we need  
21 to do more.

22          I think the perception is out there that we

1 need to do more, and probably your perception is we  
2 need to do more.

3 So, that is the reason for this next round.

4 We were able to make a couple of  
5 breakthroughs.

6 One is, we were able to work with the  
7 intelligence agencies and workout versions of the  
8 information sufficiently detailed that  
9 practitioners in the field can understand what it  
10 means and how to fix it, so that is a breakthrough  
11 for us to get this much information out of this  
12 many people in a nonclassified way.

13 The second thing that we've been able to  
14 work out to your point of distributing it in a  
15 secure fashion.

16 So we are using closed, secure portals that  
17 we have access to, now all our registered entities  
18 can get access to the information, but it is very  
19 tightly controlled.

20 So, we are just getting to the  
21 breakthroughs now where we can do this on a very  
22 wide scale basis.

1           There are 3100 entities in North America  
2   that operate electric facilities, so it's a massive  
3   scale difference in terms of doing it this way.

4           I think we are in round 2 here, we're going  
5   to get it where it needs to be.

6           CHAIRMAN WELLINGHOFF: Just so I understand a  
7   little bit better this advisory that you just issued, you  
8   just issued it yesterday?

9           MR. CAULEY: We issued it as a preliminary  
10  advisory which is to put everybody on notice and give them  
11  the information they need, we're encouraging them to begin  
12  actions.

13          We are going to solicit are there any  
14  clarifications on that that would be helpful to  
15  them to understand it better, and we are going to  
16  solicit remediation times for them to suggest  
17  remediation times.

18          Once we see, I think as Scott was  
19  mentioning, answers will come in and it will be all  
20  over the map.

21          At some point we're going to draw a line  
22  and say this is the hard remediation date set from

1 reporting requirements and follow-through in that  
2 process.

3 We are looking to, at least at this point  
4 without having seen the response data yet, my goal  
5 to try to get this closure on this in this year, in  
6 2010.

7 CHAIRMAN WELLINGHOFF: So, you are able to take  
8 classified information and work with certain security  
9 agencies and get an agreement as to the unclassified form of  
10 that information; is that right?

11 MR. CAULEY: That is correct.

12 CHAIRMAN WELLINGHOFF: And then tell me more about  
13 these secured portals of how you will transport that  
14 particular information.

15 MR. CAULEY: We have portals -- secure systems  
16 that we've built and put in place for compliance to manage  
17 event analysis and root cause analysis, things that happen  
18 on a system and also compliance data investigations.

19 We set those up through the regions, we  
20 also have one of those at the NERC office and we  
21 are now using that as a stepping stone mechanism.

22 In the near future we are going to have an

1 alert system that is self-contained in terms of  
2 directing alerts to the appropriate people and  
3 having the ability to load responses back to NERC.

4 It will be a more robust system.

5 CHAIRMAN WELLINGHOFF: Maybe then in a general  
6 sense you can compare and contrast for me, Mr. Cauley, the  
7 regulatory process that the NRC has gone through, and their  
8 overall requirements for cyber security in their 2009 rule  
9 that they issued and the CIP standards that you administered  
10 that we've approved with respect to cyber security.

11 If you could talk about those two and the  
12 good and bad parts of them and what you would  
13 ideally desire to see done on the NERC/FERC side.

14 MR. CAULEY: Really good question and really  
15 complicated set of issues involved in that.

16 Our standards that have been in place for a  
17 couple of years try to get at protections and  
18 defense in depth layers that we would use to  
19 protect control centers and other assets.

20 To some extent, they're prescriptive on all  
21 the things we expect people to do, control access  
22 and to control centers and those kinds of things,

1 training of staff.

2 The challenge is that, as a standard, they  
3 are frozen in time.

4 You put it out there as a standard and  
5 expect everybody to perform to that, but the  
6 threats were evolving quickly and probably more so  
7 in this area than any other area.

8 For that reason, I actually believe that  
9 the track that Scott mentioned that the NRC is on  
10 is a good one for us to evaluate and consider,  
11 which is what is the end objective of the  
12 protections, not listing the protection themselves,  
13 but what are we trying to safeguard against?

14 What are the bad things that could happen  
15 if somebody did come into your computers, or take  
16 malicious acts on equipment, or control  
17 communications and those kinds of things.

18 If we could get to a more results based or  
19 performance outcome based approach, that would be  
20 helpful because the threats are changing all the  
21 time.

22 One additional point is their concept of

1 allowing the entity, the licensees to submit plans  
2 on how they are going to meet the Regs is  
3 particularly challenging for us.

4 I'm not sure we can do that, because one of  
5 the challenges we have now is we have so many  
6 entities and so many assets under our standards.

7 The number, as I mentioned earlier, the  
8 scale is many times over the scale in terms of just the  
9 numbers of equipment and entities involved.

10 I don't think we are going to be  
11 comfortable allowing that kind of latitude, like  
12 here's some goals and tell us what your plan is to  
13 do that.

14 I think we have to be a little bit more  
15 deterministic on what our expected outcomes are.

16 I think there are pieces of that  
17 performance results based concepts are good, but I  
18 think we have got to tighten down our discretion -- our  
19 leeway in terms of options about what people can do  
20 and what they are expected to do.

21 I don't think we would be doing a similar  
22 type of submit your plan to safeguard your

1 equipment.

2 CHAIRMAN WELLINGHOFF: Let me follow up on that  
3 just a little bit.

4 As many of the licensees that they oversee  
5 are also entities that may have assets under  
6 NERC -- non-nuclear assets under NERC as well,  
7 potentially.

8 To that extent, those entities, I would  
9 think, could submit plans for review.

10 I'm a little troubled by the idea that we  
11 have a results based, performance-based system but we  
12 have no plans from them to look at as to how they  
13 are going to get there.

14 How do you connect the two, I guess?

15 MR. CAULEY: I think it's possible in the nuclear  
16 realm, I think that's possible because you have a very small  
17 number of facilities and you have a very concentrated  
18 amount of effort in safeguarding those because of the public  
19 safety issues around that.

20 I think it becomes more challenging when  
21 you look at the diversity of 3100 owners,  
22 operators and users, and the diversity of hundreds

1 of thousands of substations and equipment and  
2 control centers.

3 I don't think, necessarily, it is  
4 manageable that we could have the same kind of  
5 leeway and flexibility and show me the plan and I  
6 will review the plan.

7 Simply reviewing the plan and doing the  
8 verification of the rigorous efficiency of  
9 those plans would be extremely voluminous work and  
10 tracking that would be very very difficult.

11 Sorry, I can't answer any better.

12 CHAIRMAN WELLINGHOFF: Lead you back to more  
13 prescriptive system, ultimately?

14 MR. CAULEY: That's the challenge and perhaps I'm  
15 contradicting myself, but I think we do need to make sure  
16 that our requirements are driven toward what outcomes do I  
17 expect to see and I think we could measure those outcomes,  
18 but I think the outcomes have to be more specific and  
19 deterministic than what may be allowed in a nuclear plant  
20 where you have specialized options or variability and  
21 discretion that you could use on a case by case basis.

22 CHAIRMAN WELLINGHOFF: I don't want to take up any

1 more time.

2 Gentlemen, do you have any questions?

3 COMMISSIONER SPITZER: I've always been intrigued by the

4 variation in reactor design and I know there are economic

5 and engineering issues.

6 What security issues are there specifically

7 with regard to cyber security, if any, arising from

8 this variation in reactor design?

9 MR. MORRIS: Well, the current fleet of operating

10 reactors is -- most of them were designed many years

11 ago, constructed and have been operating for a long, long

12 time.

13 And when they were built, they didn't have a

14 lot, maybe any, digital software-based control

15 systems and that has obviously evolved over time.

16 To extent that new digital

17 technologies have been introduced into the current

18 fleet to the extent it's associated with the

19 safety related function of the facility, they get a

20 thorough evaluation not only for the safety -- the

21 ability to perform the safety function, but they

22 will also be captured in the scope of the cyber

1 security.

2       They were captured under the scope of the  
3 orders we issued post 9/11 and are subsequently  
4 part of the current rule.

5       The new reactors that Dave Matthews spoke  
6 to in the first panel are probably going to be, if  
7 not exclusively digital, almost exclusively digital  
8 controls.

9       I have had -- our agency has done a number  
10 of things to wrestle with the issues that arise  
11 when you begin to talk about the application of  
12 digital technologies and safety systems.

13       There's human factors issues, there are all  
14 kinds of software, hardware implementation issues,  
15 and cyber security is a piece of that discussion  
16 and so one of the things we have done as an agency  
17 is to set up an interoffice digital instrumentation  
18 and control steering committee.

19       I'm a member of that committee as our some  
20 executives in other parts of our agency, and we  
21 continue to dialogue not only internally on how to  
22 manage all of these issues, but also with the

1 industry as they struggle with how to implement our  
2 requirements and how to get the most they can out  
3 of these digital systems while to increase  
4 reliability and production and all of that.

5 At the same time, meeting our stringent  
6 safety requirements and security requirements.

7 There is a very -- I guess the short answer  
8 is there is a very broad spectrum out there.

9 The older fleet -- the operating fleet, the  
10 challenge in cyber security space isn't as large  
11 simply because the scope of systems that fall  
12 within the regulations for cyber, there just aren't  
13 that many at this point in a relative way.

14 MR. MALLET: Let me add to that, Scott.

15 I think fundamentally, any nuclear power  
16 plant light water, you are trying to protect all  
17 the design types against damage to the fuel and  
18 you're also trying to protect the water to keep the  
19 fuel cool.

20 When you get to the specific designs there  
21 are some differences in the systems used to keep  
22 the full fuel cool and there are differences in the

1 containment structure and so you do try to protect,  
2 depending on the design, different methods or  
3 systems to keep the fuel cool.

4 If that helps.

5 COMMISSIONER SPITZER: Okay, and to a more general question  
6 on NIST, all three of you have discussed your dealings, what would  
7 you take away from the most positive aspect so far of the  
8 NIST process from your specific perspectives, and then what  
9 recommendations would you have for improvement?

10 MR. MORRIS: I will go first.

11 NIST -- we try, particularly in this area,  
12 to leverage the work of other entities as best we  
13 can.

14 We try to learn from everything that is  
15 going on in this arena and NIST is certainly a center  
16 of excellence when it comes to this topic.

17 They have brought together a broad-base of  
18 stakeholders that have come up with consensus  
19 approaches for how to effectively manage cyber  
20 security.

21 So, we took full advantage of that and they  
22 are not that far from us so we have had a number of

1 interactions with them and the people who've  
2 authored those documents.

3       One thing I would say that is good about  
4 the NIST approach is that it does enable -- while I  
5 said earlier, the security controls that they  
6 provide in their document cover the known universe  
7 of threats and vulnerabilities out there.

8       That doesn't mean that they all have to be  
9 implemented.

10       Their processes is good in the sense that  
11 it enables the end-user to tailor those things, and  
12 NIST encourages this, to tailor those controls for the  
13 unique purposes of whatever your enterprise.

14       We did the first order tailoring here at  
15 NRC to say, okay, there is a set of controls that  
16 NIST would recommend be implemented, but they simply  
17 don't apply in our case so we did a first-order cut  
18 on all of those controls and offered them up in our  
19 Reg. Guide.

20       But the licensee, our  
21 licensees are free to do a second order cut on, say  
22 now that I've identified all the assets I need to

1 protect given this set of controls, which ones make  
2 sense for my facility and why, the other part of it  
3 is, we don't expect that every control will be  
4 applied.

5 They're certainly going to be cases where a  
6 a control might not be in the best interest of  
7 safety, and in those cases safety trumps and that  
8 control wouldn't be implemented.

9 From my perspective, the NIST process is  
10 one that is well understood, it can be leveraged it  
11 is comprehensive and it is flexible.

12 MR. BINDER: I just might make a few comments just  
13 to be clear, we have talked about two different NIST  
14 activities.

15 There is the NIST smart grid process, that  
16 is not what we are going about now, we are talking  
17 about FISMA their pre-existing NIST effort.

18 But I agree with Scott's characterization  
19 of all the work that they've done and they are  
20 experts in the field, and they have a very  
21 impressive framework, is how they describe it for  
22 securing assets.

1           One of the things I like about it is  
2 everything gets protected its just a matter of how  
3 much it gets protected.

4           More important things get protected more,  
5 but everything gets protected.

6           But because of the flexibility that that  
7 gives it really emphasizes the enforcement  
8 activity.

9           NIST doesn't do the enforcement activity  
10 other parts of the government do that, but we talk  
11 to those people and it is a very intense audit  
12 process that they go through, they will send 20  
13 people to audit one facility and they will take a  
14 month to do it.

15           So, it's a very intense audit process and  
16 that is really where the entity is determined to be  
17 in compliance or not.

18           So, while it's got its pluses, it also  
19 creates pressures elsewhere.

20           MR. CAULEY: NERC and its member entities and  
21 registered entities are actively involved in the NIST  
22 process, and I would echo the comments of Regis and Scott,

1 it provides an excellent framework and foundation, but to  
2 take NIST standards and directly apply them to substations  
3 and generators there's something lost in the translation.

4       What we do is try to take their security  
5 controls, the concepts behind them, and the basis  
6 for the requirements and say what applies in our  
7 world and how do we translate our world into our  
8 requirements.

9       We're probably not there yet in terms of  
10 getting all of our standards aligned with the NIST  
11 security control concepts, but that is an ideal for  
12 us and that is a direction we're heading.

13       I think the other value of NIST is that  
14 there are many interdependencies in our business on  
15 manufacturers, telecommunications companies, and  
16 others, and by having a national effort and  
17 essentially international standards setting effort that spans  
18 manufacturing equipment providers and  
19 telecommunications it actually helps us by getting  
20 the understanding out there of what we need in terms  
21 of inherit protections built into the  
22 equipment that the vendors are delivering to us is

1 added value to us if nothing else.

2 COMMISSIONER SVINICKI: Sometimes the NRC  
3 complains that we have 104 nuclear plants in this country  
4 and they are all so different that it makes our regulation  
5 of them complex, but sitting here, clearly the diversity of  
6 facilities that FERC will have to encompass in its cyber  
7 security activities, there is incredible diversity that adds  
8 to the complexity of their job, but of course our focus for  
9 our cooperation with FERC is on the nuclear power plants and  
10 the cyber area, and Scott, you and I have had the chance to  
11 talk as the MOA has developed.

12 FERC Order 706(b) really significantly  
13 narrowed the exemption for nuclear power plants.

14 I think FERC going in had been that our  
15 NRC cyber security requirements would really  
16 encompass everything. But subsequently, really in  
17 my view of the history based on NRC's own comments  
18 to FERC's order, FERC really was left with no  
19 choice but to significantly narrow that exemption.

20 So I have followed the development of the MOA  
21 between you, Scott, and your folks and FERC and  
22 NERC on this issue.

1           If my memory is right, there was a really  
2 strong attempt to develop a list of types of  
3 equipment instead of this exception process,  
4 because where we have ended up, as nuclear plants or  
5 licensees they have the opportunity to submit a  
6 request for exceptions for equipment subject to NRC  
7 cyber security regulation.

8           So we went from a very broad exemption to a  
9 narrow one. Then we tried to develop a list and say,  
10 well, it's 104 different plans but we can be pretty  
11 sure that this set of equipment would be subject to  
12 NRC cyber security regulations and therefore --

13           Now where we've ended up, if I'm Exelon and  
14 I'm a big fleet operator, I wonder is there at  
15 least going to be one set that they would for their  
16 fleets say --

17           I guess what I'm getting to if, I'm an NRC  
18 inspector of cyber security does that mean if I go  
19 to plant x in the State of Illinois, that operator  
20 might have submitted a request for exemption so  
21 that piece of equipment at that plant is subject to  
22 NRC cyber security requirements so I do inspect it.

1 But if I go across the state and go into another  
2 plant that is operated by someone else that same  
3 piece of equipment that serves the same function  
4 might be subject to the CIP standards so it's not  
5 under NRC.

6 In that sense, is it a legitimate worry  
7 that this is kind of regulator shopping, it's kind  
8 of jurisdiction shopping?

9 If I submit an exemption here, maybe I like the  
10 CIP standard at this plant and I don't like Reg.  
11 Guide 5.71 from NRC -- explain to me, first of all  
12 why we couldn't come up with a list of systems that  
13 said at least this subset should automatically  
14 be exempted, why were we unable to do that?

15 It seems like in the most unfair criticism  
16 it's as if NRC doesn't know what it regulates and  
17 what it should be applying its own cyber security. standards to.

18 Why do we have this problem at nuclear  
19 power plants?

20 MR. MORRIS: Well, you're right, Commissioner.

21 Our initial attempt at establishing an MOU  
22 with NERC we actually did -- we did create sort

1 of a generic list of systems that would not notionally or  
2 nominally fall under NRC jurisdiction.

3 That information is not lost we just moved  
4 it to a different place, we moved it to the NERC  
5 process.

6 In fact, Gerry didn't spend much time on  
7 it, but the principal purpose of these workshops  
8 going forward is those lists have been -- will be  
9 reinvigorated.

10 They are a part of what NERC has called their bright  
11 line survey, for lack of better terminology, to  
12 determine what the bright line is between NERC and  
13 NRC jurisdiction.

14 So part of the survey includes that generic --  
15 that's I guess the first step.

16 The other part I would mention is that we  
17 are working very closely with NERC and the issues  
18 you are raising are real, potentially real issues and  
19 it is not lost on us that we have to be vigilant  
20 about those things.

21 Part of the purpose of the workshops is to  
22 make sure that these issues get fully vetted and

1 ventilated in front of our stakeholders so they  
2 have the opportunity to raise these concerns as  
3 well and help us find ways to not do what --

4       COMMISSIONER SVINICKI: I appreciate that and I am  
5 hopeful.

6       I will be looking to hear more about the  
7 outcome of the workshops, but if you consider this  
8 unfair, let me know.

9       What I would regret is if we ended up in a  
10 circumstance where two regulatory agencies could not  
11 come to agreement on, you called it bright lines,  
12 but we also talked on this panel about overlaps.

13       We talked about two things and I think the  
14 regulated community would prefer to have more  
15 bright lines and less overlap.

16       So, I don't think it is necessarily fair to  
17 say because we couldn't figure it out, we are going  
18 to burden shift this onto you because  
19 two government agencies couldn't sort  
20 this out and it, that being said, it's a very  
21 positive thing to have this informed by those who  
22 operate these facilities who should know better.

1           These workshops hopefully will take  
2 something that was perhaps an exercise in  
3 frustration to do without their input and maybe we  
4 could yet develop some generic list or a list that we  
5 said as a minimum and maybe plant by plant there  
6 would be other pieces of equipment that would come  
7 on this list. And maybe it's just that I fail to  
8 understand the complexity of it, but I think it is  
9 kind of regrettable that we couldn't come up with a  
10 minimum subset.

11           MR. MORRIS: There is no doubt in my mind that we  
12 could probably come up with 80 to 90% of these on a generic  
13 basis.

14           But rather than dictate that to the  
15 licensees, I think the path the staff ultimately  
16 chose was to enable the licensees an opportunity to  
17 have them tell us, no, no. that's not right NRC, it's really  
18 this.

19           Again, right, wrong or indifferent, the  
20 path we are currently on is to collaborate closely  
21 with NERC and with the stakeholders to get this  
22 thing right rather than issue it with finality in

1 an MOU that's somehow imposed on everybody without  
2 their opportunity to have an input.

3 You may recall the stakeholders didn't get  
4 the opportunity to participate in the MOU  
5 development process.

6 COMMISSIONER SVINICKI: And I know Mr. Cauley  
7 wants to respond to this, but he acknowledged in his  
8 presentation I believe that we are in developmental stages here so I  
9 know there is more work to be done.

10 MR. CAULEY: At the risk of frustrating you further,  
11 which I don't want to do, in my mind parts of this are  
12 really clear and I think jurisdictional demarcation are  
13 really clear.

14 We have completely different objectives.

15 On one side it's nuclear safety.

16 On the other side is the reliability and  
17 operability and survivability of the grid.

18 So I think the MOU negotiations to date have  
19 done a really good job of getting that division of  
20 understanding of what it is we're trying to  
21 accomplish.

22 Unfortunately, what we end up talking about

1 then is standards to keep the grid together and  
2 keep its survivable, as well as.  
3 standards to keep the nuclear  
4 safety, do end up overlapping and the equipment  
5 overlaps.

6       So I look at this -- in terms of the objective  
7 and the goals we have a really clear division, and  
8 I think a good understanding of what we are trying  
9 to accomplish.

10       To do the rest, in terms of what standards  
11 apply where and what equipment, I think we have to  
12 look more toward what is efficient, what's going to make  
13 this work from a pragmatic standpoint, how do we  
14 divide this up so it works for the licensees  
15 because there is actually a negative consequence of  
16 double counting and double evaluating, is that we  
17 end up spending time -- wasting time looking at  
18 things that are not helpful to reliability or to  
19 safety.

20       I think on one level the MOUs have done  
21 what they were meant to do, which is provide clear  
22 demarcation of our objectives and what we're trying

1 to get about.

2 Now, workshops and negotiations with the  
3 licensees and industry is about can we do an  
4 efficient carve out of this so we don't end up  
5 tripping over each other as we go through the  
6 actual work.

7 MR. MALLETT: If I may add.

8 I think it's the staff's goal and the NRC  
9 to truly, and I believe NERC as well,  
10 Mr. Cauley may differ with me if he wants,  
11 to have some sort of a list that you start out with  
12 where you definitely have clear which system are  
13 NRC jurisdiction and which are under the FERC,  
14 NERC.

15 I think that will build upon as you have  
16 experience you can add to that list or subtract as  
17 you have experience.

18 But in the meantime, and I think your criticism  
19 is fair because we still aren't in alignment on  
20 that list.

21 We set up this process, as Mr. Cauley said,  
22 in the MOU to where if you do have a situation

1 where there is overlap, that we would get together  
2 to discuss that and certainly, what I mentioned in  
3 the beginning of this whole briefing, if there's a  
4 question as to whether it's a safety impact or grid  
5 reliability impact, the safety impact for NRC would  
6 trump the grid reliability and we all came to  
7 alignment that.

8 I think that is a key part of that MOU.

9 COMMISSIONER SVINICKI: Okay, thank you.

10 Thank you, Mr. Chairman.

11 CHAIRMAN JACZKO: Thanks everyone, I think  
12 certainly a lot of progress has been made on this issue.

13 One -- following up on Bruce's points --  
14 one of the challenges that we face in this area, to some  
15 extent there is dual regulation.

16 That was the intent of Congress. There are  
17 responsibilities in different roles here.

18 If you look from an NRC perspective our  
19 concern is safe operation or safe shutdown of the  
20 facility which may not be good for reliability.

21 But from our perspective a digital system or  
22 any system that is manipulated in such a way that

1 it causes the plant to trip in a safe way, that is  
2 not a system that necessarily, from the NRC  
3 perspective, challenges our regulatory requirement.

4 That may have significant challenges from a  
5 reliability perspective and if someone were to  
6 manipulate the grid in that way would be doing  
7 other damage, but our focus is just on that safe  
8 shutdown of the plant.

9 So there clearly are systems that were not  
10 within the scope of NRC authority, or not within  
11 the scope as we established in our regulatory  
12 requirements.

13 I think as we went on the road of the MOU  
14 the ideal situation would be for us on a  
15 reimbursable basis to conduct the inspections to  
16 effectively do the regulation on the part of NERC,  
17 and I noticed Jon one of the things you're doing is  
18 proposing legislation to Congress and one of the  
19 things we thought about was trying to fix that  
20 particular aspect of the nuclear piece of it.

21 My understanding, the legal problem is that  
22 NERC is not a federal entity.

1           Therefore, it's not a federal entity, we  
2   can't get reimbursed from NERC.

3           So, there may be a simple legal fix here  
4   that solves all of these problems and allows, from  
5   the nuclear perspective, for NRC to carry out -- the  
6   inspections to carry out the regulatory work on  
7   behalf of NERC, but we need a legal chain that says  
8   we're allowed to get reimbursed for that.

9           That may be an easier thing to do than  
10   trying in statute to do here which is to delineate exactly,  
11   where does it matter and where it doesn't because  
12   the issue is, in the end, digital systems are all  
13   the systems at a facility need to meet a certain  
14   standard, we could go ahead and carry that out  
15   and do the inspections and do that activity.

16           Again, recognizing that the kinds of  
17   attacks won't necessarily be affected by what the  
18   system actually does.

19           Whether it shuts down the plant or whether  
20   it ensures that emergency core cooling system  
21   activates properly, the kinds of digital  
22   protections in the cyber security may be the same

1 in which case it's a simple thing for us to do to  
2 carry on all that work and then the licensee has  
3 one program for all of their systems regardless of  
4 whether under NRC or NERC authority.

5 That is very much where we were heading.

6 We were having very good discussions I think with  
7 our staffs to work that out through an MOU.

8 Unfortunately, we don't have lawyers on our  
9 Commission, so I can say unfortunately the lawyers  
10 got involved and told us we don't have the legal  
11 authority to do that.

12 That may be where we can most easily  
13 resolve this is to try and just fix that piece of it  
14 to allow us to go back and actually execute the MOU that we  
15 were making a lot of good progress on negotiating.

16 And that, to some extent, solves this  
17 difficult challenge of trying to delineate the  
18 system.

19 I think there is many paths forward here  
20 and many ways we can resolve it.

21 Maybe something together we can talk to  
22 Congress about to fix your issues with your

1 authority and then we can try to cover that one  
2 piece of it as well.

3 We have gone a little bit longer than we  
4 anticipated, I think it is certainly a reflection  
5 on this last topic of the importance of this work  
6 to both of our agencies, and I for one appreciate the  
7 presentations of all of the panels that we had  
8 today and would thank, John, you and your  
9 colleagues for continuing I think to cooperate with us and  
10 collaborate with us and demonstrate how two federal  
11 agencies can work very well together in the  
12 interests of the American people.

13 We thank you for coming down to our offices  
14 today and look forward to the next visit to yours.

15 CHAIRMAN WELLINGHOFF: Thank you, Gregg, I  
16 appreciate it.

17 Your last comment on doing the work and  
18 getting reimbursed by NERC, that's a little rule  
19 called augmentation of appropriations we've run up  
20 against ourselves.

21 Hopefully, there is something we can work  
22 out on that issue.

1 I want to thank you and Commissioner  
2 Svinicki and your staff and all of the participants  
3 on all the panels today.

4 I learned a lot. It was very enjoyable and  
5 very informative and interesting, and I look  
6 forward to hosting down at FERC next year.

7 COMMISSIONER MOELLER: Mr. Chairman, our focus today has  
8 been on reliability, but I always like to give a little  
9 historical perspective.

10 Twenty years ago we had about 110, 113 operating  
11 nuclear plants. Now we have 102.

12 They're at much higher capacity levels,  
13 they are putting out power at cheaper rates,  
14 I've -- from everything I've seen, they run better  
15 and more safely and it has really been a remarkable  
16 story of regulation by the NRC and our predecessors  
17 at FERC.

18 You've watched the safety side of it. Our  
19 predecessors opened up on the economic side with  
20 wholesale competition, open access to transmission,  
21 and the result has been the equivalent of 30 more  
22 nuclear plants on the grid on an annual basis, or

1 30 large baseload plants.

2 As we go through these sometimes tedious  
3 but important issues, a little reflection I think  
4 particularly for the success of our predecessors is  
5 appropriate.

6 CHAIRMAN JACZKO: Again, I want to thank  
7 everybody, and with that we are adjourned. Thanks.

8 (Whereupon, the meeting was adjourned)

9

10