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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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MEETING WITH THE ADVISORY COMMITTEE ON REACTOR  
SAFEGUARDS (ACRS)

+ + + + +

THURSDAY

OCTOBER 2, 2014

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ROCKVILLE, MARYLAND

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The Advisory Committee met with the Nuclear Regulatory Commission at the Nuclear Regulatory Commission, One White Flint North, Commissioners= Conference Room, 11555 Rockville Pike, at 10:00 a.m., Allison M. Macfarlane, Commission Chairman, presiding.

COMMISSIONERS:

ALLISON M. MACFARLANE, Chairman

KRISTINE L. SVINICKI, Commissioner

WILLIAM C. OSTENDORFF, Commissioner

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ACRS MEMBERS:

JOHN W. STETKAR, Chairman

HAROLD B. RAY, Vice Chairman

MICHAEL L. CORRADINI, Member

CHARLES H. BROWN, JR. Member

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

10:03 a.m.

1  
2  
3 CHAIRMAN MACFARLANE: All right. I guess we've  
4 got everybody here, good, good.

5 So, today, the Commission's going to be briefed by the  
6 Advisory Committee on Reactor Safeguards, one of our biannual  
7 meetings.

8 I would like to first of all commend all the members of  
9 the ACRS for their commitment to service and their effort to support the  
10 NRC safety mission. So, thank you all.

11 And I know that today's briefers that we're going to  
12 hear from are just a subset of the larger group, and I see many of the  
13 larger group sitting around. And I want to thank all of you on the  
14 committee for your service and for all your hard efforts.

15 Since our last meeting in March, the Commission has  
16 tackled many difficult technical issues including the approval of the  
17 Design Certification for the Economic Simplified Boiling Water Reactor.  
18 And these efforts are in no small measure a result of hard work on the  
19 staff and insightful input from your committee, the ACRS. We, on the  
20 Commission, very much value all of that input and we use it in our  
21 considerations as well.

22 So, today, we're going to hear from you on a subset of  
23 topics. We're going to start off with Mr. John Stetkar, who's the  
24 Chairman of the ACRS, who's going to provide an overview of activities  
25 of the committee since our last meeting with the ACRS in December.  
26 Gosh, is it December? Wow.

1 MR. STETKAR: March.

2 CHAIRMAN MACFARLANE: March, okay March.

3 MR. STETKAR: It just seems like it.

4 CHAIRMAN MACFARLANE: It seems like  
5 December, right.

6 And then, Mr. Stetkar is going to open the discussion  
7 on Human Reliability Analysis Models.

8 That's going to be followed by Dr. Mike Corradini,  
9 who's going to discuss the ACRS Biennial Review of the NRC  
10 Research Program.

11 Then we're going to hear from Mr. Charles Brown on  
12 the proposed rulemaking to revise 10 CFR 50.55a and Digital  
13 Instrumentation Controls.

14 And the final presentation will be from the Vice  
15 Chairman of the ACRS, Mr. Harold Ray, on the staff's efforts to address  
16 the use of qualitative factors and the development of regulatory  
17 analyses and backfit analyses.

18 So, I look forward to all your presentations.

19 Let me ask my fellow Commissioners if either or you  
20 have any opening comments? No? And then, with that, I will turn  
21 things over to Mr. Stetkar.

22 MR. STETKAR: Thank you, Chairman Macfarlane,  
23 and as always, it's a real pleasure to be here to share with you our  
24 accomplishments over the last six or seven months since we last met  
25 and give you a little bit of a snapshot of what we're actively involved in  
26 now and where we're headed over the next six months or so.

1                    Now, with the first slide, second slide, which ever it is,  
2 or not. Okay.

3                    Since our last meeting in March, we've issued 14  
4 reports. I'm going to skip the first four because we're going to hear  
5 about those topics in some detail in this morning's briefing, so, if we  
6 could skip to Slide Number 4, please? Or whatever it is on the list, the  
7 next one, 5? Thank you.

8                    We've issued reports on two chapters, partial on  
9 Chapter 3 of the USAPWR Design Certification and three chapters of  
10 the Reference Combined License Application for the Comanche Peak  
11 Nuclear Plant. I'll talk a little bit more about our efforts in that area in a  
12 few minutes.

13                    Next slide?

14                    We did issue a report on the Supplemental Safety  
15 Evaluation for the SBWR that addressed the steam dyer analysis.

16                    And just in September, we issued our final report on  
17 the Reference Combined License Application for the SBWR Fermi Unit  
18 3.

19                    Next slide?

20                    I'm not going to talk about all of these. I would like to  
21 mention in particular, however, the Peach Bottom Power Uprate.

22                    That was the first extended power uprate application  
23 that we've seen where the applicant used enhanced analysis  
24 techniques and actually made modifications to the plant cooling water  
25 systems that allowed them to completely eliminate credit for  
26 containment accident pressure to support long term core and

1 containment cooling.

2 And I'd like to say on the record that the ACRS is very  
3 pleased with that licensee's initiatives and efforts to resolve that issue in  
4 a manner that demonstrates how analysis and practical engineering  
5 solutions can be used to assure maintenance of those vital defense IN  
6 depth functions of core cooling and containment performance. So, we  
7 were very pleased with that application.

8 Next slide?

9 On this slide, the only topic I'd like to note is the first  
10 one and that is our review of Chapter 7 of the mPower Small Modular  
11 Reactor Draft Final Design Specific Review Standard which addresses  
12 Instrumentation and Control Systems.

13 We view that as a very important topic because the  
14 guidance in that particular section of this Design Specific Review  
15 Standard, we believe, will provide a very solid template for reviews of  
16 Digital I&C systems for all new reactors going forward, whether SMRs  
17 or any future design certifications commenced. So, that's a real  
18 milestone.

19 Next slide?

20 Regarding our current activities and where we're  
21 headed in at least the near term in the next six months or so, we  
22 continue to be involved with new plants design certifications for the  
23 USEPR, to a much lesser extent, the USAPWR, because of their slow  
24 down. However, there are still some active topics, at least in our  
25 understanding that the staff and the applicant are addressing and we  
26 remain available to review those as they come to us.

1 We are working on the Reference Combined License  
2 Applications for the ABWR at the South Texas site and the USEPR at  
3 Calvert Cliffs site and Subsequent Combined License Applications for  
4 the AP1000 at Levy and we're just starting our review of the  
5 Subsequent Combined License Application for the SBWR at the North  
6 Anna site.

7 Next slide?

8 We continue our active involvement on the licensing of  
9 Watts Bar Unit 2. If things go according to plan, I think our schedule  
10 currently looks at our issuing a letter on that activity in the February time  
11 frame. We have a subcommittee meeting scheduled in January,  
12 according to the current schedule if that doesn't slip.

13 At the bottom of this slide, we've seen now an uptick in  
14 license renewal applications. At our current meeting this month, we're  
15 addressing the Callaway license renewal and in the next few months,  
16 we're going to be reviewing the Sequoyah, Byron and Braidwood  
17 license renewals. So we've seen, after a delay, a resurgence to some  
18 extent, in the license renewal activities.

19 Next slide?

20 As part of, you know, one of the letters that we wrote  
21 that I didn't mention and was on subsequent license renewal, as part of  
22 that letter, we noted that we were going to actively engage the staff and  
23 the industry regarding key technical issues related to the license  
24 renewal -- subsequent license renewal process long term issues.

25 And, in fact, we started that process. We just had a  
26 full day subcommittee meeting on the topic of concrete degradation and

1 aging. We plan to hold meetings on materials issues regarding the  
2 reactor vessel and internals, aging of electrical cables and other topics  
3 that have been identified by the expert panels.

4 So, the message there is that we're getting involved  
5 early on those technical topics.

6 The staff is now reviewing an application by South  
7 Texas Project for risk-informed resolution of GSI-191, the sump  
8 plugging issue. And we are very interested and actively involved in  
9 that. We've had one subcommittee meeting on that topic already and  
10 have another one scheduled and probably additional meetings in the  
11 early part of 2015.

12 Next slide?

13 Fukushima remains one of our most active areas of  
14 involvement. We've only listed sort of our near term activities on this  
15 slide and those topics are addressing the mitigation strategies. We  
16 have a two day subcommittee meeting scheduled in late November on  
17 that topic and expect to write a letter and we're following the evolution of  
18 the BWR filtering strategies issue.

19 And, next slide?

20 I'm going to go through these last couple pretty quickly.

21 Regarding the general area of risk-informed  
22 regulations, we continue to follow the evolution of the risk management  
23 regulatory framework that's been proposed and is being evaluated by  
24 the staff.

25 We're just starting to become involved in the second  
26 bullet, the risk prioritization initiative or cumulative effects of regulation.



1 We have a subcommittee meeting scheduled on November 3rd  
2 regarding that topic and we'll follow it very closely.

3 Next slide?

4 The area of PRA and other topics, the Level 3 PRA is a  
5 very large activity. In NRC research, we are following that activity  
6 very, very closely.

7 You're going to hear more about Human Reliability  
8 Methods in a couple of minutes.

9 We're following transitions to risk-informed fire  
10 protection programs under NFPA 805. We just recently had a  
11 subcommittee meeting on that topic to give us an update on technical  
12 issues and where the staff is on reviews of those applications.

13 And with that, to save myself a little bit of time for my  
14 next topic, I am going to close the overview.

15 And the first specific topic that we're going to discuss is  
16 Human Reliability Analysis Models and I'll lead that discussion.

17 There we go.

18 I'll remind you, as I probably don't need to do, that this  
19 project or this activity was initiated by Staff Requirements  
20 Memorandum written to the ACRS back in 2006. And that SRM stated  
21 that the committee should work with the staff and external stakeholders  
22 to evaluate the different Human Reliability Models in an effort to  
23 propose either a single model for the agency to use or guidance on  
24 which model should be used in specific circumstances.

25 The staff performed a very thorough assessment of the  
26 current methods and models that are out there and after that

1 assessment, concluded that development of a single hybrid  
2 methodology is the best approach and we've been proceeding  
3 accordingly.

4 Next slide?

5 We've been -- next one? Thank you.

6 We've been actively involved in this and as you can  
7 see from this slide, we've been meeting with the staff at the  
8 subcommittee level about every six months for the last four and a half  
9 years to track this project.

10 The full committee performed its first review in May of  
11 this year and issued a letter report that I'm going to highlight the  
12 conclusions and recommendations during this briefing.

13 First, before we go further, I want to go off point for a  
14 moment and give you a brief overview of Human Reliability Analysis in  
15 the context of integrated risk assessment.

16 And I think these comments will help to provide some  
17 perspective for some of our detailed recommendations in this letter that  
18 I'll discuss in a few moments.

19 To start off, it's been my experience that analysts who  
20 are involved in this process, unfortunately, often tend to focus too  
21 quickly and dwell too much on the tools and computational practices for  
22 estimating the numerical values for human error probabilities.

23 While that's certainly a part of the overall Human  
24 Reliability Analysis process, it's not the most important part.

25 The fundamental intent of Human Reliability Analysis  
26 is to first systematically identify event scenarios where personnel

1 response is needed to prevent an accident or to mitigate the  
2 consequences of an accident.

3 The next part is to carefully understand and  
4 characterize the event progression, the evolving plant conditions from  
5 the perspective of the operators.

6 And then to use information from the cognitive  
7 sciences, operating experience from the nuclear industry and relevant  
8 experience from other technologies to understand how trained  
9 professional people may behave when they're faced with those  
10 conditions.

11 Now, in a typical PRA, there's a large number of  
12 possible scenarios that we identify and each scenario has its own  
13 particular characteristics that may effect personnel behavior. When  
14 we're faced with that large number of real world scenarios, we need a  
15 process to quantify human error probabilities so that we can objectively  
16 rank those scenarios and their associated personnel actions according  
17 to their contributions to overall risk.

18 Once we have that ranking, the risk management  
19 process can then efficiently focus attention on the most important  
20 scenarios, the most important significant actions. And our  
21 understanding of the event scenarios and our understanding of human  
22 performance in the context of what are often very unfamiliar and  
23 extremely challenging conditions helps us to evaluate those numerical  
24 values.

25 Of course, once we have the risk significant scenarios  
26 and important personnel actions and understand the reasons for them,

1 it's then possible to identify practical methods to improve the likelihood  
2 that personnel will perform better in those situations which is the  
3 ultimate goal of any risk assessment.

4 So, with that diversion as kind of an introduction, I'd like  
5 to return to the slides and go through our conclusions and  
6 recommendations from our letter report.

7 Next slide? There we go.

8 First and foremost, this is a work in progress, work  
9 remains to be done to refine the proposed methods and models into a  
10 form that can be used for practical Human Reliability Analysis and the  
11 practical Human Reliability Analysis is important in that context.

12 In May, we reviewed two interim work products from  
13 this project.

14 Next slide?

15 The first one is what I'll characterize quickly as the  
16 psychological foundation for Human Reliability Analysis and it's  
17 described in NUREG-2114.

18 This is a really good report. It contains valuable  
19 information to improve our understanding of theoretical basis for human  
20 cognitive performance and the causes for human errors.

21 And again, as an aside, we tend to use the term human  
22 errors in our jargon and often times, that can be misunderstood. Our  
23 experience has been that in many cases, when people are faced with a  
24 scenario where they have many different options for performance, in  
25 the context of that scenario, people evaluate the information they have  
26 available. They evaluate their training, they evaluate their procedures

1 and they make decisions.

2 And those decisions are in the context of the scenario  
3 and in the context of their frame of mind, the correct decision. They  
4 proceed to take the actions that they've decided to take and, in most  
5 cases, those actions are correct.

6 In some cases, when we're doing our Monday morning  
7 quarterback, we find out that perhaps they could have taken a different  
8 action or an action more efficiently.

9 Those alternatives are often cast in the context of, well,  
10 the person made an error. Most cases, they didn't really make an  
11 error, they did what we expected them to do in the context of the  
12 scenario that they were facing.

13 So, we're going to stick the term, human error,  
14 because that's the typical jargon that we use. But, really, the current  
15 understanding of human performance is more in that former context,  
16 understanding how people make decisions and why they make  
17 decisions in a particular, very difficult scenario.

18 So, NUREG-2114 provides one element of what I  
19 described in my introduction as a basis for evaluation of human  
20 performance, and that's the element that comes from the cognitive  
21 sciences.

22 Next slide?

23 The second work product that we reviewed in May was  
24 the Integrated Decision Tree Human Event Analysis System, or  
25 because we really love catchy acronyms, IDHEAS methodology.

26 Elements of this methodology will enhance the

1 documentation of Human Reliability Analysis process, reduce  
2 analyst-to-analyst variability and it use and improved traceability of the  
3 bases for differing assessments.

4 Those are all important issues because the staff's  
5 evaluation of the current methods that are out there identified each of  
6 those issues as a deficiency to a greater or lesser extent in every  
7 method.

8 So, developing a methodology that provides some  
9 coherence in these areas is very, very, very important. And we see  
10 elements of this ideas methodology that will accomplish those very  
11 important tasks.

12 Now, we had in our letter report, we had six specific  
13 recommendations. Those recommendations are targeted at the staff  
14 who are deeply involved in this process. They contain a lot of details  
15 and there are even more details in the discussion.

16 At this briefing, because of time constraints, I'm going  
17 to try to stay away from the details and highlight some salient features  
18 of our recommendations.

19 So, what I'd like to do is skip this slide for  
20 Recommendation 1 and go to the slide for Recommendation 2. There  
21 we go.

22 This recommendation says that qualitative  
23 assessment guidance should emphasize the need to develop  
24 operational narratives that adequately describe the entire context of the  
25 evolving event scenario.

26 Now, in the context of my sidebar introduction, I think

1 you can understand why this is very, very important. It's essential for  
2 the people who are doing Human Reliability Analysis to clearly  
3 understand the context of the scenario.

4 Next slide?

5 We don't have a large compilation of actual experience  
6 where we've challenged people to take difficult actions in the face of  
7 very complex and often confusing situations. I say that because we  
8 can't rely on what I'd call data and statistics to quantify human error  
9 probabilities.

10 Because of that, the methodology relies on a very  
11 structured formal expert elicitation process to evaluate the likelihood of  
12 human error, again, using human error in the context that I explained  
13 earlier, and the associated uncertainty about those human errors.

14 The slide says for each combination of contextual  
15 factors, now what does that mean? Well, contextual factors is jargon,  
16 it means things like the human system interface. What are the quality  
17 and the availability of alarms displays?

18 And for example, in certain scenarios, the operators  
19 may not have those alarms and displays because we've had a power  
20 failure or a fire or the event the alarms and displays that they have  
21 might not necessarily be reliable because we've had a partial power  
22 failure or a fire that's affected a part of the plant.

23 The availability procedures, training, experience,  
24 distractions that are introduced by the scenario that may cause the  
25 operators to focus on one issue that's evolving to the extent that they  
26 may downplay other issues.

1 Conflicting priorities, do I try to put out a fire? Do I try  
2 to deal with seismic damage? Or do I try to look at a broad range of  
3 alarms in the control room that may not be all that reliable?

4 So, those are those contextual factors that are  
5 considered in these expert elicitations to help us inform the human error  
6 probabilities.

7 Next slide?

8 Because we don't have that extensive database, if you  
9 will, uncertainty, there are uncertainties and we have to acknowledge  
10 that and we have to explicitly address those in our analyses.

11 And the point of this slide and this recommendation is  
12 that those uncertainties should be evaluated as an integral part of the  
13 assessment process. They're not something, do you finish the  
14 analysis and just go patch in some uncertainty at the end of backfit.  
15 This is part of the analysis.

16 Next slide?

17 There's a lot on this slide, I just going to talk about the  
18 first bullet.

19 As part of the analysis, we evaluate what we call the  
20 available time window for operator response. How much time is  
21 available for the operator to perform a required action before the plant  
22 evolves into a situation where that action becomes irrelevant? And the  
23 amount of time that's actually required to perform the action.

24 Now, there are uncertainties also in those times. We  
25 don't know them precisely. One important message here is that, this  
26 part of the analysis isn't an academic exercise. The time that's



1 available is derived from detailed best estimate thermal hydraulic  
2 analyses that look at the event progression so that we understand the  
3 rates of change of things like temperatures and pressures and levels  
4 and flows and all of those things.

5 In one we evaluate the time that's required for the  
6 operators to perform these actions. We look at simulators and  
7 evaluations of how much time is required to the simulator? We go  
8 through walkthroughs in the plant to see whether it's feasible to enter a  
9 particular area, what types of tools are required and so forth. That's  
10 the message from that slide.

11 Next slide?

12 Our final recommendation was that a formal pilot  
13 testing of the IDHEAS methodology should be performed. But I think  
14 that we're all aware of a bad example of this process and that is the  
15 transition to NFPA 805 where the staff and the industry are now  
16 applying a very complex methodology in the light of licensing issues  
17 without that methodology having been adequately evaluated in a pilot  
18 program.

19 And this is a complex methodology also. It should be  
20 tested in its entirety in a realistic application so that we work out the  
21 bugs before it's actually used in practice.

22 Next slide?

23 We recommended that that pilot testing be performed  
24 by a set of teams of analysts so that we don't suffer from one person  
25 who is the expert doing the analysis, that we use a variety of people.

26 And more importantly, the first bullet on this slide, that

1 those teams should include members with expertise in power plant  
2 engineering, operations, the entire PRA, as well as people who have  
3 human performance and HRA capabilities.

4 The message there is that Human Reliability Analysis  
5 isn't performed by the so-called HRA expert, it's actually performed by a  
6 team of people with all of those disciplines, people who understand the  
7 systems and the engineering people who understand the operations,  
8 certainly, people who understand the entire PRA and the meaning of  
9 those scenarios, as well as people who understand human  
10 performance.

11 Next slide?

12 And in closing, the staff has indeed responded to our  
13 letter and they actually agree with all of our recommendations. This a  
14 good letter. They plan to address all of those recommendations in an  
15 update to the current draft report on the IDHEAS methodology and  
16 they've stated that they indeed plan to conduct a formal pilot testing of  
17 the methodology which we're very pleased with.

18 And with that, I'm only about six minutes over but I  
19 gained a couple in the beginning.

20 I will pass the torch to the esteemed Dr. Corradini.

21 DR. CORRADINI: He's taken all my time. Thank  
22 you, John.

23 MR. STETKAR: You're welcome.

24 DR. CORRADINI: So, could I have the first slide,  
25 please?

26 So, we wanted to talk about the NRC research

1 program and, as you know, every couple of years we go through a  
2 review of the program, issue a report, which I'm sure you all have and  
3 looked at.

4 And as usual, the scope really is to look at the current  
5 safety research program organized by RES. And then, beyond looking  
6 at all of that, identify one particular area that we think is important to  
7 kind of dwell upon. And in Chapter 3 of the report, we talked about  
8 understanding severe accident progression, so I'll come back to that  
9 with some comments.

10 And then, finally, I wanted to keep the talk short, I  
11 picked a few findings on specific research areas. There is  
12 recommendations on all the various research areas, a dozen of them, a  
13 baker's dozen of them. But I wanted to pick a couple to emphasize  
14 because some of them will already be picked up in subsequent talks.

15 Next slide, please?

16 So a general observation and this is not new. When I  
17 was in front of you, I think, two years ago discussing this same  
18 observation which is the NRC really has succeeded over the last few  
19 years in its effort to tie research activities that it undertakes to near term  
20 issues that are being confronted by its various line organizations which  
21 I've listed.

22 We will note those, still though, in some cases,  
23 research focused on organization needs may sometimes terminate  
24 prematurely some work precluding appropriate and needed efforts that  
25 would be of use for future regulatory issues.

26 My one example that I'll bring up, John mentioned

1 GSI-191. There are issues relative to downstream effects that still are  
2 open and we're considering them. And what we found very interesting  
3 with an applicant, a particular applicant looking at risk-informed  
4 approach for GSI-191 which we thought at least deserves looking into  
5 and understanding and even given uncertainties, might have some  
6 merit.

7 Next slide, please?

8 So, in terms of collaborations in the conduct of  
9 research, we've been pleased in the past, and I think we continue to  
10 encourage RES collaborations with other federal agencies such as  
11 DOE, I'll give examples in a bit, industry, universities and, in particular,  
12 international partners to effectively share knowledge and experience  
13 that contribute to intermediate long term research objectives.

14 My example for the OECD, I'll mention briefly what's  
15 going on in materials and metallurgy. What I am more familiar with is  
16 in thermal hydraulics and severe accidents beyond design basis  
17 accidents.

18 A lot of the work that the agency is doing through the  
19 research branch really interacts with and works with the international  
20 community through particularly the OECD in a lot of their programs and  
21 we're particularly pleased about that.

22 Next slide, please?

23 So, let's talk about Fukushima. In understanding  
24 severe accident progression, a lot of this focuses in on Fukushima  
25 forensics and the ACRS recommends that the NRC, and I'll insert  
26 continue to proactively engage with organizations. I said it proactively

1 engage, but I'll give you an example where they're already in the midst  
2 of it -- with the Department of Energy, with Japanese researcher  
3 organizations and others in the international community to focus on the  
4 forensics of the accident.

5 Let me take one particular example, Dr. Brian Sheron,  
6 head of RES, is now currently the Chair of the CSNI. And in particular,  
7 it was under his recommendation that they begin the SARPF group. I  
8 asked Brian beforehand what does SARPF stand for, but he said I  
9 couldn't remember. It stands for Severe Action and Research  
10 Post-Fukushima.

11 And so that group, which is headed by Dr. Hirano of  
12 Japan, is looking at ways in which one can list and prioritize inspection  
13 techniques so we can gain information as the units are deconstructed  
14 and taken apart so we can gain some information about what might  
15 have occurred in severe accident progression that we thought would go  
16 one way and it turned out to go a different way.

17 Such efforts offer a really unique opportunity to better  
18 understand boiling water reactor severe accident progression, as well  
19 as to develop better measures for mitigating beyond design basin  
20 accidents.

21 A couple other examples, NRC, if I flip it a bit, NRC is  
22 leading, as I mentioned, what Brian is doing is participating with the  
23 DOE because the DOE is trying to help identify instrumentation needs  
24 that might -- that one can rely on if we go beyond the design basis in the  
25 accidents space and use those instruments to actually provide readings  
26 that we can use and understand the accident progression. NRC is

1 participating there.

2 Also, they'll be observing a new gap analysis effort that  
3 the DOE is doing to try to understand what are the gaps in research that  
4 might need to be done.

5 Next slide?

6 So, let me give just a few specific research  
7 recommendations. In the area of Digital I&C, Charlie will coming up  
8 next talking about this, so I'm not going to steal his thunder. I'll just  
9 simply say that we continue to recommend the integration of control of  
10 access, safety and cyber security in the design stage and licensing to  
11 ensure secure Digital I&C safety systems.

12 I think Charlie, this is just a personal comment, I think  
13 Charlie's done an absolutely top notch job of working with the staff and  
14 trying to really lay out the key principles that one has to stay within this  
15 area.

16 In the area of fire safety, initiate R&D to include early  
17 detection of incipient fire, effects from fire damage and heat on fiber  
18 optic cables and cabinet fire heat release rates. I picked those three  
19 with the advice of some of my colleagues and the cabinet fire heat  
20 release rates, that's well along. That's already been started and is well  
21 along in terms of an activity.

22 In terms of early detection in incipient fires, that activity  
23 is just getting started.

24 Under reactor fuels, extended burn up and fuel  
25 performance simulations will require the RES to develop, and I'll insert  
26 also, to improve current analytical methods to evaluate proposed

1 changes in fuels and cladding.

2 FRAPCON is one of the key tools the NRC uses for  
3 modeling this. You're going to have to improve some of the modeling  
4 there if we go to extended burn ups and differences in fuels and  
5 cladding and that's something we wanted to note.

6 Next slide, please?

7 In the areas of materials and metallurgy, this kind of  
8 goes back to what I was saying about international cooperation. We  
9 continue to support the active participation and international efforts  
10 relating to materials degradation, such as the International Cooperative  
11 Group on Environmental Assisted Cracking.

12 In PRA, the RES should really initiate efforts to ensure  
13 that an appropriate characterization of uncertainty is performed in all  
14 agency analyses. I should say NUREG-1855, which kind of leads one  
15 through how to perform uncertainty analysis we feel is a very good  
16 document and really could be used as -- should be used as a guide as  
17 to how you do uncertainty analysis in the future.

18 From a practical standpoint, the PTS, or Pressurized  
19 Thermal Shock, in particular, NUREG-2163 is a good example of how  
20 one can use uncertainty analysis for a technical issue.

21 In thermal hydraulics, my final area, RES really should  
22 maintain independent confirmatory capabilities that keep pace with  
23 such developments in the industry such as computational fluid  
24 dynamics, modeling and advances in computer simulation.

25 And within the agency, TRACE is the main workhorse  
26 tool to do thermal hydraulic analysis, but that's really supplemented by

1 some commercial tools such as Fluent and STAR-CCM.

2 And we're encouraged by the fact that the staff and  
3 Research are using these tools to specifically address individual  
4 questions that need some illumination, such as induced steam  
5 generator tube failure analysis, looking at flow patterns, the boron  
6 distribution effects during a boron injection, and then flow pattern and  
7 mixing for a spent fuel pool analyses.

8 So, those are some examples of where we think things  
9 ought to go in the future.

10 With that, I'll conclude and turn it back over to Charlie.

11 MR. BROWN: This presentation is going to be on the  
12 proposed revision to 10 CFR 50.55a, incorporate by reference, IEEE  
13 Standard 603-2009 criteria for safety systems for nuclear power plants.

14 The brief consists of two parts. The first few slides  
15 provide basic fundamentals and characteristics of reliable I&C systems.  
16 The remaining slides will provide a summary of our review of the  
17 proposed rule language and our recommendations with a discussion of  
18 our bases.

19 Nuclear power plant safety -- next slide, please?

20 Nuclear power plant safety system designs rely on the  
21 following fundamental principles to compensate for failures that could  
22 degrade safety system reliability. They are redundancy,  
23 independence, determinacy, defense-in-depth and diversity, control of  
24 access and simplicity. A somewhat subjective principle but a very  
25 important principle to consider during the design process.

26 They apply to computer platform software-based or



1 field programmable array digital instrumentation and control systems as  
2 well as conventional analog-based systems.

3 Next slide, please?

4 As you are aware, today, nuclear plants are being  
5 designed with computer-based Digital I&C systems and networks as  
6 the backbone for protection, control, alarm, display and monitoring.

7 Next slide?

8 Computer-based systems allow enhanced  
9 performance but result in a higher degree of functional integration,  
10 which I'll comment on in a minute, have new design and failure issues,  
11 for example, less inherent inter-division communication independence,  
12 signal processing that is not inherently deterministic, software  
13 complexity, verification and validation and control of access  
14 vulnerabilities.

15 Just a little perspective on what do we mean by higher  
16 degree of functional integration, which is a somewhat esoteric  
17 statement?

18 With analog systems, you can basically process the  
19 data, a pressure or a temperature flow, nuclear signal, whatever and if  
20 you want to combine them into a more comprehensive algorithm for  
21 plant safety protection, very complex keeping it and maintaining it,  
22 aligning it and calibrating is difficult.

23 With software-based or computer-based systems, it  
24 allows you to develop more powerful algorithms which enhance your  
25 safety performance and position as well as a highly increased accuracy  
26 for the functions and the parameters that you're measuring because

1 you've eliminated the variability of all the analog components  
2 downstream of the -- what I call the center itself, okay, which you have  
3 to live with what you get.

4 So, that's what we mean by functional -- higher  
5 functional -- at least that's what I mean by higher functional integration.

6 Next slide?

7 Also, networks are now used for the communication  
8 between plant systems and control spaces and to external site and  
9 corporate networks resulting in potential compromised control of  
10 access from sources external to the plant.

11 Next slide?

12 The use of computer-based systems, which typically  
13 are microprocessors or programmable logic devices or field  
14 programmable gate arrays and nuclear plant safety systems, does not  
15 compromise, well let me restate this, does not compromise the  
16 determination of the fundamental principles of redundancy,  
17 defense-in-depth and simplicity.

18 However, they do introduce significant new  
19 vulnerabilities that potentially compromise division-to-division  
20 independence, determinant safety signal data processing behavior and  
21 control of access to plant safety systems from sources external to the  
22 plant.

23 Next slide?

24 Thus, the use of computer-based systems need new  
25 design requirements that are specified by rule in the Code of Federal  
26 Regulations as is done for analog systems.

1                   It also should ensure that the fundamental principles  
2 that are potentially compromised, namely independence, determinant  
3 signal processing and control of access from external plant sources are  
4 captured in the Digital I&C architecture and should ensure also that all  
5 of these are detailed during the licensing phase.

6                   Next slide?

7                   The present rule 10 CFR 50.55a specifies that nuclear  
8 power plant I&C systems must comply with IEEE Standard 603-1991,  
9 criteria for safety systems for nuclear power generating stations.

10                  The 1991 Standard does not provide criteria that are  
11 sufficient for designs based on computer-based technology.

12                  Next slide?

13                  The proposed revision to 10 CFR 50.55a revision is  
14 being advanced by NRR and they recognize the problems with the  
15 existing regulation and the standard. They've proposed updating the  
16 rule to IEEE 603-2009 which does include some expanded  
17 requirements for computer-based designs.

18                  However, and NRR was very good with this, they also  
19 recognized that there were many additional needs that were absent  
20 from the 2009 Standard which required some type of coverage in the  
21 new rule.

22                  Next slide?

23                  Thus, the draft revision proposes to incorporate by  
24 reference IEEE 603-2009 subject to the following, it imposes additional  
25 technical conditions for the use of IEEE 603-2009, it establishes  
26 conditions for applicability of the new and previous versions of the

1 Standard, it retains the incorporate by reference of earlier versions of  
2 the Standard and it provides clarifying definitions for several terms in  
3 the Standards and proposed regulation.

4 The use of computer-based technologies significantly  
5 impacts the critical fundamental principles of independence,  
6 deterministic signal processing and control of access that are inherent  
7 in the use of analog systems.

8 Thus, a primary focus of our review was to ensure that  
9 these new vulnerabilities had conditions incorporated in the new rule  
10 that would result in design features that would maintain the inherent  
11 nature of these fundamental principles in computer-based safety  
12 systems. Our comments and recommendations are the result of this  
13 focus.

14 ACRS comments -- next slide, please?

15 The proposed draft revision should be published after  
16 incorporation of our recommendations with respect to independence,  
17 determinant signal processing and control of access.

18 Next slide?

19 Independence. Independence and digital  
20 applications is not inherently ensured by the existing rule requirement  
21 for electrical isolation.

22 And I want to deviate from the slide momentarily here  
23 to just make a following comment.

24 Independence is probably, of all the principles, is  
25 probably the most critical principle because without it redundancy is  
26 meaningless. You have no redundancy if your protection divisions are

1 not independent.

2 So, what is the difference? Just a little calibration. If  
3 you can envision four divisions, each has a computational unit and a  
4 voting unit. Each division sends its computational trip signal to every  
5 voting unit in every division.

6 In the analog systems, according to the present rule,  
7 those systems, it's easy to verify independence. They're required to  
8 be electrically isolated. That means you either have relay contacts  
9 going into the voting units which separates them and prevents  
10 compromising the voting units in any other division.

11 Or, if it's a solid-state integrated circuit-type designed  
12 voting unit, you isolate it with diodes and you can handle the single  
13 failure criteria. It takes care of your other vulnerabilities.

14 With computer-based systems, that data electrical  
15 isolation, is meaningless. You can send it via fiber optics, so what. If  
16 you have corrupt data which can lockup, you may remember you move  
17 your mouse on your computer and all of a sudden the arrow doesn't  
18 move, nothing does anything, that's known as lockup.

19 And if you generate that in one division, send it to all of  
20 them, you'll probably lock them all up. Is that absolute? Absolutely  
21 not, but it may. So you have to be able to counter that particular  
22 problem.

23 So, as it exists today, the proposed rule does not -- the  
24 existing rule isolation does not work satisfactorily for the  
25 software-based units and the proposed rule does not incorporate a  
26 specific condition that prevents this loss of independence.

1 Next slide?

2 Determinant signal processing. Determinant signal  
3 processing behavior depends on program cycle design which can  
4 include operating system, operator or other external interrupts.

5 The proposed rule incorporates a condition for -- under  
6 the system integrity part of the IEEE, that's the condition where it goes,  
7 which requires predictable and repeatable operation. Not a problem  
8 with that.

9 The difficulty is that it doesn't really say what you mean  
10 from where to where. What do you want to be predictable and  
11 repeatable?

12 So, it's not clear relative to that and it really should be  
13 clear that it's relative to real plant systems from the sensor plant,  
14 excuse me, from sensor data inputs to control device actuation and it  
15 should be clarified as part of the rule.

16 Now, what is the difference between analog and  
17 computer-based processing?

18 In analog systems, those are consisted of resistors,  
19 capacitors and inductors. Once you design the system and put it  
20 together, you get a response. That response is fixed. Physics  
21 dictates how it will perform time after time after time.

22 In a computer-based system where you have software,  
23 you've got how it's programmed, how it makes it calls. What are the  
24 interrupts if they have any? Are they external? Although we prohibit,  
25 for the most part, prohibit, they're not explicitly stated, there's not a  
26 software standard that says that.

1                   So, there's a lot of complications in the software  
2 process is far more -- potentially far more variable.

3                   So, that's the difference in determinant processing  
4 between analog and why it's critical from analog to the digital-based  
5 systems.

6                   Next slide?

7                   Control of Access.   Connections between internal  
8 plant safety networks and networks external to the plant through a  
9 firewall, typically software-based and software controlled, can enable  
10 remote access that is not under the control of plant operators.

11                  The proposed rule does not contain any provision that  
12 prevents this loss of access control.

13                  One observation I would like to make, as a result of our  
14 reviews of new reactors, most applicants have stated that they will  
15 specify that plant networks connections to external sources will be done  
16 through hardware-based one way devices commonly referred to as  
17 data diodes.   So, you'll hear that terminology.   So, they are -- we are  
18 getting that, most of them have done that.

19                  However, it's not explicitly required or called out in the  
20 proposed rule as it's being drafted.

21                  This is a significant difference from plants from analog  
22 systems where access to systems is basically by technicians under the  
23 control of operators in the main control room, as well as the use of other  
24 hardware access features such as keys.

25                  Today, with the computer-based systems, if you've got  
26 a firewall that somebody can hack through, everything you've got on

1 that network, which is all the signals going back and forth, both control  
2 and protection-type signals and data monitoring are subject to being  
3 messed with.

4 So, that's why it's critical to make sure that network bus  
5 is carefully controlled and has no access from the outside.

6 Next slide?

7 We agreed with the proposed draft revisions subject to  
8 incorporation of three recommendations, revise 10 CFR 50.55a(h)(5)i,  
9 independence to specify an independent hardware-based monitor for  
10 the common safety system voting processing units that produces a trip  
11 if the common unit ceases operation or locks up.

12 The trip should be independent to the processing unit  
13 and executed by the hardware-based monitor.

14 Next slide?

15 Second one is Section 10 CFR 50.55a(h)(4) which is  
16 system integrity of the proposed rule should be clarified to state that  
17 both predictable and repeatable means processing from sensor data  
18 input to safety control device actuation and independent of any  
19 redundant portions of the safety system or other external input.

20 Next slide?

21 Third, Section 10 CFR 50.55a(h) of the proposed rule  
22 should specify an additional condition addressing Section 5.9 of the  
23 IEEE Standard control of access.

24 The condition should specify that communications  
25 external to the plant should be accomplished using one way  
26 hardware-based transmit only devices. These devices should neither



1 be software configurable nor capable of alteration by external  
2 commands or any surreptitious means.

3 I'd like to make one other observation relative to the  
4 proposed revision, give you the perspective that I gave to the  
5 committee relative to the staff's job.

6 They did an excellent job of going through the new  
7 rule, the new Standard, the proposed Standard, all the lessons learned  
8 from the design reviews and did a fine job of incorporating all these  
9 conditions.

10 Our recommendations are meant to fill gaps that we  
11 feel are very critical in maintaining the safe and reliable performance of  
12 I&C systems protecting the plant.

13 That completes my brief. Thank you.

14 MR. RAY: This was on to begin with.

15 Okay, the title slide, please?

16 Last month, the committee completed its review and  
17 issued a letter with recommendations in response to the staff proposal  
18 to make systematic, transparent and consistent a longstanding  
19 qualitative consideration of factors in the development of regulatory  
20 analyses and backfit analyses across the full range of agency activities.

21 Next slide?

22 As a vehicle for doing this, the staff would expand the  
23 scope of SECY-14-0002 which is the existing plan for updating the  
24 agency's cost-benefit guidelines.

25 Specifically, the staff proposal is to develop a set of  
26 methods with the objective I mentioned as summarized in the next

1 slide.

2 Here, the staff's objective -- here are staff's objectives  
3 for this effort. The first, to make the process more systematic is  
4 needed to satisfy the backfitting rule, 50-109, as is the second objective  
5 concerning transparency.

6 The third objective to increase consistency in the  
7 qualitative consideration of factors will likely be a greater challenge than  
8 the first two are.

9 Next slide?

10 Although it seems like a diversion from my topic, the  
11 existing guidance and the ongoing effort I referred to as  
12 SECY-14-0002, emphasized that qualitative analyses are performed  
13 and must be used in regulatory analyses where possible.

14 In improving the evaluation of direct and indirect costs,  
15 it's generally straightforward, although the costs, that is, are generally  
16 straightforward, although it still may involve significant uncertainties.

17 But the valuing of benefits inherently involves  
18 qualitative consideration of the factors involved.

19 Another issue is how to make more systematic and  
20 transparent and consistent the balance between these two things,  
21 qualitative and quantitative considerations.

22 Next slide?

23 ACRS Recommendations. The committee  
24 recommends approval of the staff proposal to initiate the effort, to  
25 identify the methods to make the qualitative consideration of factors in  
26 regulatory analyses, as I keep saying, more systematic, transparent

1 and consistent.

2 The committee recommends that the effort avoid  
3 creating a dichotomy between the quantitative and qualitative methods  
4 and recognize, for example, that quantitative analyses are inherently  
5 based on qualitative considerations, choices get made in order to  
6 decide what to apply the cost benefit to.

7 Next slide, please?

8 Because the result of the effort is impossible to  
9 forecast precisely, the committee recommends, and the staff has  
10 indicated it is their intent, to meet with the committee to review the  
11 development progress, thus, allowing more specific comments by the  
12 committee where appropriate.

13 And that's all I could summarize from our letter given  
14 that we're just proposing to start this effort.

15 CHAIRMAN MACFARLANE: Okay, over to us.

16 And Commissioner Ostendorff was supposed to start  
17 with questions, but seeing how he's absent right now, I guess I will start  
18 with questions.

19 So, let's -- no? He's back.

20 COMMISSIONER OSTENDORFF: You finished  
21 quicker than I thought you were going to.

22 MR. STETKAR: Harold took a course on speed talk.  
23 You missed it.

24 CHAIRMAN MACFARLANE: Well, he made up for  
25 the rest of you running over time, that's all I have to say.

26 Okay, Commissioner Ostendorff?

1                   COMMISSIONER OSTENDORFF: I appreciate all  
2 the committee does and I really appreciate the fact that everybody's  
3 here and that's always a good thing to see.

4                   And I know that we really benefit from having the  
5 ACRS eyes on across the entire range of issues we deal with.

6                   From time to time since I worked at NNSA for a few  
7 years, I'm asked to go speak to the Department of Energy Nuclear  
8 Executives and I think I did my fourth talk just back in August of this year  
9 and I'm always asked a question. What are the two biggest  
10 differences or two things you'd suggest are advantages or  
11 enhancements the NRC has over NNSA with the Department of  
12 Energy?

13                   One of the things I say is I think our personnel rotation  
14 practice here at the NRC helps eliminate stove piping and creates very  
15 healthy cross pollination.

16                   The second thing I always talk about is the Advisory  
17 Committee on Reactor Safeguards and how much we benefit from  
18 ongoing professional type of advice. So, I wanted to thank you up  
19 front.

20                   I will give a specific, and not single out one area, but I  
21 will. The subsequent licenses renewal paper you provided was very  
22 helpful in framing my vote, so I appreciate your work in that area, as in  
23 all areas.

24                   John, not surprising, I'm going to start out with HRA.  
25 We've had some discussion in my office on this. I was just counting up  
26 in my head when you were talking, I think I spent 19 years in Navy

1 training operators either to operate nuclear propulsion plants or when I  
2 was a prospective commanding officer instructor how to shoot  
3 torpedoes, all of which were high hazard, high consequence events  
4 every time you shot one of those torpedoes, in particular.

5 And we spent a lot of time looking at how to reduce  
6 human error and how to enhance operator training. But we never  
7 assigned any numerical or quantitative value to the likelihood that  
8 somebody would do something correctly and so I continued to be  
9 troubled in this area as we've discussed.

10 I've got to tell you, I go back to your slide 2006, okay,  
11 now, we're eight years past that. On slide 18, you say work remains,  
12 you know, to look at refining the proposed models.

13 Our principle of good regulation reliability says that we  
14 shall use the best available information. That's our own principles of  
15 regulation for the NRC.

16 And so I get a little nervous when we look at more  
17 expert elicitation. Our staff has done that. At what point do we say  
18 we've gone far enough? I'm troubled that we're continuing to do  
19 research projects. ACRS is recommending to continue this. It's been  
20 going on for years.

21 We've had, you know, Commission meeting earlier this  
22 year with other people from Halden and EPRI and so forth and I've got  
23 to tell you, am I being overly negative about the use of quantitative  
24 measures to assess the likelihood of operator performance?

25 We has this rulemaking that our staff's working on right  
26 now in filtering strategies. What I'm hearing from you is that we don't

1 have the HRA methods in place right now to provide confidence that  
2 that modeling would be appropriate for the Commission to make a  
3 decision.

4 So, I'm going to stop right there and let you comment  
5 on any of that that you want to.

6 MR. STETKAR: Well, that's a lot.

7 COMMISSIONER OSTENDORFF: Well, I do want to  
8 give you -- the rulemaking thing is really bothering me because --

9 MR. STETKAR: We don't have to shoot torpedoes  
10 from these things so that makes a little bit of it easier.

11 You covered a lot of topics.

12 COMMISSIONER OSTENDORFF: Well, at least you  
13 know the -- I mean, short term, this Commission, these Members to my  
14 right and myself and two perspective Members will be faced in making a  
15 decision on filtering strategies rulemaking during our terms as  
16 Commissioners.

17 Yet, what I'm hearing from the ACRS is, the ACRS  
18 does not believe that the state of art of HRA techniques is sufficient to  
19 quantify operator performance. Yet our staff is doing that right now.

20 MR. STETKAR: I think that, in that particular case,  
21 we're following that, obviously, very closely. We had a subcommittee  
22 meeting, we're very familiar with the models that are being developed  
23 by the staff for the -- to support the filtering strategies rulemaking  
24 activity.

25 We have highlighted HRA as an area that deserves our  
26 attention, deserves the staff's attention. And, in fact, we have another

1 subcommittee scheduled on that particular topic, I lose track of dates,  
2 but it's in November.

3 Do I believe that improvements can be made in Human  
4 Reliability Analysis methods? Yes, certainly.

5 Do I believe that we have the capability to, for the  
6 purposes of that rulemaking activity, evaluate human error probabilities  
7 in a context that will allow us to structure those scenarios to determine  
8 information that can be provided to you, quantitative information and  
9 qualitative information, to support that rulemaking? I'd say, we can.

10 Are there uncertainties? Yes, there are but in many  
11 cases, characterizing those uncertainties will help you in the decision  
12 making.

13 Sometimes, the uncertainties don't make a difference if  
14 they're clearly differences.

15 COMMISSIONER OSTENDORFF: But, let me  
16 refine because I'm looking at the clock here, let me refine my question.

17 Right now, NRR and Research staff are working on  
18 assigning the probability of an operator conducting a venting operation  
19 as part of the filtering strategy rulemaking and trying to use that to  
20 assess the benefit of this operator action.

21 MR. STETKAR: That's correct.

22 COMMISSIONER OSTENDORFF: Right now.

23 MR. STETKAR: Yes.

24 COMMISSIONER OSTENDORFF: Is that model  
25 being used right now? Does that model represent what you believe is  
26 a proper state of the art HRA model for the staff to use for quantitative

1 assessment of operator performance? Because that's what they're  
2 doing right now.

3 MR. STETKAR: They're using the best available --  
4 the tools that they have available right now.

5 COMMISSIONER OSTENDORFF: But it's not a tool  
6 that you think -- the ACRS believes --

7 MR. STETKAR: We believe --

8 COMMISSIONER OSTENDORFF: -- is mature  
9 enough? Is that what I'm hearing from your recommendation?

10 MR. STETKAR: We believe that that tool -- we've  
11 been facing this problem now for 35 years in the risk assessment  
12 business in terms of quantifying human error probabilities and having a  
13 consistent methodology that will reduce variability in terms of those  
14 quantifications. So, this isn't something that's new.

15 If it was an easy problem to solve, we would have  
16 solved it 35 years ago. So, what we're trying to do, and granted, it's  
17 taking a long time, I have no excuse for that.

18 COMMISSIONER OSTENDORFF: I'm not being  
19 critical of the staff or the ACRS --

20 MR. STETKAR: Is there the refined methodology that  
21 we would like to see evolve out of the ongoing project? The answer to  
22 that question is no, it's not ready for prime time.

23 COMMISSIONER OSTENDORFF: That's what I was  
24 asking.

25 MR. STETKAR: Is it developed far enough that  
26 elements of that methodology can be used? The answer to that is,



1 yes, it's up on the learning curve.

2 COMMISSIONER OSTENDORFF: Okay.

3 MR. STETKAR: So, we're not there but we're getting  
4 there.

5 COMMISSIONER OSTENDORFF: That's helpful.

6 Okay, Mike, I apologize, I'm going to skip you for right  
7 now.

8 DR. CORRADINI: No, I'm enjoying this.

9 COMMISSIONER OSTENDORFF: No, no.

10 Charlie, I've got to go back with our common bond of  
11 naval reactors and so forth.

12 We have certified the AP1000, Digital I&C. Has that  
13 passed your proposed standards?

14 MR. BROWN: We've finally got to the point --

15 It might be a good idea if I turn that on, I guess.

16 Yes, we got to the point where they did incorporate into  
17 the DCD the requirements for monitoring of the computer-based units,  
18 the voting units.

19 Control of access is on that one was a little bit of an  
20 open issue. We didn't take that up to the same degree on AP1000 as  
21 we have learned we needed to do on some of the subsequent reviews.

22 But, yes, AP1000 met the metrics for what we were  
23 looking at.

24 COMMISSIONER OSTENDORFF: Okay. I hear,  
25 and I just was -- spoke at two different events over this week and I  
26 heard from some in industry and external to the nuclear industry, man,

1 are we making it too hard to incorporate digital technology in the  
2 nuclear arena?

3 And I look at -- I've shot Tomahawk missiles, I've shot  
4 hundreds of weapons before and all the weapons, torpedoes, ADCAP  
5 torpedoes and the Tomahawk missiles, all that digital technology. And  
6 those have been around for decades, since the early 1980s.

7 Do we look at all at -- and lethal applications I'm talking  
8 about -- do we look at all at or does ACRS look at standards used in  
9 other areas, let's say the Department of Defense weapons systems to  
10 look at the state of practice for digital technology?

11 MR. BROWN: The answer, no.

12 COMMISSIONER OSTENDORFF: Okay, that's fine.

13 MR. BROWN: An honest answer.

14 COMMISSIONER OSTENDORFF: Yes.

15 MEMBER BROWN: But I would characterize that by  
16 you have to be aware of -- there's a question that the former  
17 Commission Magwood stated -- asked. You look at airplane  
18 technology, they've got fly by wire, what's different?

19 You've got to look at reactor plants where all you want  
20 to do is shutdown the reactor or you have feedback control systems  
21 where you have to rapidly incorporate data in order to vary, you know,  
22 planes and rudders and all kinds of other stuff to make them fly. You  
23 have to take a different approach to each of those.

24 COMMISSIONER OSTENDORFF: And I don't  
25 disagree with that.

26 MR. BROWN: My point being, is that you can't

1 necessarily look at what it takes to fire the torpedo and say is that what's  
2 necessary, or is that sufficient, for what we would do in the nuclear  
3 industry.

4 COMMISSIONER OSTENDORFF: Yes, but we get in  
5 -- they still use IEEE Standards and so a lot of the Standards are used  
6 in many cases are --

7 MR. BROWN: But the Standard -- the items I'm  
8 talking about don't really, if you look at independence, where does  
9 independence come in?

10 You push a button, it fires the -- does it do it in 30  
11 microseconds or 15 microseconds?

12 It's not really a function of what you need to do.

13 Control of access, there's nobody going to access that  
14 system when you're boring holes in the water. So, those fundamentals  
15 --

16 Now where you do come in is you can have some  
17 redundancy in firing circuits because you don't want a single failure in  
18 the firing circuits from causing this puppy to take off or the door to open  
19 when you don't want it to.

20 So, there's a lot of -- so you have to use some common  
21 sense when you apply these. And what we've tried to do as part of the  
22 committee, is look at these principles and apply them in a way to the  
23 new reactor designs that we've been presented with without adding  
24 layers of cost or complexity.

25 When you talked about a monitor on a voting unit, for  
26 instance, typically, that's -- you can go buy what's called a 555 timer,

1 okay, that costs 39 cents, put it, you know, as little block on your  
2 platform and if it doesn't get triggered every 200 milliseconds, it tells you  
3 to go do something else.

4 And you're probably resetting that processor anyway if  
5 it locks up. It's just that the reset of a processor in these systems, can  
6 it be for five to ten minutes?

7 And the systems I did in the Navy, when we reset the  
8 division processor, it had to be backed up in all indications within 250  
9 milliseconds, at the most, with the complex algorithms where you  
10 needed more, it was about three or four seconds.

11 There's a big difference between being able to  
12 demonstrate you're going to be able to take care of the plant between,  
13 you know, a quarter of a second to two seconds or three and five to ten  
14 minutes before that processor and that channel is back up running,  
15 that's unacceptable.

16 So, when you look at it, you have to do something on  
17 those voting units because that's the final trip and you can't afford to  
18 have those little babies compromised.

19 COMMISSIONER OSTENDORFF: I appreciate your  
20 providing specific examples. That's very helpful.

21 MR. BROWN: Okay. Thank you.

22 COMMISSIONER OSTENDORFF: Thank you all.  
23 Thank you, Chairman.

24 CHAIRMAN MACFARLANE: Okay, all right, I'm  
25 going to start off with Mr. Ray.

26 So, you said something I thought was very interesting,

1 tell me if I got it right.

2                   Qualitative analyses are inherently based -- sorry,  
3 quantitative analyses are inherently based on qualitative  
4 considerations.

5                   MR. RAY: Correct.

6                   CHAIRMAN MACFARLANE: Okay. Can you  
7 elaborate a little more?

8                   MR. RAY: Well, the selection, for example, of what  
9 costs and benefits you're going to compare in a quantitative analysis,  
10 assuming that's what you're going to do, that selection isn't defined by  
11 anything other than your judgment as to what things you're going to look  
12 at.

13                   On the cost side, as I've said or tried to say, it's  
14 generally pretty straightforward, direct and indirect is a little more  
15 difficult sometimes to estimate.

16                   But on the benefit side, I don't know of anything that will  
17 define the benefits in a cost benefit analysis other than the judgment of  
18 the person who's -- or the organization, the institution that's making the  
19 evaluation.

20                   So, that's the sense in which I'm making that comment.

21                   Also, the decision about, well, exactly which benefits  
22 are we going to consider? Take for example, public confidence in the  
23 agency's actions. Should that be included somehow? I'm sure it is no  
24 matter what we say.

25                   CHAIRMAN MACFARLANE: How would you  
26 measure it?

1 MR. RAY: It's going to be considered how do you  
2 evaluate in a cost benefit analysis?

3 CHAIRMAN MACFARLANE: Well, how do you  
4 evaluate human life? Is that really quantitative?

5 MR. RAY: Well, people can make it quantitative,  
6 Chairman.

7 CHAIRMAN MACFARLANE: Isn't that informed by  
8 judgment?

9 MR. RAY: It is. And --

10 CHAIRMAN MACFARLANE: So, in the end, it's  
11 quantitative or qualitative?

12 MR. RAY: In the end, qualitative factors are  
13 inherently part of any cost benefit analysis which is the point.

14 CHAIRMAN MACFARLANE: Are expert elicitation  
15 quantitative or qualitative? Aren't they opinions?

16 MR. RAY: Expert elicitations are, I believe by  
17 definition, opinions.

18 CHAIRMAN MACFARLANE: Dressy opinions maybe  
19 with a Ph.D. next to them? But opinions, yes. So that would be  
20 qualitative, correct?

21 MR. CHAIRMAN RAY: In my dictionary, yes.

22 CHAIRMAN MACFARLANE: Yes, so in the end, it  
23 seems to me that this is a misguided discussion of quantitative versus  
24 qualitative because they're not terribly separable.

25 MR. RAY: Well, again, the staff's proposal is simply  
26 make the use of the qualitative factors more systematic, transparent

1 and consistent.

2 And no one, I think, can criticize that as an objective  
3 and, as I say, 5109 says that your consideration should all be  
4 documented and this is merely an effort to try and do that.

5 The doing of it, though, is what we're saying we need to  
6 be engaged periodically to look at it because it's not easy.

7 CHAIRMAN MACFARLANE: Yes, well, I'm all for  
8 documenting these things and being very clear about all your  
9 assumptions and everything, I think that's very valuable.

10 MR. STETKAR: I think, in the interest of time, I'd just  
11 like to add something.

12 A statement you made, I think, hits the point and I hope  
13 we've made that point in our letter and that qualitative analysis and  
14 quantitative analysis are not separable.

15 CHAIRMAN MACFARLANE: Thank you.

16 MR. STETKAR: They are part of an analysis.

17 Our letter emphasizes the use of quantitative analysis  
18 to its fullest extent where you can do that. Quantitative analysis,  
19 regardless of the topic, is always informed by some type of qualitative  
20 judgment, either in the selection of parameters that will be quantified or  
21 in the interpretation of its results.

22 I did want to add something, quite honestly, you said,  
23 well, is expert judgment qualitative?

24 Expert judgment is qualitative but when we think about  
25 expert judgment these days, we don't think about asking, hey, what do  
26 you think? That's not expert judgment, that's a wild guess.

1                   We think of expert judgment in the context of a  
2 systematic process of expert elicitation and we know how to do that.  
3 It's a formal process, it isn't something where you go ask somebody  
4 what do you think today and what's your opinion.

5                   There's a structured process that makes sure that, first  
6 of all, you're an expert.

7                   CHAIRMAN MACFARLANE: Right. But in the end,  
8 though, it's -- you do that because there is no quantitative factor that  
9 you can find.

10                  MR. STETKAR: That's true.

11                  CHAIRMAN MACFARLANE: So, that's why you have  
12 to do expert elicitation.

13                  MR. STETKAR: That's true, but you do it according to  
14 a process where you understand --

15                  CHAIRMAN MACFARLANE: Oh good, that's good,  
16 I'm glad.

17                  MR. STETKAR: -- how it's done and it's  
18 reproducible.

19                  CHAIRMAN MACFARLANE: Great, but it's -- You  
20 know reproducible depending on which experts you go to.

21                  MR. STETKAR: Well, that's as I said.

22                  CHAIRMAN MACFARLANE: Back to the judgment  
23 piece and the qualitative piece.

24                  So, anyway, I've always been puzzled by that.

25                  Charlie, maybe for those of us who aren't really so  
26 good at all that electrical stuff, the Digital I&C, you know, and this is a



1 public meeting.

2 I thought it might be helpful for you to say something  
3 about why Digital I&S systems are valuable given all the vulnerabilities  
4 that you listed.

5 MR. BROWN: I tried to do that a little bit with the --

6 Okay, I tried to do that a little bit with the -- trying to  
7 characterize what was the integration, the more enhanced the higher  
8 level of integration.

9 So, I'm going to put this from my own personal  
10 experience, not the civilian world experience.

11 When we moved from standard analog, without giving  
12 compromising classified -- when we moved from analog systems to the  
13 software-based digital systems, we were able to incorporate -- okay, let  
14 me back up a little bit.

15 Plants have a pressure temperature and flow regime in  
16 which they're supposed to operate. They are normally maximally  
17 efficient at a particular band that you -- within which you operate. If  
18 you move out of those bands, you have reduced capability.

19 When you go to software-based systems, you can now  
20 take all of the available data, you can take your analysis where you  
21 have now calculated the capability of the plant over a wide range of  
22 pressure temperature and flow circumstances.

23 And you can build algorithms that allow now, instead of  
24 having to shut a plant down, you can allow a reduced -- a different level  
25 of operation without having a shutdown.

26 That is -- now, I'm not -- I've only come across a couple

1 of functions so far in the review of the new designs where they have  
2 gotten more complex -- somewhat more complex algorithms where  
3 they're combining things to come up with some other particular function  
4 they want to use to shutdown.

5 They're not as complex as anything I ever dealt with,  
6 but if you had tried to do those with all analog, they would have been far  
7 more difficult to maintain, to align and to set up.

8 So that, to me, and the accuracy, there is absolutely no  
9 question that you don't have to deal with a whole division, the whole  
10 train of drift of passive components, resistors, capacitors and inductors,  
11 they drift no matter, potentiometers, they drift, no matter how you --

12 So, you've got to account for that when you're doing  
13 your analyses and that determines your base, your, you know, time for  
14 recalibration or realigning.

15 Once you get past the A to D convert the sensor, then  
16 you have to convert it from analog to digital. Once you get past that,  
17 there's virtually no error. So, there's a much -- and I'm saying that on a  
18 general basis, we can probably find a circumstance where there's some  
19 introduced, but much narrow range, which that accuracy improvement  
20 also gives you improved plant performance and can allow you to  
21 compensate for some problems that you may find in the thermal  
22 hydraulic or other physics areas.

23 CHAIRMAN MCFARLANE: All right, that's helpful,  
24 thanks.

25 MR. BROWN: Okay, thank you.

26 CHAIRMAN MACFARLANE: Mike, see, I know you

1 were just relaxing over there.

2 So, on your Slide 35, I don't know if I can find your Slide  
3 35, you say that, it's the middle bullet, Research should initiate efforts to  
4 ensure that an appropriate characterization of uncertainty is performed  
5 in all agency analyses.

6 So, can you give examples of areas where you think  
7 the staff isn't appropriately characterizing uncertainty?

8 DR. CORRADINI: Sure, I'd prefer not to.

9 Well, the one area where we've asked, so, I'm going to  
10 look to colleagues to help me, but one area where we've asked the staff  
11 to kind of improve their use of uncertainty would be in SOARCA, for  
12 example.

13 They're in the middle of, and we're actually expecting  
14 to hear back from them relative to uncertainties in the SOARCA  
15 analysis.

16 So, it's not to say that what they're doing now is wrong,  
17 it's just that it could be better and better would be defined as essentially  
18 following to some extent guidelines of 1855.

19 We're seen, I can't remember now, I'll have to look.  
20 John, was it a year ago that we've seen a discussion of some of the  
21 uncertainty analysis?

22 And we gave them opinions back then, suggestions on  
23 how to improve it. So, that's one. Can you help me with another one?

24 MR. STETKAR Well, I think we've seen a lot of  
25 activities done by the staff that use models and risk assessment space,  
26 for example, to quantify things and decisions are made on the basis of

1 that.

2 You know, is it the judgment of the staff that a certain  
3 condition is acceptable because it meets some sort of acceptance  
4 criterion.

5 Without quantifying the uncertainties, you really have  
6 no confidence in those margins. All you're doing is comparing two  
7 numbers and there is uncertainty about both of those numbers.

8 In a real decision making capacity, I think that it's  
9 important to understand what -- and I characterize it in terms of margins  
10 -- is there a three percent probability that we might exceed the margin?  
11 Is it a one percent probability? Is it a 40 percent probability? Despite  
12 the fact that something we're calling a mean value might be slightly  
13 below our accepted or above our acceptance criteria.

14 And that's where we think that quantifying the  
15 uncertainties as part of all agency decision making activities is very,  
16 very important, as a feed-in to people who are making decisions.

17 So, it goes across the board, I think, any time that we  
18 see a quantitative analysis, the staff should be assessing those  
19 uncertainties --

20 CHAIRMAN MACFARLANE: Absolutely.

21 MR. STETKAR: -- as part of that analysis.

22 CHAIRMAN MACFARLANE: I completely agree. I  
23 would be shocked --

24 MR. STETKAR: Are there examples? There are  
25 several examples.

26 CHAIRMAN MACFARLANE: And that was my

1 training at MIT was that you don't use -- you don't put a piece of data  
2 without putting up the error bars as well.

3 DR. CORRADINI: Well I get -- let me inject one other  
4 thing.

5 I guess as the question becomes more complex and  
6 where it's a systems question versus a particular physics question, then  
7 the ability to do uncertainty analysis becomes more complex, too. So,  
8 the extent that I'm making a measurement, I can do it.

9 I just came back from a doctoral exam where we're  
10 torturing a student appropriately about some particular measurement  
11 on CHF. So, there I can be very clear about what's the answer and  
12 what's the reproducibility?

13 But if I take that and I put it into a systems calculation  
14 such as when I mentioned SOARCA's example, there's a lot of things  
15 that feed into it. There's like two dozen -- and that's where it makes --  
16 that's where they've done, I think, in my personal opinion, a good job,  
17 but it could be better.

18 CHAIRMAN MACFARLANE: Right.

19 MR. STETKAR: I think, this is a final comment, I know  
20 we're short on time.

21 But, the staff often relies on so-called sensitivity  
22 analyses. And the problem with sensitivity analyses, is that what are  
23 the consequences if I die immediately?

24 Well, I can do that analysis, but I've not given you any  
25 confidence in the likelihood that I'll die immediately.

26 Sometimes, sensitivity analyses are useful if they,

1 indeed, provide extremes. But often, we've found they don't really  
2 provide the extremes, they provide some arbitrary benchmarks. And  
3 without providing -- putting those into the right context in terms of what's  
4 your confidence that that may actually occur?

5 It really doesn't help the decision process very much.  
6 In fact, it can confound it sometimes.

7 CHAIRMAN MACFARLANE: Okay. Thank you.

8 Commissioner Svinicki?

9 COMMISSIONER SVINICKI: Well, thank you for your  
10 presentations and to all Members of the committee for their work since  
11 our last meeting.

12 I'll turn first to the committee's letter report on the staff's  
13 work on qualitative consideration of factors or whatever we're calling it  
14 now.

15 I acknowledge that the committee speaks through its  
16 letter reports but I often review transcripts of your meetings because I  
17 wish I had the -- that I was available to attend, but if I'm not, I look at the  
18 transcripts.

19 You conducted two engagements with the NRC staff  
20 on this topic one, I believe at the subcommittee level that was closed, I'll  
21 get to my puzzlement about that in a minute.

22 Ostensibly, I guess the staff's request to close that  
23 session had to do with the fact that we'd gotten into a timing disconnect  
24 where the paper was not publically available. But having reviewed that  
25 transcript and since the paper is now available, personally, I don't read  
26 anything in there that needs to be closed. But guess I'll make no

1 comment.

2 I will confine my commentary to reference to your  
3 subsequent open session with the staff and then --

4 So, I reviewed those two items and then reviewed your  
5 letter report and not having attended your letter drafting session, I'm not  
6 sure what occurred, maybe peace broke out and you convinced  
7 yourself that all of your, I think, very well founded concerns about  
8 ambiguities in what the staff is proposing do not appear in your letter  
9 report.

10 And so, I'll state this in a positive way. I found the  
11 transcripts to be much more illuminating to my consideration of having  
12 to act on the staff's paper than the letter report which, again to be fair to  
13 you as Member Ray outlined in his presentation, you've indicated that  
14 your recommendation is the Commission approve the staff's  
15 recommendation but that you want to stay engaged.

16 And I interpret the committee's desire to stay engaged  
17 in the topic may be to relate to all of the open questions that you had  
18 when you met with the staff.

19 And the reason that I belabor this point is that in  
20 reading the transcripts of your engagement with the NRC staff, I found,  
21 to be honest with you, some measure of validation over the course of  
22 the last 18 months in my meetings one on one with NRC staff on this  
23 topic, I have evolved many of the same points.

24 And so it was very validating to see, at least to the  
25 subcommittee level, to a Member, you all raised a lot of the same  
26 concerns and fundamentally one was a little bit ironic to me in that some

1 Members, Member Ray in particular, I think, referenced the fact that it's  
2 very difficult to tell what the staff's work is going to result in.

3 And I take some ownership at the Commission level, I  
4 should acknowledge as a Member of the Commission, I was not  
5 supportive of the Commission's tasking to the staff on this matter  
6 because I felt it was vague and a bit of a throwaway from our decision  
7 on containment filters which we, at the end of the day, had said, okay,  
8 but, you know, qualitative factors, why don't you go off staff and think  
9 about that a little bit more.

10 And I never like when we issue direction that doesn't  
11 give the staff a whole lot of understanding of where they were supposed  
12 to head as a result of that.

13 And as often happens in bureaucratic Washington, the  
14 chief proponent of doing this is no longer on this Commission. So, the  
15 rest of us now have this paper, the staff struggled mightily and did what  
16 they could.

17 And so, we have something that our expert advisors on  
18 the ACRS tell us is not terribly clear. Well, I think it's not terribly  
19 puzzling why that is because of the genesis of this entire topic.

20 But I thought something that was particularly  
21 interesting was the thematic concern of Members of the ACRS, again,  
22 not in your letter, but in your engagement with the NRC staff which I  
23 would characterize as there's a high level balancing of factors that  
24 needs ultimately to be done when it is any deliberation not of technical  
25 specifics but of high level public policy outcomes.

26 And what I have -- the feedback I've given any number



1 of NRC managers is, Congress dealt with that by having a Commission  
2 structure here. They put five individuals who do their best to take the  
3 technical inputs of the staff to take an analysis that the staff has to the  
4 best of its expert ability been able to make as quantifiable and specific  
5 as possible.

6 But it is not, in my view, the staff's job to do a high level  
7 balancing of public policy objectives, put that in an algorithm, make it  
8 quantifiable, monetize it and feed it back these five high level decision  
9 makers.

10 I think we are here for the purpose of something that  
11 cannot be reduced to an algorithm. And so, I thematically thought I  
12 heard that in some of the Members questioning. Again, it didn't come  
13 through with any clarity in your letter report.

14 I've talked for half my time now. I will let Member Ray  
15 or perhaps Chairman Stetkar respond to that.

16 MR. RAY: Well, let me just say, Commissioner, as I  
17 think you recognize, it's not usual for the ACRS to recommend an  
18 ongoing dialogue on a topic that we're commenting on.

19 We did in this case, I think, in some measure reflecting  
20 the need to see specific implementations. How, for example, can  
21 anyone object to making a systematic transparent and consistent  
22 process that we all accept as existing and necessary?

23 COMMISSIONER SVINICKI: Well, but I'll mirror  
24 something you said in your presentation just earlier this morning.

25 You said choices have to be made and I like that  
26 phraseology because NRC has to make choices and allocation of its

1 time and attention and, you know, dedicating -- often here, it comes  
2 down not to money but to narrow skill sets of NRC experts that we have  
3 to put on various priority questions of the day.

4 And I might pose to the Members of the ACRS, do you  
5 think that an agency that has recently validated through some case  
6 study work that its cost estimates on a quantifiable side of the ledger  
7 are routinely profoundly underestimated sometimes by factors of ten?

8 Do you think that if we were going to spend some time  
9 improving the overall regulatory analysis and consideration of cost and  
10 benefits that having validated the profound inadequacies of many of our  
11 cost estimates, would our resources be better spent fixing that and  
12 figuring out why that is?

13 MR. RAY: Well, of course, the other SECY that I  
14 referred to that's the ongoing analysis we understand to be an effort to  
15 do precisely what you're commenting about, that is, improve the  
16 accuracy of the cost estimates.

17 The add-on that resulted in the letter and the review of  
18 the that we did was to make the qualitative considerations that we all  
19 accept and recognize as very important more, and I won't repeat the  
20 three characteristics, but more --

21 And to me, Commissioner, one of the things I'd like to  
22 see as we go forward is that you do have visibility that you indicated that  
23 you should have because the decisions do get made at the  
24 Commission level properly.

25 And to say that we're going to make the qualitative  
26 considerations more visible to you and to everybody else, it seemed like

1 something, well, we ought to at least let it go forward.

2 COMMISSIONER SVINICKI: Well, I think I might,  
3 though, suggest that another way of framing something -- it's a clever  
4 loophole if the staff were to believe that if we just define a proposal  
5 vaguely enough that then makes it something that because you can't  
6 find fault with it or we wrap it in the mantle of some absolute good like  
7 we're going to improve the agency's processes.

8 I have to tell you, that as a decision maker, and this  
9 might seem a little bit counterintuitive, but when something is wrapped  
10 in a general good with no definition, my inclination is to disapprove it  
11 until I have some further detail about it, because otherwise, it, you  
12 know, it's a very open ended license to expend, I don't how many  
13 resources, on something, again, when this agency, I think, is faced with  
14 applying its skill sets and NRC managers do have to make some tough  
15 choices about that.

16 So, I acknowledge and you acknowledged in your  
17 presentation that the overall objective, I think your phraseology was,  
18 how can one argue with this?

19 And I do think, though, that it's legitimate for the ACRS  
20 in its role advising the Commission to say, we just simply think that this  
21 proposal by the staff, although appearing meritorious, is simply not well  
22 defined enough for proceeding at this time.

23 So, if the default is to say if something looks like a good  
24 idea and details will follow, we recommend that the Commission  
25 approve it. I'm not sure that I frame decision making in that way.

26 MR. RAY: I understand. On the other hand, I'm sure

1 you understand that the kind of comment that you just indicated you  
2 would expect we might make now is a comment that we can still make  
3 and that was the intent of asking the staff to review with us periodically  
4 because of exactly the reason that you say. And that is that the effort  
5 to make more systematic, transparent, and consistent the qualitative  
6 considerations may simply be a bridge too far, something that's not  
7 doable.

8 But to say it's not doable now, at the end of the day, the  
9 committee felt was something we should let them try.

10 Now, I think you've raised the question of, well, maybe  
11 it distracts from efforts that could be better spent on the cost side  
12 improving the Commission's cost analysis. And, you know, that's a  
13 decision certainly that you all can make.

14 COMMISSIONER SVINICKI: Another concern, I'll  
15 just close by adding, you know, it isn't just a matter of allocation of  
16 resources or having greater definitions. Some Members of the ACRS  
17 also in their individual capacity, question the staff on whether or not it  
18 may not be beneficial to have an overly regimented system.

19 There were statements to the effect that we will create  
20 the window dressing of a great systemization of this balancing of factors  
21 and, at the end of the day, it's really nothing more than a mirage for the  
22 kinds of application of judgment that needs to be made.

23 So, I think there were also concerns that, at the end of  
24 the day, creating a highly proceduralized way of doing this may not be  
25 best because analysts need to have the freedom to exercise their  
26 judgment and decide what factors are relevant.

1                   And at the end of the day, decision makers need to  
2                   have the ability to do a balancing of factors test as well.

3                   So, it's on the front end and the back end and I think  
4                   there were many pointed questions for the staff in the transcript about  
5                   just backing decision makers into a corner with an over proceduralized  
6                   approach to something that, in many cases, benefits from a bit more  
7                   flexibility.

8                   MR. RAY: Those comments will still be on the table  
9                   as we continue our review. That's all I can say and, perhaps, the  
10                  judgment to say, well, let's give it a try and come back to us was one  
11                  that can be questioned. But it wasn't a decision not to continue  
12                  pursuing the concerns that you're referring to.

13                  MR. STETKAR: I think it I can -- and this is a great  
14                  discussion, you have obviously done your homework and there were all  
15                  of those. And if you'd read the transcript from the subcommittee  
16                  meetings, you would have heard a lot more of that type of line of  
17                  questioning from individual Members.

18                  COMMISSIONER SVINICKI: That is why I regret that  
19                  that transcript was not publically available.

20                  MR. STETKAR: That was --

21                  COMMISSIONER SVINICKI: The full committee  
22                  meeting was really a watering down.

23                  MR. STETKAR: We did face on the subcommittee  
24                  exactly the characteristic that you framed. The version of the paper  
25                  that was submitted to us was marked predecisional, don't release to the  
26                  public and that, in fact, is what we were given to review at the

1 subcommittee level and we had to treat it that way. It literally was a  
2 timing issue.

3 Had we had the subcommittee meeting a week later, it  
4 would have been an open meeting that --

5 COMMISSIONER SVINICKI: See, I just want all your  
6 brilliance to be out in the daylight because there are very, very  
7 important points you make.

8 MR. STETKAR: No, honestly, so do we. I mean we  
9 had serious discussions about whether that meeting should be open  
10 and because the material that we were given to deliberate over and that  
11 all of the Members had read in preparation of their comments was  
12 clearly marked predecisional, not for public disclosure, Our concern  
13 was -- and we had not been able to see what is now the final version of  
14 the paper. Our concern was that some Members might ask a question  
15 out of context. In other words, something that, perhaps, had changed  
16 from the version that we saw in preparation for the subcommittee  
17 meeting to the version that was released to the public that, perhaps,  
18 was off point, should not have been -- and that fundamentally was the  
19 reason for us to keep the meeting closed. We didn't do that lightly.

20 We do like to have both our subcommittee meetings,  
21 as you're well aware, and the full committee meetings, certainly, open  
22 to the public.

23 If I could shed just one -- this is long, but if I could shed  
24 one little bit of insight.

25 We also, at the committee level, recognized -- we  
26 thought carefully about this in enclosure one to that SECY paper that

1 lists the long list of activities that relied -- that have in the past relied on  
2 both qualitative and quantitative and, in some cases, only qualitative  
3 information to support a Commission determination.

4 We thought about that pretty carefully and realized that  
5 this guidance going forward was going to apply for that whole spectrum  
6 of things. Not only things that you might be able to quantify more  
7 clearly, like, for example, filtered venting where, as I said, we're  
8 developing models, quantitative models for that to support that  
9 decision.

10 But things like security related issues or informing the  
11 public about certain transportation routes, those are really, really  
12 difficult to quantify in the sense that we normally quantify things.

13 And yet, the staff makes recommendations to the  
14 Commission. The Commission makes decisions on those issues and  
15 we felt that certainly a more structured process for incorporating that  
16 qualitative information into the staff's recommendations to the  
17 Commission merits some thought.

18 COMMISSIONER SVINICKI: I'll just close by saying,  
19 you know, given the different types of issues, and I know the enclosure  
20 that you're talking about, and the staff was on unable in questioning by  
21 the ACRS to come up with one definition for qualitative factors.

22 So, it's curious to me that there's diverse set of  
23 applications for this. I will candidly admit I'm very skeptical that we  
24 would be able to enshrine one approach for analysts in guidance that's  
25 going to meet all these different types of things. So, I'll just leave it  
26 there. I'm well over my time, my colleagues have been patient.

1 MR. STETKAR: And in closing, I think we are also,  
2 that's why we want to keep following this with the staff.

3 COMMISSIONER SVINICKI: Okay, thank you.

4 CHAIRMAN MACFARLANE: Anything else? No?

5 All right, well, thank you for that very long and fruitful  
6 discussion. And we look forward to more of this in the future. So,  
7 thanks again for all your hard work.

8 Okay, we are adjourned.

9 (Whereupon, the above-entitled matter went off the  
10 record at 11:40 a.m.)