

UNITED STATES  
NUCLEAR REGULATORY COMMISSION

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BRIEFING ON RISK-INFORMED REGULATION

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THURSDAY,

MAY 11, 2017

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ROCKVILLE, MARYLAND

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The Commission met in the Commissioners= Hearing Room at the Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, at 9:01 a.m., Kristine L. Svinicki, Chairman, presiding.

COMMISSION MEMBERS:

KRISTINE L. SVINICKI, Chairman

JEFF BARAN, Commissioner

STEPHEN G. BURNS, Commissioner

ALSO PRESENT:

ANNETTE VIETTI-COOK, Secretary of the Commission

MARGARET DOANE, General Counsel

EXTERNAL PANEL:

BOB BEMENT, Executive Vice President and Chief Nuclear Officer,  
Arizona Public Service

DANNY BOST, Executive Vice President and Chief Nuclear Officer,  
Southern Nuclear Operating Company

SCOT GREENLEE, Senior Vice President, Engineering and Technical  
Support, Exelon Nuclear

DAVE LOCHBAUM, Director, Nuclear Safety Project, Union of Concerned  
Scientists

BILL PITESA, Senior Vice President and Chief Nuclear Officer, Duke Energy  
Corporation

NRC STAFF PANEL:

VICTOR MCCREE, Executive Director for Operations

ALEJANDRO ALEN, Resident Inspector, Vogtle Units 1 and 2

BILL DEAN, Director, Division of Risk Assessment, Office of Nuclear  
Reactor Regulation

C. J. FONG, Team Leader, PRA Licensing Branch 2, Division of Risk  
Assessment, Office of Nuclear Reactor Regulation

JOSEPH GIITTER, Director, Division of Risk Assessment, Office  
of Nuclear Reactor Regulation

ANDERS GILBERTSON, Reliability and Risk Analyst, Performance and  
Reliability Branch, Division of Risk Analysis, Office of Nuclear Regulatory  
Research

## PROCEEDINGS

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9:01 a.m.

CHAIRMAN SVINICKI: (Presiding) good morning, everyone. I'm going to call the meeting to order.

This morning the Commission convenes for a briefing to provide the Commission with the status of both NRC and the industry risk-informed initiatives and also hear an overview of success, focus areas, perhaps challenges in advancing risk-informed regulation. This is a very timely topic, in my view, and there is a lot to cover today.

Before we begin, I would ask my colleagues if they have any opening comments to make.

Okay. Well, then, we shall dive into our first panel of presenters. This panel consists of Mr. Danny Bost, Executive Vice President and Chief Nuclear Officer of Southern Nuclear Operating Company; Mr. Bill Pitesa, Senior Vice President and Chief Nuclear Officer of Duke Energy Corporation; Mr. Scot Greenlee, Senior Vice President, Engineering and Technical Support for Exelon Nuclear; Mr. Bob Bement -- help me there.

MR. BEMENT: Bement.

CHAIRMAN SVINICKI: Bement. Thank you. Executive Vice President and Chief Nuclear Officer of Arizona Public Service, and we will close the panel with the remarks and presentation with Mr. David Lochbaum, Director of the Nuclear Safety Project of the Union of Concerned Scientists.

Again, thank you all for being here today. I welcome you. And we will begin just in the order in which the participants are listed on the panel. So, Mr. Bost, if you would begin?

MR. BOST: I will. Thank you very much.

Is the microphone on?

1 CHAIRMAN SVINICKI: Yes.

2 MR. BOST: Okay. I thought it was on.

3 Thank you.

4 First of all, on behalf of the panel, I want to say that we appreciate the  
5 opportunity to brief the Commission on a topic that is very important to us and very  
6 important for the industry.

7 And I will begin our discussion on slide 1 and talk about where were we  
8 in the 1990s. So, I want to take us back and talk about some things we did then.

9 Our agreed-upon purpose of the PRA at that point was to provide  
10 insights into the strengths and weaknesses in the design of our plants and the operation  
11 of our plants, and allow the licensees and the NRC to take these insights and use them to  
12 completely inform both operational as well as regulatory discussions.

13 There was a Policy Statement that the NRC put together in 1995. That  
14 envisioned increased use of PRA in regulatory matters, certainly look at how it is  
15 supported by the state of the art at the time. It stated that the PRA should be as realistic  
16 as practical, and it concluded that safety goals and numerical objectives should be used  
17 with consideration of uncertainties. So, look at where we are trying to accomplish and  
18 not as much these specific numbers.

19 When you look at this Policy Statement, we believe it was good then  
20 and we believe that that Policy Statement remains viable and valid today. So, we like the  
21 Policy Statement. We think that is a good way to go.

22 So, next slide, please.

23 This 1990s effort led to some early successes and focused on  
24 resources in the right places and we believe improved safety. So, some of these  
25 successes included Maintenance Rule, reactor oversight process. We could go through

1 several different ones. I'm not going to go through each of those, but there were some  
2 very good successes that came out of our efforts in the nineties.

3 At that point, several of the utilities, including my own, we stepped up  
4 investment and support for PRA activities. I'm a three-site utility, and I have had as many  
5 as 40 full-time equivalents working in this area. Very important to us. I've got 12 people  
6 that's dedicated to just PRA models. So, we are getting through all the modeling. I've  
7 got three internal events models. I've got three fire PRAs. So, through the years we  
8 have participated very highly in the PRA area and we have participated in several pilot  
9 efforts. So, that is from the nineties.

10 Now I would like to fast-forward the clock a little bit. So, let's come  
11 forward 20 years to the day. And we are not achieving the same level of success today  
12 as we were in the nineties. One of my stations is the industry lead for implementing NRC  
13 Tech Spec Task Force 505, which is Tech Spec Risk-Information Completion Times.

14 So, we have been working to implement what we all thought was a  
15 well-developed TSTF for over four-and-a-half years. So far, we have been through nine  
16 sets of requests for additional information from the staff. We have expended over \$15  
17 million, and we are still unable to get the effort approved. So, it is getting very, very  
18 difficult.

19 Another example -- and it is a different station -- another of my stations  
20 has been working to transition to NFPA-805. And we have been working on it for eight  
21 years, eight years to get 805. We have expended \$16 million on program and process,  
22 and we have invested over \$50 million on modifications to the station. I have got one unit  
23 with an SER and one that does not have it.

24 And now, issues are being brought up on incipient detection, which has  
25 called everything into question. I'm not going to go into the incipient detection. I think

1 some of our other panelists are going to discuss that later.

2           What I wanted to focus on is the fact that on these two efforts alone we  
3 have invested over \$30 million in getting these things going, process and program. So,  
4 very, very important to us, but it has been really very difficult to get it going. And it is  
5 clear to me that we need a new direction in this area. Our current progress and our  
6 current results are just not sustainable.

7           Next slide, please.

8           This graph illustrates the industry average core damage frequency from  
9 internal events over the past 25 years, and it shows a success. So, the first portion of the  
10 curve, that reflects improvements made as a result of our IPEs, our Individual Plant  
11 Examination studies in the nineties, as well as improvements in plant and equipment  
12 performance. You can see the improvement that we made in plant safety by looking at  
13 which equipment is important and start focusing our attention on that equipment.

14           The second section of the graph is where we were implementing the  
15 Maintenance Rule. So, once we knew what was important, the Maintenance Rule, we  
16 worked to improve the availability and the reliability of the equipment. If you do that, you  
17 improve safety. So, again, we see our core damage frequency numbers coming down.

18           And then, in the third section of the curve, from approximately the year  
19 2000 and beyond, just that is operational practices. That is operational risk control, and it  
20 is also specific things like plant changes, putting in our low-leakage reactor coolant pump  
21 seals at PWR. So, all of that stuff contributed to that third section and getting those  
22 decreases.

23           I want to mention that this does not include outage risk, but we have all  
24 made improvements there as well through the years. It is just this does not capture the  
25 outage risk improvements that we have made.

1           So, implementation of risk-informed regulations and concepts has  
2 improved the safety of our plants by over 90 percent, and you can see that on the charts  
3 there.

4           Next slide, please.

5           So, this is our long-term vision for risk-informed regulation. I mean,  
6 what we see is that risk information will be used in regulatory matters -- and that is straight  
7 out of the Policy Statement; there is no change from that -- to the extent supported by  
8 state of the art. That is out of the NRC Policy Statement.

9           We will be using risk-informed decisions on a daily basis to operate our  
10 plants. Many of us are doing that today. The first thing that my plants, when they come  
11 on to give a report, because they talk about what their online risk is, and when I look  
12 around here, I think all the rest of us are the same way. So, we have incorporated this  
13 into our daily activities at the plant.

14           Efficient processes will exist for using risk in decision-making. So, that  
15 is very important. We believe the PRAs need to be realistic and that there will also be  
16 broad implementation. This is not going to be we have got one place that is  
17 implementing everything. We believe this needs to be broad and across the industry.

18           Next slide, please.

19           In our ideal implementation of risk-informed regulation, I mean, realistic  
20 risk information will be used in all facets of decision-making. This is in licensing. This is  
21 in our operations. It is in our oversight.

22           And resources are appropriately allocated to manage risk. Typically,  
23 when we talk about this, we talk about what is high-risk; where do we need to go focus  
24 our attention?

25           We also want to use risk information to efficiently disposition issues with

1 low safety significance. Where should we not be spending our time because that could  
2 divert us from what is important? So, we think that is an important thing to cover as well.

3 Next slide, please.

4 So, this slide lists the Risk-Informed Steering Committee work that the  
5 industry is working on with the staff. I'm the Chair for the Industry Risk-Informed Steering  
6 Committee. I work with Bill Dean. Bill Dean is chairing the NRC Risk-Informed Steering  
7 Committee. These committees work separately, and we pull the two groups together in  
8 an effort to move these priorities along, and we are having a difficult time moving these  
9 things forward.

10 These items have been on our agenda for over a year at least, at least  
11 over a year. And we have only recently completed the first bullet. So, that first bullet on  
12 PRA Finding Closure Review Process was completed last week. All others remain open  
13 and unresolved. And again, we are in need of a new direction to make progress in this  
14 area.

15 At this point, I will turn it over to Bill Pitesa.

16 MR. PITESA: Thanks, Danny.

17 So, if you go to the next slide on looking at industry investment, and  
18 probably I am going to speak specifically to Duke. But the PRA investment we have is 42  
19 full-time folks just working on PRA, on fire PRA. We have got 11 models, one for each  
20 unit, the 11 reactors at Duke, and we have got 10 employees who are full-time on that.  
21 So, these are very smart people who do a great job.

22 When you look at our internal events and fire modeling, clearly, as an  
23 industry, we have put a lot of effort and energy into that.

24 And then, when I think about FLEX and how it could help us in our  
25 overall PRA, a reduction of risk, I talked about it when I was here with the Fukushima



1 discussion. And ultimately, I do think we still have opportunity to use FLEX more than we  
2 have because it is a great contributor to risk mitigation.

3 In fact, at the NEA Conference in a couple of weeks, our Harris site is  
4 actually going to win one of the awards associated with using FLEX equipment to extend  
5 the Tech Spec from three days to fourteen days and allow us to do a pump replacement,  
6 which made a far better pump, while we were online. And FLEX helped us through that  
7 risk analysis, and I think that was very important. I think it is actually something that the  
8 industry needs to utilize more.

9 So, you go to the next slide.

10 What we clearly feel is what I would call kind of this pent-up desire  
11 around doing more risk-informed license amendments. And you can see here a number  
12 that we expect to be submitted over the course of the next few years.

13 So, just as a reminder, you know, the TSTF-425 is associated with  
14 surveillance frequency. TSTF-505 is associated with Tech Spec completion times, and  
15 50.69 is really a variety of engineering programs.

16 I am not sure this is a perfect graph because 2017 is getting away from  
17 us, but you can see, I think, that there is a huge desire by the industry to utilize  
18 risk-informed application more than perhaps we have in the past.

19 Next slide.

20 If you really look at what we want to cover here today -- and Danny  
21 opened it up with a good many of it -- is where should we really move from a risk-informed  
22 standpoint? And there are four points we absolutely want to better discuss, and we are  
23 going to touch each of these points in more detail.

24 The first one is around realism in PRA. I think when you look at some  
25 of the PRA analysis out there, it has really been overburdened by conservatisms, and we

1 need to make sure that the PRA is very realistic for what you are trying to recognize.

2           And then, the second one is in use of PRA insights. We have gotten as  
3 an industry I think very focused on the specifics of numbers, but I think there is more  
4 investment needed to recognize what the true insights from the PRA are. What is very  
5 low-risk? What is more important risk? And where should you be focused to make sure  
6 you are working on the right things?

7           The third is just creating what I would call a pervasive culture of  
8 risk-informed thinking. I think it is perhaps foreign to some people that might not have  
9 really considered how important risk should be in the way we work on every activity. And  
10 so, we are going to talk more about that, but I think that is a very important piece.

11           And then, the last one is around is the resources. As you saw from our  
12 previous slide, the number of applications that we anticipate, we think it is very important  
13 for the NRC to recognize that, on the receiving end of those applications, are the right  
14 resources dedicated to make sure there is a readiness for those applications that are  
15 coming through?

16           So, as we go through each one of these -- I am going to hand off to Scot  
17 to cover the first one around realism.

18           MR. GREENLEE: Okay. Thanks, Bill.

19           Before I get into talking about the slide, I also, like Danny and Bill, want  
20 to talk a little bit about our investment at Exelon into risk management. We have 45 to 50  
21 full-time engineers devoted to PRA and risk management. And over the last five years,  
22 we have invested about \$55 million just improving our models and improving our risk  
23 management techniques at our sites. And that doesn't include the \$16 million that we  
24 spent in modifications for our NFPA-805 plants.

25           And just like Duke and Southern, we also have fully-developed internal

1 events models, and we are working to get all our fire models aligned with Reg Guide  
2 1.200 in the future, which we will complete that this year for the legacy Exelon plants and,  
3 then, we will have to work on FitzPatrick, which we, of course, just newly acquired.

4 So, with that, I will get into the slides. This slide talks about the  
5 importance of realism in our PRAs, and that is what I am going to talk about for the next  
6 several slides.

7 In particular, the problem really right now is fire. Our fire PRAs are not  
8 realistic, and I will talk about why that is a problem. But you can see the lack of realism if  
9 you look at the industry operating experience and, then, you go into our fire models and  
10 you look at what those fire models would predict for significant fire events. There is a  
11 pretty big delta. The models would predict we should have had over the last 10 years  
12 about 15 significant fire events, and we have really had two. So, there is a delta, and  
13 why do we have this delta?

14 We have the delta because we are not informing our models, unlike our  
15 internal events models. We have informed those models with industry operating  
16 experience. We aren't doing that in the fire realm.

17 We also are not using state-of-the-art modeling and simulation  
18 capabilities which we have today. Instead, what we are doing is we are using very  
19 conservative, bounding assumptions in our models, and we are using very, very  
20 conservative testing as inputs to those models. And I will give you an example.

21 In our fire models, if you assume that you have a cabinet fire, we now  
22 assume that that entire cabinet is completely consumed with fire. So, you lose all of the  
23 equipment inside of that cabinet, and we give no credit for detection or suppression of the  
24 fires in that cabinet.

25 And when you look at the fires that we've actually had at our nuclear

1 plants in our cabinets, that doesn't happen. We are able to actually detect and suppress  
2 those fires without losing an entire cabinet.

3 So, what do we need to do? Well, let me talk about realism. Why is it  
4 important that we have realism in our PRA models? It is important because, if you have  
5 bounding assumptions in your models, you mask the true insights of the models. And if  
6 you go back to that graph that we showed you, yes, the reason why we have had such  
7 success in this industry is because we have been able to look at our internal events  
8 models, know what the highest-risk issues are, and then, we have been able to actually  
9 reduce that risk over time. We can't do that with our fire models because they don't show  
10 true risk.

11 And I will talk about NFPA-805, which really is problematic from the  
12 industry perspective, because what we have done is we have taken large amounts of  
13 funding and funneled into modifications under NFPA-805 without knowing the true risk  
14 reduction that we are getting because our fire models are not realistic. And this is not in  
15 keeping with the best practices for health and safety of the public.

16 It is a good practice, if your models are realistic and you are reducing  
17 risk and you know what that risk reduction is, to invest in risk reduction, but that is not  
18 what we have done in NFPA-805.

19 Next slide, please.

20 Okay. This slide shows core damage frequency comparisons for all  
21 hazards. As you can see, the fire is the red block, and it just dominates all of the other  
22 hazards. And this is pretty typical for most plants.

23 MR. PITESA: And it is the Harris plant, but in clearly every one of the  
24 Duke sites fire is not just the dominant, but it is over 50 percent.

25 MR. GREENLEE: And it is very similar to the Exelon sites, too.

1                   And interestingly enough, the Nuclear Energy Agency is about to put out  
2 a report that looks outside of the United States and looks at different risks and hazards.  
3 And typically, fire is less than 25 percent of the risk at a plant if you have done it right and  
4 you have a realistic model.

5                   Next slide, please.

6                   Okay. Well, this slide basically summarizes a number of the things that  
7 I have already talked about. So, I am going to talk about two particular items on this  
8 slide.

9                   The first one is the second-to-the-last bullet, and that involves incipient  
10 detection that Danny talked about. The bottom line for us is it is really disappointing for  
11 us that the staff have minimized the credit to very much minimize the credit that we get for  
12 incipient detection. And that is also disincentivizing licensees to go install these systems.

13                  And if you look at the operating experience, Duke has good operating experience on  
14 incipient detection.

15                  MR. PITESA: Yes, we actually had a very clear example where we had  
16 a transformer that was beginning to fail. And we got the alarms. We recognized it.  
17 While we did not get the bus stripped in a way that prevented it automatically occurring,  
18 we were able -- the operators did a pre-job brief. They got prepared for the outcome.  
19 We had the procedures pulled. We had people involved. And I would say we were able  
20 to react in a much more efficient and planned way versus being very reactive when that  
21 transformer failed on us.

22                  MR. GREENLEE: Yes, so we actually think that it is counter to safety  
23 and good risk management to have minimized the credit for these valuable systems.

24                  Then, you can see in the second-to-the-last bullet on this slide we have  
25 been actively working for about 10 years to try to get realism in our PRA, our fire PRA

1 models, and we really haven't moved the needle. And it is time.

2 Next slide, please.

3 Okay. This is just a little depiction of, on the left-hand side, if you go  
4 into our NFPA-805 models and you look at the contribution of fire, the percentage of core  
5 damage frequency, that is what is on the left. And fire, of course, is dominating.

6 What we believe is it is overstated by about the factor of seven. And if  
7 you look at the slide on the right, that is the more realistic actual picture for fire, and it is  
8 also much more consistent with what the NEA is about to put out.

9 So, next slide, please.

10 So, how do we get to realism in our fire models? What we really need  
11 is a partnership between industry and the NRC in getting back to informing our models  
12 based on industry operating experience, coming up with methodologies that allow us to  
13 use simulation in modeling. And then, if we do testing, we need to do realistic testing and  
14 we need to not do testing that is just overly conservative.

15 If you look at many of the tests that we are running now, we are actually  
16 using accelerants to get things to burn because they won't burn. And the testing is just  
17 not accurate.

18 So, the other thing I do want to mention on this slide is high-energy  
19 arcing faults. High-energy arcing faults, I won't spend a lot of time on this because it is  
20 fairly complicated and we really don't have the time to get deep into it.

21 But that is a current example where the agency is doing testing, and the  
22 testing is not realistic. It doesn't reflect what we see in our plants, and it is really not  
23 moving forward the state of the art with respect to fire. And we would really like to work  
24 with the agency on this.

25 And then, the last bullet on the slide is something that we truly need in

1 the industry. We really need a robust method to approve new methodologies because, in  
2 order to get these models realistic, we have got to use new methods, like I said,  
3 simulation and modeling, and we have got to have a method to robustly approve these  
4 new models. And the staff have been somewhat hesitant to really put together a process  
5 that we can use that is efficient in this regard.

6 And now, I will turn it over to Bob. No, I'm sorry, I have got one more  
7 slide.

8 MR. BEMENT: I can't explain this slide.

9 (Laughter.)

10 MR. GREENLEE: Okay. Yes, I need to give a little background on  
11 this slide because it is a little complicated. But the background is, after the Three Mile  
12 Island nuclear accident, the Commission established a Policy Statement on reactor safety  
13 goals. As part of that Policy Statement, the Commission established two quantitative  
14 health objectives.

15 The first one was related to an early fatality related to a nuclear  
16 accident. And the quantitative was that the risk to an individual of an early fatality should  
17 be less than one-tenth of 1 percent when you look at all other hazards combined for an  
18 early fatality. That is No. 1.

19 No. 2 had to do with a cancer death. The statement was similar. It is  
20 the risk to any individual should be less than one-tenth of 1 percent, given when you look  
21 at all cancer deaths.

22 So, those were the two goals. And then, the Commission linked both of  
23 those goals to numerical values. The cancer risk was linked to core damage frequency  
24 at  $10E$  to the minus 4th. And then, the fatality was linked to large early release frequency  
25 at  $10E$  to the minus 5th.

1                   And you can see, if you will put the slides back up, please?

2                   On the left-hand side you can see what we thought the margin, if you  
3 take the E to the minus 4 and the E to the minus 5th and you compare them to the actual  
4 goals, back in the 1990s, on the left-hand side you can see what we thought the margin  
5 was. We didn't have a lot of margin, but we had a margin to those goals.

6                   But today, after a lot of research on severe accidents and severe  
7 accident progressions, we actually know, over on the right, that the margin we have on the  
8 fatality is about a thousand, and the margin on cancer is about 300. So, a significant  
9 margin.

10                  And what does this mean? There's a couple of things that we need to  
11 talk about here, and Bob will talk about this a little bit more. But we spend a lot of time  
12 with the staff on numerical values, the staff getting into our PRA models and worrying  
13 about the actual numbers coming out of the models.

14                  As you can see, with the margins that we have, we ought to not be  
15 wasting resources. As long as the models are realistic, we need to focus on the insights  
16 from the models versus the numerical accuracy of the models.

17                  And second, in some cases what has happened is the staff have put  
18 together limits on the licensing submittals. If you are above the E to the minus 4 or the E  
19 to the minus 5th, you can't do risk-informed submittals anymore. And so, those licensees  
20 can't get the benefit of the risk improvements if their numbers are high, and we need to  
21 revisit that.

22                  And with that, I will turn it over to Bob.

23                  MR. BEMENT: Thanks, Scot.

24                  I want to start, as the others have, with Palo Verde's investment in the  
25 probabilistic risk. We have eight full-time equivalent engineers working on our risk



1 management support.

2 For us, we have our internal events, flood, fire, seismic, all  
3 peer-reviewed PRA models, and all of our internal/external hazard models meet the new  
4 Reg Guide 1.200, Rev. 2. The new peer-review facts and observation closure review  
5 process that Danny talked about is one thing that we have got approved. We are in the  
6 process of doing our first peer review. In fact, the people will be onsite next week, and  
7 that report will be closed in the middle of June.

8 Also, after that, we will submit our 50.69, which is the Risk-Informed  
9 Engineering Programs that Bill talked about, in the third quarter of 2017. Our TSTF-505,  
10 which is risk-informed completion times, was submitted 22 months ago, July 2015. And  
11 we have implemented our risk TSTF-425. So, we have a lot of investment and a lot of  
12 energy going with risk-informed decision-making.

13 And I will add, as Danny talked a little bit about, if you look at my  
14 Standards and Expectation Book, if you look at my leadership model, risk-informed  
15 decision-making is throughout there. And it has the graph that we showed of Harris for  
16 Palo Verde.

17 Our people understand what risk, what the significance is of it. When  
18 you look at ours, 65 percent of my core damage frequency risk says it is coming from fire,  
19 and that is going to go up with our update. And it is hard to convince people that they  
20 need to worry about the plant equipment when fire dominates your probabilistic risk  
21 analysis.

22 And so, I want to move, with that, move towards the use of insights.  
23 Like Scot talked about, the use of hard numerical thresholds as a key decision-making  
24 tool, what we are asking to do is to use an integrated decision-making process, and we  
25 want that integrated decision-making process to use defense-in-depth and safety margin

1 and the PRA numbers.

2                   And Scot talked about how fire PRA, if you just use the numbers, how  
3 fire PRA is skewing the actual data. So, we want to be able to use the insights. We  
4 need the limits. We need numbers that give us guidance, but we also want to be able to  
5 use the insights from the other parts of the risk-informed decision-making process.

6                   And the example on the bottom talks about the risk-informed Tech Spec  
7 completion time that Danny has been living for the last four-and-a-half years. You know,  
8 this allows us to make good or more intelligent decisions on how we do maintenance on  
9 our equipment.

10                  What I will tell you is we have got balled up between the staff and  
11 ourselves on loss of function. And loss of function gives us so little bit of the gain that we  
12 have spent 95 percent of our time on something that is going to give us less than 5  
13 percent of the difference.

14                  What loss-of-function discussion is about is, if you lose loss of your  
15 safety function, should you immediately shut the plant down or should you have up to 30  
16 days or 24 hours, whatever we can agree upon? It is our belief that shutting the plant  
17 down when you have a loss of function isn't the best and safest thing to do with a nuclear  
18 plant. We want the rules to make sure that we are working together to come up with the  
19 best decisions of how to improve the safety, the long-term safety, of the nuclear plants.

20                  So, with that, go on to the next slide.

21                  Continuing moving towards insights, the reviews we believe are most  
22 effective if we can get the focus on the application of the risk, rather than the details of the  
23 PRA model. We have an NRC-endorsed process for using peer reviews that includes a  
24 rigorous qualification. It has been enhanced by the new finding closure process that we  
25 discussed.

1           And what I will tell you is there is some history of what has driven the  
2 regulator to want to see more of what is inside the box on the risk. As an industry, we are  
3 working together to improve our probabilistic risk analysis across the fleet, and we are  
4 sensitive to making sure that we are not using -- or that we are using approved models  
5 from industry-established methods. And so, it is important for us that we believe that we  
6 can improve this process if the implementation of the framework of Reg Guide 1.200 and  
7 1.174, as written or after the revision goes through, using them as intended would  
8 increase or would address the majority of the issues for the risk-informed licensing  
9 reviews and it would streamline this process and get us back to where we think we should  
10 be, and allow us expending the money to reap the benefits of that and improve the safety  
11 of the plants.

12           The next slide.

13           Some of the issues, and we have had good discussions with these with  
14 the Risk-Informed Steering Committee, with Bill Dean's team. Not all the agency staff  
15 has embraced risk-informed approaches. Some of the branches, their culture hasn't  
16 moved and we need to get that culture to move because it adds undue expense to the  
17 utilities and it increases the number of RAIs, as Danny talked a little bit about.

18           And so, the difficulties with continuing risk-informed licensing, the  
19 risk-informed completion time applications undergoing unduly long reviews due to the  
20 focus on the PRA models rather than the application. And we just need to get back  
21 where we can get those reviews done in a timely period.

22           Bill put up the number of plants that we are trying to get through the  
23 review process. We have got to streamline that review process to make that happen.

24           And then, the last thing I will talk about is we are encouraged that the  
25 NRC has started evaluation of a process for dispositioning low-level things that we really

1 shouldn't be spending the staff's time or our time on. And we needed to finish that with a  
2 robust process for final disposition, but we think that is moving in the right direction and  
3 appreciate the effort that the staff has put in on that.

4 With that, I will turn it back over to Scot.

5 MR. GREENLEE: Okay. I know we are running a little short on time  
6 here. So, I will cover this next slide rather quickly. If you will put the slide up on the  
7 screen, please? Okay.

8 Inconsistent use of risk information in the ROP and, in particular, the  
9 troubling spot for us at the moment is when there is a deficiency at one of our sites. It is,  
10 what is the significance of that deficiency? And in some cases we are expending an  
11 inordinate amount of resources when an issue is truly not risk-significant. This wastes  
12 both the staff's time as well as the industry's time.

13 If you look at the bottom of the slide -- I won't go into them -- but those  
14 four bullets at the very bottom are the things we think we need to do to get back to true  
15 risk in determining these events' significance.

16 The one example I will give you, a recent plant in a BWR, have five relief  
17 valves. One of the relief valves was actually failed. We went into an outage. We  
18 tested it. It didn't work. And it was improperly assembled. So, it was our mistake,  
19 improperly assembled. The other four were properly assembled. They worked.

20 If you calculate the risk significance, it is clearly green. But, then, the  
21 staff added the common-cause factor on top, boosted it up by over 200 times, and put it  
22 right in the white band, and that is not the true risk significance. We call that theoretical  
23 significance. What that means is, if you went back in time before you ever touched those  
24 valves, the theoretical go-forward risk may have been there. But, once you have  
25 assembled them and you have only got one that is wrong, that is theoretical risk now.

1           The other way the staff will look at it is, if you made a mistake over here,  
2 well, maybe you could have made some mistake over in the system or this system. But  
3 that is not the right way to calculate risk. We have got to get back to actually calculating  
4 the true risk of these issues.

5           And with that, I will turn it over to Danny.

6           MR. BEMENT: Yes, I will take it for just a second, one more thing.

7           MR. GREENLEE: To Bob.

8           MR. BEMENT: Yes.

9           As you have heard, the industry has invested heavily in resources  
10 needed to transition to more complete implementation of risk-informed regulations. And  
11 we are improving as an industry of putting the right resources and working as an industry,  
12 working together to streamline our processes.

13           And I want to talk a little bit about I am leading the 50.69 effort, and that  
14 effort, we have worked with the staff and we have created a template for all submittals.  
15 And the staff has reviewed that and given it back to us, and we have made changes  
16 based on their input.

17           And then, we created a Coordinating Committee, and that Coordinating  
18 Committee is reviewing all of the applications from the industry to make sure that they are  
19 aligned with that template. And we have agreed with the staff that we will all do a facts  
20 and observation peer review and reduce the number of things that the staff has to review  
21 in the submittals. And then, we are planning a workshop in June between us and the  
22 staff and talking about how to make those submittals go smoother from our submittal  
23 standpoint and their review process.

24           In going through that process, we have learned a lot of how to get  
25 ourselves streamlined and aligned as utilities. So, when the NRC gets submittals, they

1 are not all different, that they are aligned, and it allows them to just use their process.

2 And then, the last thing is we want to just make sure we are working  
3 with the staff and make sure that they have the capability to do the reviews in the depth  
4 and breadth, which is really a lot of the leadership and where the leadership is engaged in  
5 helping us come to the right conclusion.

6 And with that, I will turn it to Danny.

7 MR. BOST: Okay. Thanks, Bob.

8 So, I will go over the last two slides and try to close and bring this all  
9 together.

10 What is the current status of our risk-informed regulation industry  
11 efforts? Where are we? And as I mentioned earlier, we think that the principles, the  
12 PRA Policy Statement from 1995, we think they remain valid now and we think they  
13 remain valid in the future.

14 It is also clear that our current implementation of risk-informed  
15 regulation, it is not sustainable from both a cost and a schedule perspective. We've just  
16 not been successful with this, and we are going to have to have a change. A change is  
17 necessary in order to implement both efficiently and to implement it more broadly.

18 The last slide. So, what we would like for the Commission to consider  
19 is consider a plan to improve realism in PRA information used in decisionmaking. We  
20 would like to have considered an approach to more completely consider risk insights  
21 versus an overreliance on what numerical results are. We would like for development of  
22 process for supporting consistent use of risk information in all decisions. And we also  
23 want to make sure that we target organizational resources and expertise that is necessary  
24 to support risk-informed application. We recognize that that has to be addressed.

25 And I think for at least the third time today, or maybe the fourth time, I

1 want to emphasize that a new direction is required to move forward and focus both the  
2 utility resources and the NRC staff resources. We just can't continue on our current path.

3 I think we have all discussed what are considerable resources that we  
4 have invested and dedicated to risk-informed activities. We believe in this. We know it  
5 can be used to continue to make our plants safer. We've got the evidence that shows  
6 that it will make it safer, and we want to implement this on a go-forward basis. But we  
7 need to get aligned with the staff on here's how we are going to do this; here's how we are  
8 going to go together and make this effort successful.

9 Lastly, we have covered a lot of information today. So, please let us  
10 know if you have got any questions on any of this stuff or if you have got any additional  
11 information that you need to have.

12 And certainly, on behalf of the utility panelists, I want to thank you for  
13 the opportunity to discuss this very important topic with the Commission today. Thank  
14 you.

15 CHAIRMAN SVINICKI: I thank our utility panelists for that presentation.

16 And we will next hear from Mr. David Lochbaum. Please proceed.  
17 Thank you.

18 MR. LOCHBAUM: Thank you. Thank you and good morning.

19 I hadn't planned on talking about UCS's resources on risk  
20 assessment -- (laughter) -- but since all of my colleagues did, and I was surprised to learn  
21 it is more important to us than it is to them. While they have token representation here  
22 today, 50 percent of the UCS staff is here with you today on this issue.

23 (Laughter.)

24 Slide 2, please.

25 It may just be semantics, but I don't feel that risk-informed

1 performance-based regulation is a replacement for or alternative to prescriptive  
2 regulation. I believe that prescriptive regulations were always risk-informed, and what we  
3 are talking about today merely represents the natural evolution associated with more and  
4 better operating experience.

5 Slide 3, please.

6 We are hopeful that these efforts will achieve the goal of providing plant  
7 owners with incentives for implementing safety measures over and above the minimum  
8 levels established by regulatory requirements.

9 Slide 4, please.

10 Okay. To be honest, the goal is really to achieve more than merely a  
11 foundation for those safety incentives, but to actually see such measures implemented.

12 Slide 5, please.

13 I need to start with what needs to be avoided throughout this process.  
14 Regulatory requirements were established through open processes. We view these  
15 requirements as three-party contracts between the NRC, its licensees, and the public.  
16 They protect the owners from the NRC requiring more stringent and usually more costly  
17 measures, and they protect the public from the NRC accepting less.

18 The rights of all three parties must be preserved throughout this  
19 process. Fortunately, we believe there are some safety incentives that can be provided  
20 without depriving any party of any right.

21 Slide 6, please.

22 This chart illustrates how voluntary investments can increase actual  
23 safety margins over those established by regulatory requirements. By complying with all  
24 applicable regulatory requirements, Reactor X has the safety margin defined by those  
25 requirements. By voluntarily investing in additional safety measures, Reactor Y has



1 achieved a larger safety margin balance. Reactors X and Y both have adequate  
2 protection. Reactor Y provides more than adequate protection.

3 Slide 7, please.

4 This list of examples of voluntary safety margin investments show the  
5 varying degrees of associated regulatory oversight. The flood alarms would have little to  
6 no regulatory oversight. They are voluntary.

7 The replacement ECCS pumps would have surveillance and operability  
8 requirements established in Technical Specifications for those components. The 50.69  
9 adoption has clear regulatory oversight, and the N plus 3 capabilities for FLEX equipment  
10 are in addition to, or expansion of, the mitigating strategies requirements.

11 Slide 8, please.

12 This is a very abridged listing of potential incentives that the owner of  
13 Reactor Y might derive from its voluntary safety margin investments. We selected these  
14 examples because we feel they could allow owners to reap benefits from those  
15 investments without compromising or lessening the public's rights.

16 Slide 9, please.

17 As often happens, the devil is in the details. Using voluntary safety  
18 margin investments to offset other safety measures has some unanswered questions  
19 such as these, but we see no showstoppers or even show-slower-downers in the likely  
20 answers to these questions.

21 Slide 10, please.

22 For example, on the issue of how do you appraise the value of safety  
23 margin investments, we think the plant owners and the NRC have successfully used the  
24 SAMA process to agree on the values of various potential safety upgrades. That SAMA  
25 template could, then, be used when an owner wants to borrow from the safety margin

1 bank either an NOED space, SDP space, lengthening the schedule, or whatever, and  
2 have the NRC agree as to what the value of that investment is.

3 Slide 11, please.

4 Another question involved the regulatory oversight of a voluntary safety  
5 margin investment during the loan period. It may be covered by existing oversight, such  
6 as in the case of the replacement ECCS pumps or it could be measures agreed upon by  
7 the plant owner and the NRC in a transparent process, and it may not be necessary in  
8 other cases. It is not necessarily mandated that there be associated regulatory oversight.

9 Slide 12, please.

10 As an example, suppose Plant Y has installed seismic automatic reactor  
11 trip and wants to rely on that investment to obtain longer time to evaluate some new  
12 seismic hazard that has arisen. The licensee commits to an LCO. Because that is a  
13 voluntary seismic trip function, that function could be taken out of service for an indefinite  
14 period without any concern, because it is a voluntary measure. It is not relied upon in the  
15 safety analysis.

16 But, when that voluntary safe trip is, then, substituted for some other  
17 safety issue, we believe at least the issue of regulatory oversight needs to be asked and  
18 answered. It may not be a one-time license amendment request, but it should be  
19 something that is acceptable to the NRC and transparent to the public.

20 Slide 13, please.

21 I call this one overdraft protection because we are a little bit worried that  
22 we don't plant owners emptying the safety margin bank by using one voluntary investment  
23 to justify an infinite number of loans. So, what we think is the way to protect against this  
24 is, before allowing a voluntary safety margin investment to offset some other safety issue,  
25 the NRC should ensure that this investment is not being used as collateral for too many

1 other safety margin issues. My brother works in the banking industry, and that is why I  
2 get this analogy.

3 (Laughter.)

4 We don't think this check would be too onerous, but it should not be  
5 omitted.

6 Slide 14, please.

7 We firmly believe that decades of operating experience coupled with  
8 existing processes could allow plant owners who voluntarily implement safety measures  
9 over and above the minimum required levels to benefit from those investments. Enabling  
10 those benefits to be realized would make it easier for owners to justify future investments  
11 in additional safety margins.

12 Slide 15, please.

13 Once a process has been developed and road-tested, and after the  
14 refinements that need to be made are made, the process might, then, be expanded to  
15 permit voluntary safety margins to offset non-compliances with regulatory requirements.  
16 We believe this tiered approach that we have outlined would permit benefits to be  
17 obtained in the near-term while setting the stage of the foundation for additional benefits  
18 to be derived later.

19 Thank you.

20 CHAIRMAN SVINICKI: Thank you very much.

21 And we will next begin the Commission question-and-answer period.  
22 Before we begin that, I just want to note that the members of the Commission,  
23 immediately following this meeting, will be engaging in the NRC's Military Appreciation  
24 Event. So, you may note that we are going to drop our questions and thoughts here.  
25 We are going to truncate and be very mindful of the clock because we don't want to be

1 late to that event. So, it doesn't mean anything if we don't go on quite as much as we  
2 usually do. And we look forward to participating in that event. So, we want to be there  
3 promptly.

4 We will begin the Q & A with the questions of Commissioner Burns.

5 COMMISSIONER BURNS: So, I will only use every other word in my  
6 question in order to save time, and you figure it out. Thank you for all the presentations.  
7 It is a lot to chew on, quite frankly. And if I look back over the years, this is one of the  
8 things I think in nuclear regulation is not static.

9 As much as I think -- you know, what was it -- the end of history, we  
10 talked about in the 1990s. Look how that worked. But I think the good thing has been  
11 sort of this ongoing dialog over the years and our ability to perhaps have a better handle.  
12 And this is an industry where looking at how you assess risk, get risk insights, I think, as  
13 we note, it probably in some ways has been a leader.

14 I think on the industry side, and I think Dave Lochbaum as well, I think  
15 has given a lot to sort of chew on. A couple of things I would pose for the industry folks,  
16 because, quite honestly, there is some, I think, very significant criticism, from what I have  
17 heard this morning, of sort of staff, you know, where the staff is and how we are moving  
18 here.

19 But I guess one of the things I would start out is there has been a lot of  
20 praise for the PRA Policy Statement from the mid-1990s, for the Maintenance Rule, which  
21 goes back to the early nineties, and even the Safety Goal Policy Statement. And I could  
22 probably wander back to WASH-1400 and the like.

23 So, while I saw on the industry slide, the last slide, in terms of an SRM  
24 and put that aside, is there a need from - at the Commission level -- because I will not be  
25 the one, obviously, who is in there looking, and you should hope I'm not the one in there

1 doing the PRA analyses and all that. But, from the Commission level, is there a need for  
2 some other sort of focus on policy? And I will put it to industry, and, Dave, you can  
3 chime-in as well.

4 MR. PITESA: Yes, I think right out of the gate the culture of using  
5 risk-informed actions or ways of looking at things are going to be a game-changer for the  
6 industry.

7 Danny, you can pick up, but I believe, overall, one of our key messages  
8 is that down in the staff there is almost an avoidance to really utilizing and recognizing the  
9 importance of the risk associated with a particular issue.

10 MR. BOST: Yes. I guess, Commissioner, one thing I want to key back  
11 on. So, keywords, you said significant criticism today. It wasn't intended to be that way.  
12 I think everybody is working hard on this, but I don't think we are all aligned on this is  
13 how it needs to be implemented.

14 So, you are asking, should we have a policy-type document?

15 COMMISSIONER BURNS: Uh-hum.

16 MR. BOST: I think that is what is necessary to get us all on the same  
17 page -- that includes industry, staff, workers, me, the folks at the table, everybody -- that  
18 says here's how we want to use risk-informed; here's the boundaries and how we do it.

19 And the examples that the team was giving, the panelists were giving  
20 today, really were examples of where we are taking very detailed, deterministic  
21 information and trying to apply that in this risk-informed, and it makes everything  
22 mushroom. It makes it very, very hard and difficult, because we are not all applying this  
23 the same way. So, we do believe there are some policy-level things that could get this in  
24 a better place for us to be more effective and more efficient here.

25 COMMISSIONER BURNS: Okay. Dave, you want to answer?

1 MR. LOCHBAUM: Even before you asked the question, a homework  
2 item I had was to look at the project game list, see if there is anything that has been  
3 eliminated or been reduced that would be an obstacle. I am not familiar enough to say  
4 what that answer is, but that was a homework item I was going to do that I think touches  
5 upon your question.

6 COMMISSIONER BURNS: Okay.

7 MR. GREENLEE: Yes, and I think what we have seen in the industry is  
8 that some of these difficult issues, when the Commission gives direction to the staff, we  
9 start making progress. I mean, I will give you the big example right now is digital. I think  
10 we are making a lot of progress after direction from the Commission on digital. And I  
11 think we need a similar effort in the area of risk-informed regulation and thinking.

12 COMMISSIONER BURNS: Okay.

13 MR. BEMENT: Yes, I want to make sure, I believe that the staff is  
14 working diligently. Palo Verde had a diesel failure on December 15th and we went  
15 through a deterministic and, then, risk-informed decision-making. And Bill Dean and Joe  
16 Giitter and their staff did us a fantastic job working through the holidays.

17 And so, it has nothing to do with people worked hard. What I think  
18 would help is if we had a clear vision of where we are headed in that challenge of how to  
19 implement risk as we go forward, where it allows the leadership of the NRC to align their  
20 organization, and this is the way we are going to go utilizing risk to improve the safety of  
21 these plants.

22 COMMISSIONER BURNS: Yes. One other thing, and again, I will  
23 draw on my sort of early experience. Like when I first came to the agency, the first thing I  
24 did was work in Enforcement. And actually, the good thing about that is it really made me  
25 focus on and try to understand licensing basis, what requirements are, Tech Specs, and

1 things like that.

2 And one of the things I think that is important, and I think an important  
3 thing coming out of this initiative, someone said -- it may have been you, Bob -- in terms of  
4 you do not want to have the shutdown evolution if that is not necessary.

5 MR. BEMENT: Right.

6 COMMISSIONER BURNS: And in a way, the way things are  
7 structured, you have limiting conditions for operation. And I forget, what is the big one?  
8 If you have got one of those, you do have to shut down.

9 MR. BEMENT: 303.

10 COMMISSIONER BURNS: 303? Okay. I can't remember the  
11 number. That's good. That's good.

12 And I think what I hear from you is that, you know, what this helps with,  
13 that there is a way of looking at surveillance times, looking at, well, LCOs in terms of  
14 equipment availability, things like that. And I'm assuming part of what the outcome of this  
15 is, is looking at that and saying, for example, that the 12-hour repair, we really from the  
16 PRA insight, that might be a 24-hour repair. Have I got that right?

17 MR. BEMENT: Yes, sir.

18 COMMISSIONER BURNS: Okay. So, is this the process folks are  
19 going through under this? Because one of the things that you get in the tug-and-pull, and  
20 the reason I asked that is you get this pull back and forth. And I think we had a  
21 discussion at one of the earlier meetings. Bill, you may have been there. I know Dave  
22 was there, but you two may have been there.

23 It was this question about, you know, there is a certainty. The license  
24 provides an anchor point from which you judge. It prevents arbitrary action by the  
25 agency. It provides some certainty to the licensee. We recognize there is some other

1 process like NOEDs and things like that, exemptions that may be imposed.

2 But one of the things I do have some concern with as you go forward, I  
3 don't have any concern with relooking at, for example, LCOs or surveillance outage times,  
4 things like that. The question and the one thing that I am struggling with, and it is not that  
5 I am constitutionally opposed to it, but the interest is, how do we look at what we call  
6 those low-safety-significant things and grapple with them and deal with them outside of  
7 the framework, which is, in effect, if you will, the contract between the regulator and the  
8 licensee?

9 And I don't know if I made myself clear, but if anybody would like to  
10 chime-in, I would be interested in hearing your thoughts on that.

11 MR. GREENLEE: I guess when it comes to the low-safety-significant  
12 items and dispositioning those, I don't know that we have a perfectly clear path forward.  
13 But one of the options, of course, is, for example, if you go back to tornadoes and  
14 TORMIS, NRC licensed that. So, that was actually a part of your license.

15 It is possible that we could create a tool that is actually part of your  
16 license that NRC would approve in order to disposition low-safety-significant items. That  
17 is one of the tools we talked about.

18 COMMISSIONER BURNS: Okay. Okay. Okay. Dave?



1                   MR. LOCHBAUM: I forget the number, but there was a Generic Letter  
2 that came out in the late eighties that allowed licensees to remove or relocate things from  
3 the Technical Specifications to other control documents.

4                   COMMISSIONER BURNS: Yes. Right.

5                   MR. LOCHBAUM: Fire protection programs was probably the major  
6 one.

7                   COMMISSIONER BURNS: Yes.

8                   MR. LOCHBAUM: Something like that applied to whatever the issue of  
9 the week is seems to be a template to satisfy the licensee's needs, the NRC's oversight  
10 needs, and the public's transparency issues. So, something like that.

11                   What we are a little concerned about was the carte blanche, blank  
12 check, let the licensees do whatever they want thing that was proposed last year. That  
13 we have some reservations about.

14                   COMMISSIONER BURNS: Okay. I'm going to stop there. I've got a  
15 lot of questions, but I'm going to stop there.

16                   (Laughter.)

17                   CHAIRMAN SVINICKI: Okay. Thank you for that.

18                   And I will probably consume most of my time telling a story and not  
19 getting to my point. I may not have time to offer you an opportunity to react, either.

20                   So, I was privileged earlier in my career to work for Senator John  
21 Warner of Virginia. I have to say that because there is a Senator Mark Warner of  
22 Virginia. I did not work for him. I'm sure he is a fine man.

23                   But Senator John Warner is turning 90 or has turned 90 years old, which  
24 is a wonderful milestone. And I was lucky enough, his family invited me and some other  
25 former staff members to go to his birthday party last Friday night. So, I had a few

1 moments with the Senator.

2                   And it is a curious thing when you have worked for somebody and they  
3 have mentored you because you never really step out of that role. You can be Chairman  
4 of the Nuclear Regulatory Commission, but that's not how Senator Warner sees you.

5                   (Laughter.)

6                   And so, after pleasantries, he said, "Kristine, what is it that is happening  
7 in the country that concerns you the most, that you have the most worry about?"

8                   So, I had to be fast on my feet and I felt like a staff person again, but I  
9 said, "Well, I think that the incessant nature of things causes us not to have the time and  
10 energy to spend on the long view, and I do see in other cultures that they spend more  
11 time thinking about the longer-term view. And we have to deal with so much in the  
12 moment that I think we sacrifice the perspective that the long view can give us."

13                   And he took that in and, of course, he said I ought to write an essay on  
14 that point. So, he had an assignment for me. I'm not sure what I would do with it. And I  
15 said, "I'll have to get to that in my spare time, Senator."

16                   But, when I prepared for the meeting today, I tried to take that long view  
17 that I said is often missing in things. And I have been serving on this Commission for a  
18 good, long while, but I haven't been here for some of the history that has been described  
19 today.

20                   But, when I think about this kind of risk-informed regulation, I would also  
21 note I was asked about this at the Regulatory Information Conference after my talk. And  
22 I really didn't understand the question. It kind of came at me out of left field. It said, you  
23 know, "What would you say about the NRC's progress on risk-informed regulation?" And  
24 it struck me as such a thing that it is a backdrop to what we do here at NRC. So, I didn't  
25 really understand the relevance of it.

1           It became clearer to me why I might have been asked that, as I  
2 prepared for today's meeting. Because I think there is a central benefit here, and I would  
3 have to say that David's viewgraph I think gave the greatest visual on it, which it was that  
4 the central benefit that I think both the industry and the regulator could recognize here is  
5 that, if done well, this risk-informed regulation can provide risk reduction at sites beyond  
6 that which results from compliance with the regulations and beyond which the regulator  
7 has the authority to compel.

8           But it still is a central good. It is a central benefit. And as I study the  
9 history, it is clear to me that in the 1990s -- and I wasn't here that long ago -- but the  
10 Commission valued that benefit because it put policies and direction in place to the staff.  
11 It is clear to me that the staff at least began the process of taking that up, that policy and  
12 direction.

13           But, when I look at us here in 2017, I observe that we are not in the  
14 place that that trajectory, if followed, would have put us. So, I don't observe that that's  
15 happening on the industry side or the NRC side. And these are my individual  
16 observations, considering this history.

17           So, the question is, why is that so and what happened along the way?  
18 I am not a brilliant person, but I have a hypothesis that two really important things  
19 happened to both the industry and the NRC. One was the terrorist attacks of 9/11 and  
20 the other was Fukushima.

21           And because regulatory changes on a rather long timescale, you may  
22 say, well, those are two discrete events and what happened in between them -- I think that  
23 about the time that NRC was finalizing, enshrining its actions on 9/11, Fukushima  
24 happened. Because things take a long time to be put in place and regulations to be  
25 changed.

1           So, it is my personal view that -- I can't speak for the industry's  
2 experiences -- but I think here at NRC there is a good chance that, with a focus, and I  
3 think appropriately so, on the regulatory changes we made for those two very significant  
4 events, we drifted away from the central priority of the core benefit of risk-informed  
5 regulation. And I don't in any way criticize it because it was an appropriate attention to  
6 have.

7           But the question we need to ask today is, is there still this central benefit  
8 that the Commission in the 1990s apparently realized and set a direction? And if so,  
9 what actions do we want to take going forward?

10           I am of a view, I appreciate that I don't want to be sitting and doing PRA  
11 analyses, either. Like Commissioner Burns, you wouldn't want me to do them, either.

12           But organizations move in the direction in which they are led. That is  
13 my view. So, I think that there is a term I learned from the industry since coming to this  
14 Commission, and it is something called management attention units. And so, those have  
15 to be allocated like a physical thing.

16           So, I think if leaders say, "This is an important orientation for us to move  
17 in the direction of," whether it be the very interesting proposal that David Lochbaum put  
18 forward, and I am grateful that he took an opportunity one-on-one with me to give me a  
19 little bit better sense of that. He only had 10 minutes today to talk about it, but there is  
20 more meat on the bones there, and I am sure more that he could continue to develop,  
21 again, if he wanted to allocate his units of time and attention to that.

22           But the parties as a whole in the three-party contract that David talked  
23 about, I think the first thing to do in 2017 is to say, are we going to have a shared  
24 movement in this direction? Do we want to kind of come back to that time period?

25           When I first heard about maybe new Policy Statements and other

1 things, I was very skeptical of that. I am not sure it takes that form. It might be nothing  
2 more than just day-to-day management attention and a setting of priorities to say that this  
3 is something that we want to do.

4 So, I appreciate the opportunity to have this meeting today. We have  
5 talked about a lot of things. I hope that this doesn't -- I didn't take it as a criticism of the  
6 staff. My colleague indicated that there were some very pointed criticisms of the staff. I  
7 don't really view it that way. And I'm developing so much fatigue of this; it seems like a  
8 lot of public policy dialog today. It is just examples and counter-examples. And where is  
9 that getting all of us? I'm really not sure.

10 But I think if we could just -- if the industry knew whether or not NRC  
11 wanted to somehow renew its attention to this, they would, then, maybe bring forward  
12 actions that would be in alignment with that. I think if we told you today we're really not  
13 interested in kind of recentralizing our focus on this, then you will take different actions.  
14 And so, at bottom, I don't hear you criticizing us so much as kind of checking in with us  
15 and saying, you know, this has promise and it has value that the regulators should value  
16 as well.

17 I have sat in private with NRC senior leaders. They tend to get real  
18 honest when their retirements have been announced.

19 (Laughter.)

20 But, you know, I will say that I have had very knowledgeable individuals  
21 who spent their entire career here who have told me that something that plagues them a  
22 little bit on the way out the door is that they know that investment that is done at sites for  
23 rote compliance with things displaces in some cases investment that would have had a  
24 real safety benefit and a risk reduction benefit.

25 And because they have spent their whole career on safety, they're

1   bothered by that missed opportunity. And they're bothered that in their tenure, you know,  
2   there wasn't enough management attention units and time and resources to try to get that  
3   moving more in that direction.

4                   And so, I know, again, thoughtful folks here who have worked at NRC  
5   have given this a lot of thought. I know that the staff has varying familiarity with this and  
6   understanding of it. But I think that, if a direction were set, they would pull in that  
7   direction, because they've always done that. That is something I have always observed  
8   here, and I know that they would continue to do that.

9                   So, those are some of my thoughts. I didn't get all the way through the  
10  background. So, I have a little bit more work to do, since I came home last night and  
11  found a flood in my foyer, which is, in addition to being a very unwelcome thing to come  
12  home to, distracting me from getting through the remainder of the history in this binder,  
13  which I would like to do, but I am involved in FLEX mitigation of buckets and pails and  
14  bailing and things like that. So, that consumed my evening.

15                  But that is what I take away from this. And so, I think the Commission  
16  will take in this information. We will hear the staff's presentation, and I hope they are not  
17  overly defensive. I don't think they should be. They have continued to move in this  
18  direction. The question is, are we doing it in the organized kind of fashion with the  
19  priority that is commensurate with its value? I don't know the answer to that, but it is just  
20  a question. And based on my preparation for today's meeting, it is a very worthwhile  
21  question I think for us to be looking at. The Fukushima response is at a place in its  
22  maturity that it might be a very natural time for NRC as an organization to really think  
23  about this question.

24                  So, I will end there and turn it over to Commissioner Baran.

25                  COMMISSIONER BARAN: Okay. Great.

1 Well, thank you all for your presentations and really for your suggestion  
2 to have this meeting. I think it is really worthwhile. I think it has been good. I think it  
3 will continue to be good on the next panel, too.

4 I wanted to start, I think, at least initially -- I want to be good; I want to  
5 stay within 10 minutes -- with where Commissioner Burns left off on the low-risk  
6 compliance issues. And I know Bob mentioned it a little bit in his presentation, and there  
7 were some questions on it.

8 This was a topic, one of the many topics that came up during the  
9 day-long stakeholder meeting we had back in September. And, Dave, my recollection is  
10 at that time, you know, as you said, you were pretty skeptical of this, critical of this effort,  
11 raised some concerns about it.

12 And at that time, it was really pretty amorphous what it was that we were  
13 all talking about. And I just remember several people chiming-in and it wasn't clear  
14 anyone really was thinking about it in the same way.

15 Since that time, the staff has continued to work on it and have been  
16 exploring different concepts and approaches. As I understand it, the current iteration of  
17 this effort basically envisions a type of long-term enforcement discretion for compliance  
18 issues that are termed to be low-risk.

19 It sounds like you have continued to follow this. If that's right, I would  
20 just be interested in your current thoughts about where it is now.

21 MR. LOCHBAUM: Well, it has had a lot of different vehicles along the  
22 way. At one time, basically, the NRC would just define certain criteria that they would  
23 allow licensees to continue operating despite non-compliances. It did morph at one point  
24 into an NOED-type thing, which we thought was the proper, a more proper model,  
25 because it still has NRC control over individual cases as well as public transparency.

1 Because the NOEDs, even though the public can't intervene in those, there is public  
2 awareness.

3 It is not quite the same that Bob talked about the diesel generator issue  
4 that Palo Verde had last December. That went through on a very compressed scale.  
5 The NRC staff released the documentations, the RAIs they asked, the Final SER, and the  
6 final approval, made all those public within hours to a day at most. So, the public could  
7 monitor what was going on.

8 And what is an unusual situation and might have some -- if it was a  
9 vacuum, we probably would have filled it with bad things. But, because it was very  
10 transparent, you could see why that was an appropriate thing to do.

11 We think NOEDs provide that similar public awareness, not the same  
12 level of public engagement as a license would be, but at least it is a process that has NRC  
13 control and public transparency. In some inclinations, it was neither, and it was 0 for 2.

14 (Laughter.)

15 COMMISSIONER BARAN: Well, I want to get, what I would like to do  
16 maybe is just spend a minute talking about how I am currently looking at this, and just get  
17 your honest reaction, you know, to those thoughts and where you think things are on this  
18 initiative.

19 Here's the way I look at it: I think if our regulations, in this case  
20 Technical Specifications, need to be updated and risk-informed, I think as an agency we  
21 should focus our energy and resources on that activity, on risk-informing and updating the  
22 Technical Specifications, getting to the right regulatory requirement.

23 Fundamentally, compliance with our requirements is how we ensure  
24 adequate protection. I mean, that is at the core of everything we are doing here. And I  
25 don't think it makes sense to go down a path of allowing long-term non-compliance with



1 regulatory requirements that we have.

2           And I think the Commission's 1995 PRA Policy Statement recognizes  
3 this because the Policy Statement, obviously, endorses the use of risk insights, but it also  
4 said that it was looking at it in preparation for this. There is this quote in there, and it is  
5 not a single line. It is talked about in various places.

6           "It is, of course, understood that the intent of this Policy is that existing  
7 rules and regulations shall be complied with unless these rules and regulations are  
8 revised."

9           Now I don't want to move away from that kind of core approach. So,  
10 my view is, if our Tech Specs would require a licensee to address an issue of very  
11 low-safety-significant within 72 hours, but a 30-day or a 60-day or a six-month deadline  
12 would be more appropriate, as an agency, I think we should focus on revising and  
13 risk-informing that underlying requirement rather than coming up with a process to bypass  
14 the requirement for potentially an extended period of time.

15           I'm interested in what you all think about that reflection. Yes?

16           MR. LOCHBAUM: Well, I would agree with that because I have sat  
17 through a lot of Commission or NRC public meetings when Salem, Millstone, and others  
18 who were having problems, or in-depth seminars. And one of the recurring themes was  
19 that the owners allowed problems to go unfixed. So, workers got into the habit of saying,  
20 "Well, this is no worse than that. So, I won't report that." Or, "No use, because they are  
21 not going to get fixed." So, there became this malaise where the workforce decided that  
22 nothing is important. And not everything is the same importance, but you don't want to  
23 instill that mindset that nothing is important.

24           If you start turning your back on issues that are low-risk and don't  
25 promptly dispose of them, just ignore them, you are basically upping the bar. "Well, if this

1 is ignored, what else gets ignored?" This is low-risk; that's low-risk, too. Absent a  
2 meltdown, everything is low-risk, and we can't get into that mindset. Salem and many  
3 plants have demonstrated that doesn't work. We don't need another example of why it  
4 doesn't work.

5 MR. GREENLEE: I would also agree with you, and I'll give you an  
6 example of something we are doing right now which is actually dispositioning low-risk  
7 issues but under a regulatory footprint. And that is the tornado missile issue. We have  
8 been working closely with the staff to come up with a methodology to say, do we really  
9 need tornado missile protection for this very, very low-risk item? And that is going to  
10 eventually be approved by the regulator.

11 And so, we will disposition and close out. You won't have long-term  
12 non-compliance. You will be in compliance with what the regulators approved. And I  
13 think that is really the direction that we need to ultimately head in a broader sense to be  
14 able to disposition and not end up in long-term compliance issues.

15 COMMISSIONER BARAN: Uh-hum. I don't want to see us avoiding  
16 the hard work of getting to the right regulatory requirement and just, "Well, it's just too  
17 hard to get to the right regulatory requirement. Let's find a way to get around the  
18 regulatory requirement." I think that is counter to kind of everything we are talking about,  
19 I think, today.

20 Other reactions on this issue? I don't want to spend all our time on this,  
21 but --

22 MR. BOST: I agree with what you are saying, too. I think all the  
23 panelists here would agree that we are not looking to temporarily bypass something.  
24 That is a by-far exception and not a rule that we want to apply.

25 COMMISSIONER BARAN: Okay.

1 MR. BOST: If something is truly low-risk, then we ought to go change it  
2 and say this is now a low-risk and here is what the requirements ought to be.

3 COMMISSIONER BARAN: Okay.

4 MR. BOST: So, we want to live in that space as well.

5 COMMISSIONER BARAN: All right.

6 MR. BEMENT: In three of the documents we talked about, TSTF-505  
7 and 425 and 50.9 --

8 MR. PITESA: The other one.

9 MR. BEMENT: The other one? Thanks.

10 (Laughter.)

11 You know, they are within the regulatory process, and you are extending  
12 or have the ability to extend, but it is within the regulatory process. And so, it is  
13 preapproved by the Nuclear Regulatory Commission. So, it really does what you are  
14 saying. It keeps you to the short duration, but gives you the ability, going through a  
15 process that is approved, preapproved, to go up to 30 days. And 30 days I believe is  
16 about the longest that the preapproved process would allow you.

17 But we agree.

18 MR. PITESA: Completely, and I think what is so important to recognize  
19 about the low-risk items is, when the answer by Tech Specs right now is to shut down the  
20 unit, and your PRA guys look at it and say the risk of shutting down the unit is far greater  
21 than the risk of having that condition exist for some short period of time, but, yet, that is  
22 what we are forced to do --

23 COMMISSIONER BARAN: Right.

24 MR. PITESA: -- that just does not make sense.

25 COMMISSIONER BARAN: Okay. I want to ask about 50.69 because

1 I know there's a lot of interest in these submittals. I think one of Bill's slides that he talked  
2 about indicated that there may be about 25 applications this year. You caveated that in  
3 the time.

4 But I wanted to ask about that because my understanding is that the  
5 staff is contemplating reviewing about 10 of these a year. And I would just like to get  
6 your thoughts, you know, your latest thinking on the timing of this, and kind of when we  
7 would expect these, and what kind of frequency.

8 MR. PITESA: I think one of the key pieces is we are working together  
9 as an industry to make sure we are using a common template; that we are using peer  
10 reviews on these different submittals; that the staff faces a very consistent product when it  
11 comes in.

12 COMMISSIONER BARAN: Okay.

13 MR. PITESA: And then, as far as the timing on each one of those, I do  
14 suspect that that graph that is on page 9 probably shifts to the right by months, but it is not  
15 shifting to the right by years.

16 COMMISSIONER BARAN: Okay. In terms of, you know, if we are  
17 going to have dozens of 5069 submittals come in, my thinking is, you know, what I hear  
18 from the staff is, if they get a high-quality PRA, if there is a high-quality PRA, and a  
19 submittal follows the guidance, it should be a relatively straightforward review.

20 MR. PITESA: Right.

21 COMMISSIONER BARAN: If there is a lot of interest in this, if we are  
22 going to be looking at dozens and dozens and dozens of these submittals, from my point  
23 of view, it would make a lot of sense to have like the strongest applications come in the  
24 door first, so that there is an opportunity to build some confidence in this process.

25 You know, I hope that is something you all -- it sounds like that is

1 something you have been looking at and trying to work out as part of this coordination.

2 MR. BEMENT: Commissioner, one of the things I talked about is we  
3 also have a group that is reviewing each one of those submittals. And we want to make  
4 sure they are all quality submittals; they are all following the same template. So, the  
5 NRC doesn't have to look at each one of them and say, where are they headed with this  
6 one? And so, it will help that process.

7 COMMISSIONER BARAN: Okay.

8 MR. BEMENT: And we believe that, as we do that, they are going to  
9 start coming in fairly slowly here for the first six months.

10 COMMISSIONER BARAN: Uh-hum.

11 MR. BEMENT: And it would give the staff time to get their wind, get  
12 their feet under them and a pace that they feel comfortable with. And I believe that they  
13 can probably see more than 10, but I am not going to --

14 MR. PITESA: And I want to recognize the template is so important, that  
15 we get that right, and certainly appreciate the staff working with us to make sure we have  
16 got the right information contained in those submittals.

17 COMMISSIONER BARAN: Okay. Thank you.

18 MR. GREENLEE: And this new process the staff approved last week  
19 for the facts and observation closure reviews, that the industry has put together a new  
20 process for that. We are pushing all the licensees to go through that process with their  
21 PRA models before they go through the submittal. So, what the staff are going to see are  
22 just the open facts and observations, which should greatly reduce the review time.

23 COMMISSIONER BARAN: Great. Thank you.

24 CHAIRMAN SVINICKI: Well, again, thank you to the panelists.

25 We will take a five-minute break while we reset for the NRC staff

1 presenters. We will reconvene promptly at 10:25.

2 Thank you.

3 (Whereupon, the foregoing matter went off the record at 10:20 a.m. and  
4 went back on the record at 10:29 a.m.)

5 CHAIRMAN SVINICKI: Okay. Let us reconvene and come to order.  
6 We will now hear from the NRC staff panel on related topics to what the previous panel  
7 talked about.

8 And I do want to note that Bill Dean is sitting here and someone told me  
9 that you may not, this may be your last time sitting here, as much as you enjoy presenting  
10 to the Commission at these meetings. And I just wanted to offer an observation that, in  
11 my history at NRC, I thought I was going to have the title for the poorest jokes and the  
12 worst possible jokes that elicited the most groans of anyone, but I have to say that, since  
13 you=ve been my moderator at my plenary sessions at the Regulatory Information  
14 Conference, you=ve left me in the dust, so I shall never have the title of the worst jokes  
15 because you will be in the trophy case for many, many years to come. So I just wanted  
16 to offer --

17 COMMISSIONER BURNS: We=re going to put your head there.

18 CHAIRMAN SVINICKI: Well, that took a turn there. Okay. Well, I will  
19 let our Executive Director for Operations, Victor McCree, begin. Thank you.

20 MR. MCCREE: Chairman, thank you. Good morning, and good  
21 morning Commissioners Baran and Burns. We=re pleased to be with you this morning to  
22 provide a brief overview of the evolution of NRC=s risk-informed regulatory activities  
23 since the Commission=s Probabilistic Risk Assessment policy statement was issued in  
24 1995, as mentioned earlier.

25 Our presentation this morning is focused mainly on operating reactors.

1 However, many of the initiatives that we'll speak about are also applicable to new  
2 reactors both in our initial reviews, as well as future operations.

3 Next slide, please. We hope to leave you with a few key messages.  
4 First of all, the acceptability of licensees' Probabilistic Risk Assessments, or PRAs, has  
5 improved over the last decade or so supporting more advanced risk-informed initiatives.  
6 Second, as licensees have expanded their use of risk insight, they've made notable  
7 improvements in the margin of safety at their plants, and you heard some of those this  
8 morning. At the same time, we've enhanced the use of risk insights in NRC's  
9 regulatory decision-making. And, third, we recognize the challenges, both technical and  
10 cultural, some of which have been mentioned this morning. And we have increased our  
11 use of risk information.

12 To meet these challenges, we've invested in improving our regulatory  
13 infrastructure, our organizational capacity, as well as approving PRA methods.

14 Next slide, please. You'll hear from five other speakers that are with  
15 me this morning. You mentioned Bill Dean, the Director of Office of Nuclear Reactor  
16 Regulation. I'm happy his head is still attached to his frame, as diminutive as it may be.

17 To Bill's far right is C. J. Fong. C. J. is a team leader for risk-informed  
18 initiatives in the Office of Nuclear Reactor Regulation. He'll introduce some of the  
19 risk-informed initiatives that are underway and provide some recent examples of safety  
20 improvements resulting from those insights. He'll also discuss insights made to the  
21 Probabilistic Risk Assessments in recent years.

22 Alejandro Alen, to my far left, is one of the resident inspectors at the  
23 Vogtle operating site, Vogtle's Unit 1 and 2. He'll talk about our efforts to ensure  
24 adequate oversight of risk-informed initiatives that are currently being implemented at  
25 Plant Vogtle.

1           To my left, Anders Gilbertson, who is a Reliability and Risk Analyst in  
2 the Office of Nuclear Reactor Regulatory Research, will discuss our current efforts to  
3 make PRAs more realistic and to improve the integrated risk-informed decisions we make  
4 with them.

5           And, finally, Joe Giitter, to Bill=s right, is the Director of the Division of  
6 Risk Assessment in NRR, and Joe will discuss our efforts to create a culture of  
7 risk-informed regulation at the NRC.

8           With that, we=ll begin our presentation. Bill?

9           MR. DEAN: Good. Thanks, Vic. Good morning, Chairman Svinicki,  
10 Commissioners. And despite the advanced billing, I intend to have no puns or jokes in  
11 this presentation, and the reason why is because this is really a pretty serious area for me  
12 and for my organization. Since I came onboard NRR almost 30 months ago, a primary  
13 focus for us has been how can we better embed risk information and risk insights into our  
14 decision-making, so it=s a topic area that, this being my last Commission meeting, I can=t  
15 think of a better one to go out on because this has been very important to me over the last  
16 two and a half years.

17           So, anyway, we=re going to talk to you about how we=re trying to  
18 enhance our ability to integrate risk information to our regulatory practices and processes  
19 and, by doing so, improve the technical and safety basis for our regulatory decisions.

20           Industry representatives did a good job of describing the history of how  
21 the use of Probabilistic Risk Analysis, or PRA, has grown over the years since the  
22 Commission=s PRA policy statement of 1995. Risk considerations have been  
23 incorporated into our major programs of rulemaking, licensing, and inspection and  
24 oversight since that time, though it=s been more of a segmented approach versus an  
25 integrated holistic approach. And there are some good reasons for that that we=ll get



1 into later this morning.

2 This slide is a great graphical depiction of how a recognized vulnerability  
3 related to station blackout events that led to the station blackout rule in 1989 has been  
4 addressed over the years to create meaningful safety improvements with the use of  
5 insights and risk information central to this accomplishment. Examples such as this were  
6 significant contributors to the steady improvement in core damage frequency of the  
7 nuclear fleet, as industry depicted earlier.

8 Next slide. Many other areas stand out as great examples of similar  
9 risk-informed performance-based approaches to safety that have been developed over  
10 the last 20 years. The maintenance rule, NFPA 805, the reactor oversight process, and  
11 risk-informed in-service inspection and testing are some of the more prominent examples.

12 And we continued to leverage risk information and utilize risk-based  
13 tools to enhance our decision-making today. There have been substantial improvements  
14 in the quality and content of PRAs over the years that C.J. will discuss in a few minutes.  
15 This has allowed us to expand the areas into which risk information is a key element of  
16 our decision-making process.

17 As this chart shows, there have been an increasing number of  
18 risk-informed license submittals, and we expect that number to increase in the near future,  
19 as you heard from industry. While the overall trend is upwards, there are some  
20 categories of risk-informed license amendments where we expect fewer applications.  
21 For example, essentially every plant in the fleet has received a license amendment  
22 aligned in the risk inform, their in-service inspection program, and about three-quarters of  
23 the plants have received approval to risk inform their technical specifications surveillance  
24 frequencies. We have great confidence in our ability to complete these routine  
25 risk-informed licensing actions on schedule, and we've developed a separate internal

1 metric just to track completion of similar risk-informed license amendments.

2 Another example that reflects our ability to incorporate the use of risk  
3 insights is related to mitigation of beyond design basis equipment, also known as FLEX  
4 equipment. We have successfully incorporated credit for FLEX into several of our  
5 qualitative and quantitative risk assessments. Recent examples of where this was used  
6 was for allowed outage time extensions for essential service water at Shearon Harris and  
7 the situation that Bob mentioned earlier, the emergency diesel generator issue at Palo  
8 Verde.

9 We are looking at a number of areas where licensees may request  
10 credit for FLEX and are revising and/or generating new guidance to ensure consistent  
11 application by the staff. One area where we are revising guidance to incorporate FLEX is  
12 the significance determination process where we use our SPAR models to quantify  
13 performance deficiencies and ultimately make decisions on characterizing the significance  
14 of these performance deficiencies.

15 Thus far, we have been providing credit for FLEX in an ad-hoc fashion,  
16 so we are updating the RASP Handbook, or the Reactor Assessment Standardization  
17 Project Handbook, to ensure our risk analysis credits FLEX where it's appropriate in an  
18 efficient and consistent manner.

19 Next slide. I'd like to take a few moments to talk about some recent  
20 challenges we face relative to making progress in several risk-informed initiatives, such as  
21 NFPA-805 and Risk-Informed Technical Specification 4b, which industry touched on this  
22 morning. It's important to note that these two initiatives have, or will lead to substantive  
23 changes in the current licensing basis, including authorizing licensees to make future  
24 risk-informed decisions without NRC staff review and approval. Most other past  
25 risk-informed initiatives have tended to approve very specific and fixed changes.

1           NFPA-805 reviews were voluminous and technically complex. The  
2 industry and the NRC worked together to pilot the application, and we have guidance in  
3 place for subsequent applications. However, in retrospect, there are issues during the  
4 pilot reviews that never got fully resolved, and we carried them over into the bulk of the  
5 NFPA-805 individual plant reviews, such as how to deal with deviations from the guidance  
6 that had been jointly developed by NRC and EPRI. Industry earlier stated that they  
7 believe fire PRA models are overly conservative, but, as Anders will discuss later, we  
8 continue to focus efforts on enhancing the realism of these models.

9           For Tech Spec 4b, or the risk-informed allowed outage time reviews, we  
10 thought it was necessary to conduct a pilot review first. It is not unusual for complex  
11 first-of-a-kind power reviews to take several years to complete, and that was the case for  
12 our pilot effort involving Vogtle. However, a couple of years ago when we were in the  
13 process of completing our initial safety evaluation for Vogtle, there were some significant  
14 concerns raised by staff on the implementing guidance and how the applicants were using  
15 that guidance.

16           While we tried to address these issues in individual reviews that were  
17 ongoing at the time, these efforts were not effective and resulted in our withdrawal of  
18 support for the applicable Technical Specification Task Force Traveler, or TSTF-505. A  
19 TSTF provides an approach that, if followed closely by industry, should allow for a more  
20 streamlined review by the staff.

21           We have now worked through those issues with Vogtle. It's been  
22 painful, but we will be issuing soon the safety evaluation and the license amendment for  
23 Vogtle, and then proceed with completing the other six in-house reviews that we currently  
24 have. This will now allow us to then focus our efforts on working with industry to get the  
25 TSTF-505 revised expeditiously to support future efficient and effective reviews of

1 applications. However, some of our staff continue to have issues with this initiative, and  
2 we are currently processing a different professional opinion associated with Tech Spec  
3 4b.

4 One very positive aspect of this experience is that the level of  
5 collaboration between the engineering staff and the PRA practitioners to work through the  
6 issues associated with risk-informed tech specs has resulted in greater shared  
7 understandings that will significantly help us as we review other risk-informed initiatives in  
8 the future.

9 Industry pointed to a cultural challenge that the NRC has as a potential  
10 barrier to greater use of risk-informed thinking. I would characterize our challenge in this  
11 area as being the result of having a regulatory framework that is largely based on  
12 deterministic principles and a staff that has many years of experience operating in that  
13 realm. For years, we have relied on engineering judgment as part of our decision-making  
14 process, and, typically, that involves some degree of conservatism in order to assure  
15 there=s adequate defense-in-depth and safety margin. I would offer that the use of  
16 engineering judgment is a form of risk-informed thinking.

17 Our challenge today is how do we train and educate our staff to be able  
18 to understand and utilize today=s risk tools and models to sharpen their engineering  
19 judgment so as to better evaluate what is the appropriate safety margin and  
20 defense-in-depth that is needed to make decisions and provide reasonable assurance of  
21 public health and safety.

22 So while industry pointed out some areas where the NRC can focus and  
23 continue to improve in how we use risk information, there is a significant challenge that  
24 industry has which also needs to be addressed, and this is the inconsistent treatment and  
25 approach to PRA. Not every licensee has invested the resources and effort that you

1 heard from the panelists this morning.

2 As the Commission is aware, PRAs are a voluntary initiative for the  
3 operating reactor fleet. We had the good foresight to require PRAs for reactors licensed  
4 under Part 52, so this should not be an issue for the next generation of reactors.  
5 However, given the inconsistent application by industry of our standard for PRA quality,  
6 Reg Guide 1.200, it makes it difficult to develop generic regulatory approaches that would  
7 rely on a licensee=s PRA as the basis for our decision-making.

8 Additionally, we expend a lot of effort on assessing PRA quality on  
9 individual reviews when a licensee submits a risk-informed amendment because of this  
10 situation. And over the years, we have developed and expanded our own version of a  
11 PRA model, the SPAR models, as a means to have an independent risk assessment tool.

12 We have expended a lot of resources to maintain and upgrade SPAR models, and  
13 having two risk models also creates the opportunity for differences of opinion on the  
14 significance of certain issues since we are not singing from the same song sheet, so to  
15 speak.

16 So this is an area that industry controls that, if the effort was expended  
17 to enhance the fleet-wide quality of PRA models, it could lead to a greater degree of  
18 efficiency in our review activities.

19 Within NRR, as I noted at the outset, we have focused a lot of attention  
20 on improving our capability to use risk information in our decision-making.

21 Recently, our management team spent a good deal of time discussing  
22 how can we continue to make progress in the area? And it comes down to three main  
23 focus areas. One, doing more to better communicate our vision for fostering a more  
24 substantive risk-informed mind set and highlight areas where we have successfully  
25 integrated risk in a safety-focused manner. Secondly, enhance the training and

1 education of our staff so that their understanding and comfort level in using risk  
2 information is increased. And, three, refining or developing appropriate processes and  
3 procedures to more clearly describe how risk information can and should be used in a  
4 wider variety of our regulatory applications.

5 As you will hear later, we are embedding risk principles into our  
6 processes so that they become part of our regulatory fabric and our way of thinking and  
7 are not seen as something that is different or at odds with how we have traditionally done  
8 things. As Dave Lochbaum so eloquently stated earlier, this is an evolution and  
9 compliments and enhances our decision-making capability to focus on safety.

10 So I now turn things over to C. J. to discuss some of the safety  
11 improvements that have been informed by risk insights. C. J.?

12 MR. FONG: Thank you, Bill. Good morning, Chairman and  
13 Commissioners. As Vic mentioned, my presentation will provide recent examples of  
14 safety improvements that have been made, in large part, because of insights gained from  
15 risk analysis. I'll also discuss how the NRC is improving its risk-informed infrastructure,  
16 that is the ability to efficiently and effectively review risk-informed licensing actions.

17 Before I get into the body of my presentation, I'd like to highlight a few  
18 terms that you'll be hearing today. This slide is some of the major risk-informed  
19 licensing initiatives that are currently underway, and I realize these have been mentioned  
20 earlier but let me do a quick recap for you.

21 First on the list is Technical Specification Task Force, or TSTF, 505,  
22 also referred to as Tech Spec Initiative 4b. This initiative would allow licensees to extend  
23 tech spec completion times based on insights gained from their PRA models.

24 Next is TSTF-425, or Tech Spec Initiative 5b. This initiative allows  
25 licensees to adjust surveillance frequencies that is the frequency with which they test tech

1 spec equipment, using PRA insights.

2 Third is Risk-Informed Generic Safety Issue 191, which allows licensees  
3 to address post-LOCA debris issues, in other words the issues that were raised by  
4 Generic Letter 2004-02, using the risk-informed approach. This effort implements the  
5 Commission direction provided to the staff in the SRM to SECY-12-0093, which provided  
6 options for addressing GSI 191.

7 Fourth is 50.69, or Risk-Informed Categorization of Structures, Systems,  
8 and Components, or SSCs. This regulation allows licensees to assign treatment  
9 requirements to SSCs according to their safety significance, which is determined using a  
10 risk-informed process. Treatment requirements span a wide-range of activities, including  
11 design, testing, procurement, installation, and reporting of defects. Alejandro will provide  
12 details and examples later in the presentation.

13 Finally, in response to the information request letter sent to licensees  
14 following the Fukushima Dai-ichi event, approximately 20 sites will be submitting a seismic  
15 PRA to the NRC for review.

16 Next slide, please. This figure ranks some of the risk-informed  
17 initiatives that I just described in terms of the complexity of our review. The initiatives  
18 near the top of the figure are generally more complex to review because the NRC=s  
19 risk-informed decision-making framework is not one-size-fits-all. Instead, the safety  
20 significance of the decision being made and the degree to which PRA is being used to  
21 support that decision define what is acceptable to the staff.

22 The acceptability of a PRA is defined in terms of the four attributes that  
23 you see in the orange square on the left of the figure: scope, level of detail, technical  
24 robustness, and plant representation. Let me take a moment to define those terms. The  
25 scope of the PRA means the different plant operating modes and hazard groups, such as

1 internal events, fire, flooding, that are evaluated. The level of detail of the PRA is defined  
2 in terms of how the plant itself is modeled. For example, a very simple model might  
3 evaluate the probability that a diesel generator fails. A more detailed model might  
4 consider various failure modes, such as fail to start or fail to run, as well as the possibility  
5 that the diesel can be recovered after it fails.

6 The technical robustness of the PRA is defined in terms of the  
7 reasonableness of the PRA=s approximations and assumptions. Finally, plant  
8 representation describes the degree of fidelity between the PRA model and the as-built  
9 as-operated plant.

10 It is difficult to assign a numeric metric or value to each of these  
11 attributes. But our review guidance and the licensee=s implementation guidance adhere  
12 to the principle that greater scope, level of detail, technical robustness, and plant  
13 representation are needed for the more complex submittals you see in the figure here.  
14 This is because these submittals rely more heavily on PRA results and because they  
15 provide greater flexibility to the licensees.

16 Next slide, please. As we just discussed, verifying the acceptability of  
17 licensee PRA models is a necessary component to approving risk-informed initiatives.  
18 This acceptability review is made easier when licensees submit PRAs that have  
19 undergone a high-quality peer review.

20 This figure shows a recent snapshot of the state of industry PRA models  
21 in terms of how many had been peer reviewed. As Bill pointed out, there=s progress to  
22 be made, but we believe that recent enhancements to PRA guidance and consensus  
23 standards have led to improvements in the acceptability of the models. For example, the  
24 NRC has endorsed consensus standards for internal events, internal flooding, and fire  
25 PRA models via Reg Guide 1.200. In addition, we have developed guidance for the NRC



1 staff, which is found in Chapter 19 of the Standard Review Plan.

2           These developments have led to PRA models that are more  
3 standardized, more scrutable, and, in general, more credible than the models that were  
4 developed during the IPE and IPEEE days. This increase in acceptability supports the  
5 use of risk analysis in more complex applications.

6           Next slide, please. Just as the licensees have improved their PRA  
7 models, we have expanded and improved our own models Standardized Plant Analysis  
8 Risk, or SPAR, models. We now have an internal event SPAR model for every plant in  
9 the fleet, as well as two Level 2 models and five new reactor models shown by the blue  
10 and red bars respectively. The green bar representing the number of all-hazard SPAR  
11 models, that is models that include external events such as seismic, is at 23 and growing.

12           As we have learned recently, external events, such as fire and flooding,  
13 can be significant risk contributors at some sites, so having SPAR models that incorporate  
14 the risk from these hazard groups helps us to make more informed decisions. I'll also  
15 point out that, in addition to adding new models, we have a contract with Idaho National  
16 Lab to update our existing models on a regular basis to ensure that they incorporate new  
17 data and plant modifications.

18           Next slide, please. It's important to keep in mind the PRA model  
19 improvements have not, by themselves, improved plant safety but, rather, the insights  
20 they've provided have identified design and operational changes with substantial safety  
21 benefits. This slide contains recent examples of such safety improvements that were  
22 made based on insights gained from fire PRA.

23           Some of the items on this list should not come as a surprise. Even  
24 without a fire PRA, we know that improvements in the ability to prevent, detect, and  
25 suppress fires will reduce fire risk.

1           That said, we've observed other improvements that are less obvious  
2 and were identified, in large part, through the development and quantification of fire PRA.  
3 Many licensees who have performed a fire PRA have reduced fire risk by installing new  
4 equipment, such as improved reactor coolant pump seals designed to improve the plant's  
5 ability to cope with the effects of a fire, for example station blackout. Others have  
6 installed new auxiliary feedwater pumps, an example of which is shown in the photo here.  
7 Improvements such as these are a major benefit to the risk-informed approach.

8           Next slide, please. An example of how risk insights have been used to  
9 improve the regulatory decision-making process is the resolution of Generic Safety Issue  
10 191, which I described earlier. Many of the modifications that were made to address this  
11 issue are somewhat intuitive from an engineering perspective. For example, licensees  
12 have removed fibrous installation and have enlarged the surface area of their strainers,  
13 allowing them to operate with reduced head loss, even when challenged by debris.

14           What's interesting is that licensees using the risk-informed approach  
15 have identified additional safety improvements that were not as readily apparent as in  
16 large strainers or installation removal. The risk-informed approach requires licensees to  
17 construct a 3D CAD model of containment, an example of which is shown in the figure  
18 here.

19           This model is used to evaluate thousands of small and medium-break  
20 LOCA scenarios that, under the deterministic GSI 191 approach, are typically assumed to  
21 be bounded and are, therefore, not directly analyzed. Some licensees have discovered  
22 that relatively modest plant improvements can increase safety margins for these  
23 lower-consequence but higher-frequency scenarios. Examples include increased RWST  
24 levels and shorter strainers that stay submerged even under smaller LOCAs.

25           Deterministic approaches have served us well and continue to play a

1 critical role in protecting the public=s health and safety. That said, risk-informed  
2 approaches, with their consideration of a broader set of challenges to plant safety, can, at  
3 times, reveal potential safety improvements that are not readily obvious when using  
4 deterministic methods alone.

5           Next slide, please. In Stephen Covey=s well-known book *ΔThe 7*  
6 *Habits of Highly-Effective People,*@ habit number seven is sharpen the saw. In the  
7 figurative sense, this means that we need to focus not just on making risk-informed  
8 decisions but also on improving our organizational capability to make these decisions  
9 wisely and in a timely manner.

10           To do this, we are updating Regulatory Guide 1.74, as directed by the  
11 Commission, and we are working on several initiatives that involve training and  
12 development for NRC staff. You=ll hear more about that later from Anders and Joe.

13           We have also engaged industry on processes that will enhance  
14 risk-informed decision-making in several ways. For example, the industry recently  
15 developed an F&O independent assessment process, and, by the way, that=s the same  
16 closure process you heard the industry panel mention earlier today.

17           Under this process, licensees would resolve technical issues, termed  
18 facts and observations, or F&Os for short, that are identified during the peer review  
19 process before submitting them to the NRC. We believe that this process, if properly  
20 executed, would benefit both the NRC and industry when applied to the initiatives that  
21 were on my first slide.

22           By gaining assurance that technical issues related to a licensee=s PRA  
23 have been resolved prior to a law being submitted, we will be able to focus resources on a  
24 limited number of areas where open items remain. This would potentially reduce the  
25 number of requests for additional information needed to complete a review, thus reducing

1 the industry=s burden, as well.

2 Of course, the NRC=s oversight of risk-informed programs does not end  
3 with licensing. Inspection is a key component to ensuring that risk-informed programs  
4 are being implemented correctly. Therefore, I will now turn things over to Alejandro to  
5 discuss the insights gained in this area. Alejandro?

6 MR. ALLEN: Thank you, C.J. Good morning, Chairman,  
7 Commissioners. As you know, the entire reactor oversight process is a risk-informed and  
8 performance-based process. Resident inspectors routinely consider plant risk insights to  
9 carry out are baseline inspection program. However, given that Vogtle was one of the  
10 leading sites in implementing risk-informed initiatives, I=m here today to provide our  
11 current efforts underway to ensure appropriate oversight of the following three  
12 risk-informed initiatives.

13 First, 10 CFR 50.69 rule associated with a risk-informed category station  
14 and treatment of structure systems and components; and, second, the following two  
15 risk-informed technical specification initiatives: Initiative 4b, which would allow extension  
16 of technical specification completion times, and Initiative 5b, which would allow licensee  
17 changes to surveillance frequency intervals.

18 Next slide. So as you know, the current body of an NRC requirements  
19 associated with safety-related equipment are largely based on conservative and  
20 deterministic events. These requirements are referred to as special treatment and place  
21 strict controls on the design, fabrication, installation, testing, qualification, and many other  
22 activities designed to provide a high level of assurance that safety-related equipment are  
23 capable of performing their intended functions.

24 So 50.69 is a voluntary risk-informed rule that adjusts the number of  
25 safety-related equipment that are subject to these strict controls. This is done by

1 classifying components into one of four risk-informed safety classes or risk categories  
2 using an NRC-approved methodology.

3 Safety-related components are identified as risk 1 if they are a high  
4 safety-significant and risk 3 if they're low safety-significant. The rule then relaxes  
5 special treatment controls in risk 3 components and allows for more flexible alternate  
6 methods to demonstrate that the required functionality of these components can be met.

7 These alternate methods are known as alternate treatment and must  
8 include high-level treatment controls for inspection and testing, as well as corrective  
9 action. An example of an alternate treatment would be the procurement of a commercial  
10 grade pump that can satisfy safety-related requirements for flow, head, and pressure.  
11 Another alternate treatment could be the extension of codes and standard test  
12 frequencies for pump and valves which are normally driven by ASME code requirements.

13 After alternate treatment is supplied, the rule requires licensees to  
14 assess the performance of these risk 3 components and adjust their categorization of  
15 treatment if their performance drops below acceptable levels. The categorization  
16 process also identifies safety-significant non-safety-related equipment and identify these  
17 as risk 2 components. The rule then requires the licensee evaluate and ensure the  
18 treatment for these risk 2 components can support their accredited safety functions.

19 So in summary, the objective of the rule is to adjust the scope of  
20 equipment subject to special regulatory controls to better focus licensee and NRC  
21 attention and resources on equipment that has safety significance. Based on South  
22 Texas Project 50.69 light program, it is expected that approximately 75 percent of  
23 safety-related components will be categorized as risk 3.

24 Next slide. Today, there are only two plants that use risk-informed  
25 categorization of SSCs to relax special treatment requirements. First, South Texas

1 Project, which was granted a series of extensions between 1997 and 2001 which became  
2 the framework of 50.69; and, second, Vogtle, which was approved to use 50.69 in 2014,  
3 about when I began my resident rotation at the site.

4 In June 2016, about a year and a half later, I led a two-week on-site  
5 inspection of Vogtle=s early 50.69 program implementation in accordance with Inspection  
6 Procedure 37060 titled, A10 CFR 50.69 Risk-Informed Categorization and Treatment of  
7 Structures, Systems, and Components Inspection.@ We reviewed program documents  
8 and procedures for the three major program elements, that is the categorization process,  
9 alternate treatment, and feedback and process adjustment.

10 For the categorization process, the team reviewed all four systems  
11 categorized at the time. Those systems included containment spray, radiation monitoring  
12 system, component cooling water system, and the essential water system. Review of  
13 alternate treatment and feedback and process adjustments were limited due to program  
14 documents being in early stages of the program and given that several lower-level  
15 procedures for alternate treatment were still being developed at the time of the inspection.

16

17 The team did, however, review one alternate treatment evaluation  
18 conducted at the time which extended the free-flow test frequency of containment spray  
19 pumps from 18 to 54 months. This was acceptable based on operational considerations,  
20 as well as historical tests and maintenance results for these pumps.

21 Overall, the team determined the licensee=s program and  
22 implementation was consistent with the staff=s safety evaluation report and 50.69  
23 requirements.

24 So going forward, the residents will continue to track the progress and  
25 performance of the program and recommend additional inspections based upon, one, the

1 number of systems categorized and time since initial inspection; two, if an event indicates  
2 that a risk 3 or 4 component may be more significant than initially determined; or, three, if  
3 alternate treatment has significantly degraded the reliability of risk 3 components.

4 In order to identify the need for additional inspections, the resident will  
5 keep track of the licensee=s 50.69 progress by tracking the number of systems  
6 categorized and reviewing performance assessment results of equipment subject to  
7 alternate treatment.

8 Next slide. This next one is Risk-Informed Technical Specification  
9 Initiative 4b. This initiative allows licensees to extend existing completion times by  
10 evaluating the total real-time plant risk. Licensees implement this by adding a new  
11 program to the administrative controls portion of the tech specs known as Risk-Informed  
12 Completion Times, or RICT.

13 For example, as depicted at the bottom of the slide, an existing  
14 three-day completion time to restore an inoperable sub-system could be extended up to  
15 30 days by maintaining total plant risk below specific risk thresholds and implementing  
16 actions to manage the risk associated with the extended out-of-service time.

17 Next slide. So once approved for Vogtle, residents plan to review the  
18 licensee=s implementation similarly to risk assessment inspections associated with online  
19 maintenance, which we already conduct under the baseline inspection procedures. This  
20 inspection would involve the same risk management tools that would be used for the  
21 risk-informed tech specs program and inspection activities would be very similar, as well.  
22 Residents would verify the plant walk-downs that the configuration of the plant that=s  
23 consistent with the licensee=s risk management tools and also would verify  
24 implementation of risk management actions. Some examples of risk management  
25 actions could include the protection of systems or components that are risk significant for

1 that given plant configuration and also minimizing of activities that could increase the  
2 likelihood of plant transients and raising risk awareness across the site organizations.

3 Currently, the staff is working to revise the baseline inspection  
4 procedure to incorporate inspection guidance and requirements for routine inspection and  
5 risk-informed completion times. To date, South Texas Project is the only plant to have  
6 adopted this initiative in 2007, which was reviewed under a temporary instruction in 2008  
7 with no inspection findings.

8 The current residents at South Texas review every completion time  
9 extension under the maintenance risk assessment baseline inspection procedure, along  
10 with the supplemental guidance and the temporary instruction, in order to ensure the  
11 program is being adequately implemented. No issues or concerns have been identified  
12 with South Texas's implementation of the program to date.

13 Next slide. At last, we continue to oversee Vogtle's implementation of  
14 risk-informed -- yes. At last, we continue to oversee Vogtle's implementation of  
15 Risk-Informed Tech Spec Initiative 5b. The initiative relocates surveillance frequencies  
16 for most surveillance requirements to the licensee control program known as the  
17 surveillance frequency control program and allow licensees to make changes to  
18 surveillance frequency intervals using an NRC-approved methodology.

19 From a safety perspective, the program provides for optimization of  
20 surveillance frequencies by maximizing equipment availability and, in some cases,  
21 increasing equipment service life that would reduce test-related wear and tear.

22 On the figure, you can see the administrative aspect of the change.  
23 The frequency interval is replaced with reference to the surveillance frequency control  
24 program, and the new program is added to the administrative control portion of the  
25 technical specifications.



1           To date, this initiative has been adopted by approximately 75 percent of  
2 the industry. Vogtle adopted it in 2012 and has conducted nine surveillance frequency  
3 extension evaluations, most of them during the last few years. We have reviewed three  
4 of these evaluations under the baseline inspection program. In our review, we verified  
5 evaluations are consistent with the NRC-approved NEI methodology and appropriately  
6 consider operating experience, test history, manufacturer recommendations, codes and  
7 standards, and risk insights from the PRA models.

8           Our focus has been on extension of risk-significant components. For  
9 example, residents reviewed a frequency extension for the emergency safety feature  
10 actuation system. This test involves many risk-significant systems and components and  
11 it=s one of the most complex surveillances conducted during the outage. Normally, we=d  
12 observe portions of the test and review the test results. We review issues that arise  
13 during the test to determine if they are in any way related to the surveillance frequency  
14 extension.

15           We also track surveillance extensions and consider these during routine  
16 screening of licensee=s corrective action program to identify performance issues and/or  
17 average trends related to surveillance frequency extensions. No average trends or  
18 performance issues have been identified to date, and it=s our perspective the program  
19 has been implemented appropriately.

20           This concludes my remarks, and I will turn it over to Anders, which will  
21 provide an overview of the Agency=s efforts to improve integrated risk-informed  
22 decision-making and PRA realism. Anders?

23           MR. GILBERTSON: Thank you, Alejandro. Good morning, Chairman,  
24 Commissioners. The purpose of this presentation, as Alejandro stated, is to provide an  
25 overview of the Agency=s current efforts to improve integrated risk-informed

1 decision-making and PRA realism.

2           Next slide, please. Consistent with the Commission policy statement  
3 on the use of PRA methods in nuclear regulatory activities, we are striving to make  
4 risk-informed decisions based on the best available information and, in doing so, follow an  
5 integrated risk-informed decision-making process. As discussed in the Commission  
6 policy statement, a probabilistic approach to regulation enhances and extends the  
7 traditional deterministic approach by allowing consideration of a broader set of potential  
8 challenges to safety, providing a logical means for prioritizing these challenges based on  
9 risk significance, and allowing consideration of a broader set of resources to defend  
10 against these challenges.

11           As shown by the figure, a probabilistic risk analysis is just one of the five  
12 principles used in the integrated risk-informed decision-making process. This process  
13 also requires consideration of deterministic attributes of the decision, such as maintaining  
14 consistency with the NRC=s defense-in-depth philosophy.

15           Next slide, please. As related to the defense-in-depth philosophy, we  
16 recently completed and published for public review and comment a Draft Revision 3 of  
17 Regulatory Guide 1.174 in response to the SRM on SECY-15-0168. Reg Guide 1.174  
18 provides an approach for using PRA in risk-informed decisions on plant-specific changes  
19 to the licensing basis.

20           We originally initiated the effort to revise Reg Guide 1.174 in 2011  
21 based on Commission direction and the SRM on SECY-11-0014, which stated that the  
22 NRC staff should revise this guide using precise language to ensure the  
23 defense-in-depth philosophy is interpreted and implemented consistently.@ The Office of  
24 Nuclear Regulatory Research is performing this effort with direct involvement with the  
25 program offices, and this effort is being overseen by the Agency=s risk-informed steering

1 committee.

2                   Next slide, please. The guidance on defense-in-depth and the current  
3 revision of Reg Guide 1.174, which is Revision 2, provides a general discussion of the  
4 defense-in-depth philosophy and a list of the seven defense-in-depth evaluation factors  
5 that are used to assess the impact of a licensing basis change on defense-in-depth. We  
6 incorporated the following key enhancements for the defense-in-depth guidance with input  
7 from both internal and external stakeholders.

8                   The introductory and background discussions on the defense-in-depth  
9 philosophy have been expanded to provide additional context. A definition has been  
10 developed for each defense-in-depth evaluation factor that describes the NRC=s  
11 interpretation of the evaluation factor and additional context is provided to further explain  
12 that interpretation, and guidance has been developed on how to apply the  
13 defense-in-depth evaluation factors on an individual basis, as well as in an integrated  
14 fashion.

15                   For each evaluation factor, statements have been included regarding  
16 how the licensing basis change should and should not impact a given evaluation factor  
17 and a discussion has been provided for further explanation of those statements.

18                   Next slide, please. During the guidance revision period, industry  
19 proposed that we incorporate the following three enhancements into Reg Guide 1.174: the  
20 addition of a discussion on aggregation of risk from different hazards based on the  
21 discussion of risk aggregation from NUREG-1855; added emphasis that the boundaries  
22 between different regions of the risk-acceptance guidelines are gradual in nature, as  
23 opposed to a step change; and an endorsement of the guidance from NUREG-1855 on  
24 the treatment of uncertainties, which is used to support risk-informed decision-making.

25                   Additionally, we added guidance for new reactors related to transitioning

1 from the risk metrics of large-release frequency in conditional containment failure  
2 probability to the large early-release frequency risk metric and related to containment  
3 performance expectations. This guidance was added based on the Commission direction  
4 in the SRM on SECY-12-0081, which approved our recommendation to incorporate a  
5 reference in Reg Guide 1.174.

6 We also incorporated relevant language related to defense-in-depth  
7 from other NRC guidance documents, such as the Standard Review Plan, and this  
8 revision effort was informed by insights from the recently-published NUREG-KM-0009,  
9 which provides a historical review and observations of defense-in-depth from the NRC  
10 and from international perspectives.

11 We believe that this effort will result in improved efficiency, clarity, and  
12 reliability of risk-informed applications consistent with the principles of good regulation.

13 Regarding the project=s schedule, reviews by and meetings with the  
14 ACRS are planned for August and September of this year, after which the final publication  
15 process for Reg Guide 1.174, Revision 3, will begin. And publication is expected by  
16 March 2018.

17 Next slide, please. The following items are some of our ongoing efforts  
18 to improve PRA realism, which are intended to enhance how we treat PRA model realism  
19 and conservatism in the decision-making process. We are working on the development  
20 of methods for potentially modeling FLEX equipment, and the improved reactor coolant  
21 pump seals and PRA, which may involve participation by a volunteer plant, appropriate  
22 credit for FLEX equipment, and improved reactor coolant pump seals will improve plant  
23 safety for many initiating events, including those for fire.

24 Regarding FLEX equipment modeling and PRA, in April 2017, we  
25 completed an assessment of the guidance in NEI 16-06 for incorporating mitigating

1 strategies and equipment in risk-informed applications that should meet the guidance of  
2 Reg Guide 1.200.

3           Regarding reactor coolant pump seals modeling in PRA, we completed  
4 in May 2017 the draft safety evaluation of the submitted topical report, which allows  
5 licensees to take credit for the seals in risk-informed activities.

6           Efforts to enhance the probabilistic flooding hazard analyses are being  
7 addressed by the NRC=s Probabilistic Flooding Hazard Assessment Research Program.  
8 This program supports development of technical bases and tools needed for reviewing  
9 regulatory submittals that apply a risk-informed approach to determine a site=s flood  
10 hazards and potential consequences.

11           In particular, using a traditional deterministic flooding hazard or flooding  
12 analysis to examine risk, it is not very useful as it does not consider the low probability of  
13 beyond design basis flooding events, the contribution to risk of higher probability/lower  
14 flooding levels that are coincident with random failures or planned outages, or the risk that  
15 flooding could impact a plant=s ability to respond to a non-flooding induced failure, such  
16 as impaired site access or ability to perform menial actions.

17           In contrast, a probabilistic flooding hazard assessment examines risk by  
18 considering a wide spectrum of flooding event magnitudes and their frequencies of  
19 occurrence, as well as the plant response across that hazard spectrum.

20           Since the late 1990s, the NRC and the Electric Power Research  
21 Institute have been working collaboratively under a memorandum of understanding to  
22 develop tools, methods, and data related to fire PRA modeling. This collaboration has  
23 resulted in the first jointly-published NRC-EPRI guidance document. Work on improving  
24 the level of realism in fire PRA continues, such as efforts related to main control room  
25 abandonment, more realistic heat release rates and fire ignition frequencies, and

1 aluminum high-energy arc faults.

2 We have drafted a fire research plan to address realism in fire PRAs  
3 and shared this plan with our stakeholders in a public meeting earlier this month.

4 In coordination with EPRI, we have agreed to continue to work on the  
5 items of mutual importance, and we look forward to this continuing collaboration.

6 Finally, in response to the recent industry letter related to SPAR models  
7 in the RASP Handbook, we are planning to engage external stakeholders to discuss  
8 minimum values of joint human error probability estimates and the basis for going below a  
9 probability value of ten to the minus six.

10 Regarding common-cause failures, the NRC position on modeling these  
11 types of failures is documented in a draft NUREG. However, the staff is engaging  
12 stakeholders to explore additional appropriate approaches to the treatment of  
13 common-cause failures in various regulatory applications.

14 That concludes my remarks, and now I will turn it over to Joseph Giitter.

15

16 MR. GIITTER: Thank you, Anders. Good morning, Chairman and  
17 Commissioners. All of the initiatives that have been discussed today would not be  
18 possible without skilled, highly-talented staff. I'm going to try to very briefly discuss  
19 some of those steps that the staff has taken to ensure that we have adequate  
20 organizational capacity to address the anticipated wave of applications that we have  
21 coming in and, in the longer term, to create a sustained culture of risk-informed thinking  
22 within the Agency.

23 As you are well aware, the Agency has long struggled with getting  
24 highly-qualified individuals with PRA experience. So in November of 2012, the NRC  
25 launched the grow-your-own probabilistic risk assessment analyst training program. The

1 goal of that program was to enhance the Agency-wide pool of PRA practitioners who can  
2 support future and current risk-informed initiatives.

3 The candidates, who were selected after a competitive screening  
4 process, received extensive training in PRA and, in some cases, plant systems. Many of  
5 the successful candidates are former senior reactor operators, NRC resident inspectors,  
6 or had other extensive operating experience and only required the PRA training.

7 As you can see in this graph on the slide, there are currently 11  
8 graduates of the program, and they represent both NRR and NRO. Many of them are  
9 actually here today over to my left. If you wouldn't mind just raising your hand quickly, I  
10 just want to -- okay.

11 We also have two more people who have entered the program at a later  
12 date and who should complete the program within a year or so. And one individual is  
13 actually scheduled to take their qual board next week. So we've had a lot of success  
14 with that program.

15 And since graduating from the program, we've been able to have some  
16 of these individuals devote their time to some of the risk-informed initiatives that you heard  
17 about this morning. Having trained PRA experts with operational experience is also an  
18 added benefit in looking at significant determination process issues and reviewing  
19 risk-informed tech specs and evaluating and accrediting FLEX and various risk-informed  
20 applications.

21 We have also arranged for contractor support to help with the seismic  
22 PRA reviews and the risk-informed tech spec reviews. Because these contractors have  
23 experience supporting the staff for NFPA-805 and other risk-informed applications, they  
24 have a good understanding of their regulatory process and requirements for the use of  
25 PRA in licensing reviews. Using contractors will also allow us to supplement the staff

1 resources to address the expected wave of risk-informed applications.

2           On a limited basis, we have also detailed risk and reliability experts from  
3 the Office of Research to support the current workload of operating reactor risk-informed  
4 initiatives. And I=ve been working very closely with my counterpart, Mike Cheok, in the  
5 Office of Research to evaluate how we can expand that level of support if necessary.

6           To appropriately provide oversight of the increased risk analysis  
7 concepts, we=ve developed inspector training as each initiative has come to fruition. For  
8 example, for NFPA-805 inspections, we developed a training and reference handbook and  
9 are using the lessons learned from initial inspector training to develop an online training  
10 course for future inspectors.

11           Similarly, we have developed a web-based training course for the 4b  
12 initiative. We believe that these tools will help ensure that our inspectors are well  
13 prepared to ensure adequate oversight of these new risk-informed initiatives.

14           Next slide, please. We recognize that, to be successful in moving  
15 towards greater acceptance in use of risk-informed decision-making throughout the  
16 Agency, we must also develop risk-informed training for a broader audience, not just for  
17 PRA practitioners. In support of that broader objective, we have delivered a number of  
18 seminars on risk-informed decision-making at division meetings throughout NRR and  
19 even at a monthly OGC seminar. We=ve also conducted a number of risk-informed  
20 thinking workshops that are open to all NRC employees.

21           This photograph was taken at the most recent workshop which was held  
22 a few weeks ago in April. To date, nearly 150 staff from both headquarters and the  
23 regions have participated in this workshop. These full-day workshops provide  
24 participants hands-on experience applying risk-informed decision-making framework to  
25 scenarios that replicate real-life Agency situations.



1                   As this slide here shows, we've also developed a risk-informed thinking  
2 certificate program. This program requires the attendance at the workshop that I just  
3 discussed, the completion of an introductory course on PRA, and the completion of an  
4 independent study activity to apply risk-informed decision-making to a selected work  
5 assignment. To date, four people have received this certificate and another half-dozen or  
6 so are in the pipeline.

7                   We also sent out a yellow announcement in March for a PRA certificate  
8 program. This self-directed learning experience builds on the knowledge obtained from  
9 the risk-informed thinking certificate with the goal of participants developing a basic skill  
10 level in key areas associated with the PRA competency model. The program culminates  
11 with a three-month rotational assignment in a PRA-related branch within the Agency.

12                   Although these training initiatives will not create experts in PRA, we do  
13 believe that these programs can ultimately improve the organization's capacity to  
14 understand and effectively apply risk-informed decision-making principles.

15                   Next slide, please. Finally, while we have advanced communication  
16 and training on risk-informed decision-making, we believe that, in order for this to be  
17 sustainable, we need to more fully incorporate risk-informed thinking into our processes  
18 and procedures for conducting licensing reviews.

19                   To that end, we have updated our office procedures for conducting  
20 licensing reviews to emphasize the importance of leveraging risk insights, where possible,  
21 in the conduct of licensing reviews. Incidentally, at the grassroots level, there's been  
22 greater sharing of information between the PRA specialists and the traditional reviewers.  
23 In the past, the PRA reviewers would conduct the review separately from the reviewers  
24 that were responsible for evaluating the deterministic aspects, such as defense-in-depth  
25 and safety margin. We have been slowly moving toward a team review model where the

1 traditional reviewers and the PRA reviewers collaborate and share information.

2 Most recently, this approach was successfully used during the Vogtle 4b  
3 licensing review. Ultimately, this approach should lead to broader understanding and  
4 acceptance of risk-informed thinking throughout the organization.

5 We have developed enhanced review guidance that builds upon existing  
6 guidance documents, such as regulatory guides and standard review plans, to provide  
7 additional detail to enable more efficient completion of staff reviews. This guidance is  
8 envisioned to be developed for the most common license amendment request received  
9 with a focus on streamlining reviews by ensuring that the staff=s focus is on the most  
10 safety and risk-significant elements. It also provides a means to clearly communicate the  
11 various review elements needed to make a reasonable assurance determination and  
12 includes, where appropriate, incorporation of risk insights. This guidance is currently  
13 being piloted throughout NRR.

14 Ideally, in the future, every licensing review will start with the question  
15 @what is the risk significance of this?@ This approach will help ensure a focus of NRC  
16 resources on those issues that are most safety significant, which should help streamline  
17 the reviews, streamline the current review process, and improve the efficiency of our  
18 licensing reviews.

19 The hope is that incremental improvements like this will eventually help  
20 the NRC achieve the vision that Bill described in his opening remarks where integration of  
21 risk insights into regulatory decisions becomes part of the regulatory fabric.

22 That concludes my presentation, and I will turn it back over to Vic for  
23 closing remarks.

24 MR. MCCREE: Thanks, Joe. I regret that we=ve gone over our  
25 allotted time, but I hope and believe that you=ve heard a thoughtful, forward-looking,

1 open, and optimistic description of our journey on the increased use of risk in our  
2 regulatory processes.

3 Licensees, PRAs have improved. Risk insights have made the nuclear  
4 power plants safer. We=re actively working to build upon this process. We=re  
5 developing tools and the regulatory infrastructure which Joe just mentioned to continue to  
6 expand our understanding of risk and risk insights and how to apply risk-informed thinking  
7 in our Agency decision-making. These activities will help us to reach full implementation  
8 of the vision set forth by the Commission in 1995.

9 Chairman, as you mentioned, this is Bill=s last Commission meeting,  
10 and I have had the pleasure of knowing Bill for all my NRC career. Our paths have  
11 intersected at a number of different points. I know him as an exemplary leader, as a  
12 principled regulator, very thoughtful communicator, and even in times, in those rare times  
13 when we disagreed, I believe it helped to enable us to make wise decisions.

14 As far as the topic today, his understanding and appreciation for  
15 risk-informed thinking has contributed greatly to the progress that we=ve made along the  
16 way of being a more risk-informed regulator, and the investment that he=s made in  
17 infrastructure and in our culture, I believe, will extend long past June 30th. So thank you,  
18 Bill, for all that you=ve done.

19 And with that, that concludes our remarks, and we=re ready for your  
20 questions.

21 CHAIRMAN SVINICKI: Thank you very much, and thank you to each  
22 of the presenters for covering your topic areas very thoroughly. You=ve teed up a lot of  
23 information.

24 I will just say on Bill=s last Commission meeting that I do agree that it=s  
25 very appropriate that this would be the topic for your last Commission meeting. I think

1 the Commission really acknowledges your leadership in so many of these areas.

2 And with that, we'll begin the questions with Commissioner Burns.

3 COMMISSIONER BURNS: Thank you, Chairman. Again, this panel  
4 has also given us a lot of food for thought. It's interesting and reflecting again on both  
5 the first panel and the discussions you've had today is the long journey, if you will, that  
6 we've been on in this area. In some ways, I might describe it as sort of lurching toward  
7 nirvana. And I say that because I think what I hear from you and I think I hear from  
8 industry is that steps are made, progress is made, but the question I have is what are the  
9 barriers toward further progress, further coherency in this area?

10 So what I would maybe ask and throw out to you all is it seems to me  
11 that there are probably three different areas in which, you know, and you've touched on  
12 this in your presentations, where there can be a particular focus. Yes, put me down  
13 about eight minutes there. And that is we have policies, you know, at the broadest level  
14 of the Commission, at the Commission level, at the senior staff level, there are policies  
15 that inform what we do in this area.

16 Then there are processes. How do we implement that? We've talked  
17 a little bit about that, and that's one of the areas where I say we see progress. And,  
18 again, this is not all on the NRC side. I think this is on the industry side, as well, quality  
19 of PRAs, consistency, you know, submittals, things like that.

20 So policies and then processes. And then it's people. Joe's talked  
21 about, in terms of enhancing the capability of our own staff, sort of moving that forward.

22 My question would be to you all is where do you see the greatest need  
23 in each one of those areas? Do we need additional policy? What do we need to  
24 effectuate good processes, and what more do we need to grow good people and good  
25 reflection of people in this area?

1           MR. DEAN: Okay. If you don=t mind, I=ll start. I=m sure some  
2 others will chime in. With respect to policies, I believe that we already have the policies  
3 that exist that give the staff the direction, the guidance to leverage risk information to  
4 incorporate it into our decision-making. The enforcement policy talks about leveraging  
5 risk insights for low safety-significant issues in terms of enforcement discretion. We have  
6 chosen over the years to focus only on short-term enforcement discretion, but there=s  
7 nothing that precludes us from existing policy that would allow us to go for an extended  
8 period of time. You know, the discussion that Commissioner Baran had with the previous  
9 panel on a focus area for us right now.

10           The Commission, in various SRMs throughout the years, has continued  
11 to emphasize to the staff, continued to make progress in terms of leveraging risk  
12 information and risk insights, in terms of what you=re doing in terms of the regulatory  
13 fabric and the regulatory structures.

14           The focus really for us is more on processes than people. Joe talked  
15 quite a bit about people and the things that we=re doing. In terms of processes, we kind  
16 of have this gap, right? So we have up here Reg Guide 1.174 that says if a licensee  
17 comes in with a risk-informed license amendment, this is what, you know, how you=ll treat  
18 it. So that=s pretty well understood and applied, right? But there=s a large gap in terms  
19 of how do you then use risk information, risk insights for things that don=t quite meet that  
20 quality but where risk information and risk insights can give you valuable information in  
21 terms of how important the particular issue is relative to safety. That=s where we need to  
22 focus, I think, our attention on in terms of how do we embed into our other processes, how  
23 do we leverage risk information and risk insights, and, of course, the continued training  
24 and education of the staff.

1                   So I think the latter two are really the key focus areas in my mind.

2                   MR. MCCREE: I think Bill knocked it out of the park. The only thing  
3 I=d add, the Chairman used the term Δmanagement attention units,@ which I think is very  
4 important, at least conceptually, because, as leaders, we need to recognize the  
5 importance that being risk informed and risk inclined has in the progress we need to make  
6 as regulators, and the attention that Bill and his staff have given of late has been very  
7 helpful. So we just need to continue to apply that.

8                   COMMISSIONER BURNS: Okay. Alejandro, we had the chance to  
9 meet with you, and I appreciate your support on a recent visit I made to the operating site  
10 at Vogtle, which is sometimes neglected in the last few years. But it was a good visit to  
11 get down there, and we talked a little bit on the risk-informed aspect.

12                   Tell me something in terms of how you=re prepared or how you have  
13 been preparing and the kind of training the residents get in terms of moving towards, you  
14 know, better appreciation or capability in this area.

15                   MR. ALLEN: Sure thing, Commissioner. You know, in terms of  
16 risk-informed initiatives and thinking, when I joined the NRC in 2008, we were already in  
17 the PRA policy statement phase. And it=s part of the initial training qualification and  
18 courses that inspectors, in the initial types of training, take. You know, we have to take  
19 PRA, technology, and regulatory applications training, and those to me have been very  
20 useful in understanding the basics, the background framework, and the different building  
21 blocks of PRA and not just that but its correlation to maintenance, risk assessments, and  
22 the regulatory requirements associated with online maintenance. So I think we have  
23 received an adequate amount of training with those regards.

24                   Also, in terms of support, you know, we=re at the site, we=re residents.  
25 We=re only two guys there. It=s hard to get people to bounce things off of, but, you

1 know, we're always a phone call away from the regions, the technical experts at  
2 headquarters. We talk with the technical folks up in the training centers all the time, as  
3 well as senior residents and residents at other sites, to bounce ideas off of them. And  
4 any concerns that we may have, you know, we'll share it and get insights.

5 I mean, me, personally, I have about eight years experience with the  
6 NRC, so I consider myself, you know, a kid sometimes. But, you know, so we rely on the  
7 technical experts, and we certainly have that in the different offices.

8 I can tell you from these regulatory risk-informed initiatives, you know,  
9 we've already gotten a great deal of support from the different offices. The regional  
10 inspector's report actually provided a reactor, senior reactor engineer that accompanied  
11 the team for the 50.69 inspection. You know, we had him there for the entire two weeks  
12 of the inspection, and he provided us insights for the preparation and really helped us out  
13 in getting through that inspection.

14 Also, another example for risk-informed completion times and as we  
15 prepare for that, we've already been in contact with the South Texas Project's residents  
16 and they've already implemented that program there. So they certainly have some  
17 insights they have shared with us, and we'll continue to bounce things off from all those  
18 folks and certainly expect that great level of support as we go on.

19 COMMISSIONER BURNS: Okay. Thanks. And I think that you  
20 emphasized a couple of good things. It's not only the individual preparation but sort of  
21 the willingness and availability to integrate with other experts throughout the Agency.

22 At the risk of going over, I do have one question. We heard a reference  
23 to an OECD nuclear energy agency study with respect to looking at risk, relative risk, and  
24 it sort of said we're overemphasized fire risk and there may be conservatism in our PRAs  
25 or whatever versus what we're seeing at the other OECD countries which, of course, are

1 most of the big nuclear fleets. Any --

2 MR. MCCREE: I jotted that reference down, as well. I'll be at NEA in  
3 a couple of weeks, and if I don't get a copy of it or additional information on it between  
4 now and then I'll certainly secure a copy when I'm there.

5 But I'm not familiar with it, and I don't think Bill or my colleagues here  
6 at the table are. But I'm sure Scott, Mr. Greenlee, is correct in his reference. We just  
7 need to get some information.

8 COMMISSIONER BURNS: Yes - for the Secretary - I would be  
9 interested in sort of understanding what NEA, the NEA study is doing. Thank you,  
10 Chairman.

11 CHAIRMAN SVINICKI: Well, again, thank you all for your  
12 presentations. I share Commissioner Burns' interest in that. I have had a concern and  
13 perhaps a growing concern that, in particular, the fire PRA models have moved away from  
14 realism. And while that may have served the needs of whatever application they were  
15 being utilized for at the time, maybe NFPA-805, it does move away from the purity of  
16 PRA, as I understand it, which is sensitivity analyses off of the base model are certainly  
17 appropriate but that should be more where conservatisms are explored and addressed.  
18 But in the truest sense, PRA practitioners, I think, would attest that the model, the base  
19 model itself should be the most realistic reflection of what's going on there. So if you  
20 NEA is doing work in this area, I'm certain that the Agency could benefit from those  
21 insights.

22 Joe, I appreciate your discussion of the risk-informed thinking  
23 workshops. Before you presented that today, I'm not sure that I knew that that was  
24 going on. I have some curiosity about that. I think that inculcating a mindset of  
25 awareness about risk-informed decision-making is an important element of the NRC



1 journey, as Victor has described it, over the course of years.

2                   And something that's been presented to me is that organizations that  
3 have had the model of putting the PRA expertise all over in one area and having those  
4 subject matter experts work in some isolation, that there's a real downside to that, that it  
5 needs the awareness of the utility of the tool and how it can factor into decision-making.  
6 You don't need to be a PRA practitioner. I think as you move up in management in a  
7 safety organization or safety regulator, it's important to have an awareness of what the  
8 tool is, how are the expert practitioners utilizing it, how does it add value to  
9 decision-making processes, but I think it can be this barrier. If it's not your area of  
10 expertise, it can seem like a little bit of a dark art of PRA. You know, you hear a lot about  
11 it.

12                   It really is a structured tool to better inform decision-making, you know,  
13 at its root. I'm sure, as a practitioner, they would have a better definition. But I think, as  
14 a non-practitioner, that's a helpful thing for me to have an appreciation for.

15                   Joe, are there any further efforts in NRC to kind of embed PRA experts  
16 and practitioners closer to the licensing work?

17                   MR. GIITTER: Yes. I said the certificate program we have would be  
18 another example. And I think, fundamentally, what's really going to make the difference  
19 is if we can get to a team review approach because, as I said before, our PRA  
20 practitioners will do their review. In the past, that's the way it was. And then the  
21 traditional engineering reviewers will do their review, and they'll provide their safety  
22 evaluation inputs separately to the Division of Operating Reactor Licensing and the  
23 project manager, they'll integrate those. I don't think that's a very effective model for  
24 collaboration and sharing of information. And one of the things we did experience, and  
25 there's been a lot of management attention on Vogtle in the last six months, but one of

1 the things that we did experience is we did have some of our PRA practitioners work  
2 directly with the traditional engineering reviewers, and I think there was sharing of  
3 information on both sides. And I think that sort of collaboration, level of collaboration,  
4 fundamentally, is the model we need to move to within our licensing reviews because I  
5 think, once that occurs, there will be a much better appreciation of what we mean by  
6 risk-informed decision-making.

7 CHAIRMAN SVINICKI: And this is a little bit of a perilous question, but  
8 the other observation I've heard from organizations outside NRC is that it's difficult if  
9 senior levels of leadership do not have an awareness of the utilization of PRA or other  
10 risk-informed decision-making tools. So if an issue is complex and it's going to very high  
11 levels in the organization, it's difficult to have that understanding.

12 Would you characterize that something that we're also working with at  
13 NRC, noting, of course, that the current director of NRR has a deep and rich  
14 understanding of risk-informed decision-making? That may not be true of all managers at  
15 NRC.

16 MR. GIITTER: I think it's really important that the NRC leadership at  
17 all levels embraces and supports risk-informed thinking. And I think if that isn't there,  
18 then we don't have a lot of chance for success.

19 CHAIRMAN SVINICKI: Thank you. Bill, did you want to add?

20 MR. DEAN: I did want to add something to that. In recognition of that  
21 concern, one of the things that we did last year, and C.J. led a team that went out to all of  
22 the regions to talk about risk-informed decision-making with the managers that are  
23 involved in significance determination process assessments as a means to try to  
24 reinvigorate. Vic was just pointing out to me years ago there was this course called  
25 P-111, which was, I guess, basic principles of PRA that all managers were required to

1 take. So --

2 CHAIRMAN SVINICKI: Can I ask is it an element of any SES  
3 performance standards? Would it be embedded in there in terms of reviewing managers  
4 against that or no?

5 MR. MCCREE: No, ma'am, it is not. And, in fact, your question  
6 inspires --

7 CHAIRMAN SVINICKI: Should it be?

8 MR. MCCREE: I think, I believe that a grasp understanding and  
9 experience of risk-informed regulation is something that most, if not all, executives have  
10 before they enter the SES.

11 But your question reminds me to find out where we are in terms of how  
12 we've evolved through P-111 training because it was mandatory in circa 1998 - >99,  
13 certainly after the issuance of the policy statement. So you had a generation, if you  
14 would, of NRC leaders and staff who it was mandatory that we take the training. So what  
15 I need to gain a better understanding of is how we've transformed that or transitioned that  
16 over the years to ensure that it's part of our experience as leaders.

17 CHAIRMAN SVINICKI: Thank you for that. And I appreciate hearing  
18 at some point what you find out there.

19 I do want to note, although I haven't concluded my independent  
20 personal look at the draft Regulatory Guide 1285, which is the proposed Revision 3 of  
21 Reg Guide 1.174, which I think Alejandro and Anders might have touched on in their  
22 presentation. Again, it's not before the Commission, but I'm just looking at it as a point  
23 of interest. As was noted here today, it is a significant document in terms of our overall  
24 risk-informed decision-making efforts. And there was discussion of the staff updating in  
25 response to a staff requirements memorandum, and that is true. But there are, I think, a

1 number of SRMs in which the Commission has spoken to elements of this, and I don't  
2 think quoted today but something of note to me was a more recent direction issued in  
3 response to SECY-15-0168, which was a set of staff recommendations on issues related  
4 to implementation of a risk management regulatory framework.

5 In there, one of the elements of the Commission's direction, again this  
6 was March of 2016, was that the Commission agrees with the staff's conclusion that a  
7 formal Agency-wide definition and criteria for determining the adequacy of  
8 defense-in-depth should not be developed. So I'm in the midst of trying to square that  
9 direction with the presentation with a tremendous expansion of, I think it's seven factors  
10 that are in the current reg guide regarding defense-in-depth. Those are each taken and  
11 there is, as was presented today, a definition, interpretation, and detailed guidance on the  
12 application of each defense-in-depth evaluation factor.

13 I'm trying to reconcile that with the SRM direction. I know the staff has  
14 briefed the Commission offices and concludes that they have complied with the  
15 Commission's direction. I'm still trying to square that circle or whatever is a good  
16 analogy there because I think that when you have a detailed guidance on the application  
17 of each defense-in-depth evaluation factor, which, again, were just discussed at a very  
18 high level in the current reg guide, being part of the Commission that issued this direction,  
19 I had a different understanding of the Commission's concerns saying let's not have a  
20 detailed set of criteria for the adequacy of defense-in-depth.

21 But I'm still mid process, don't know where I'm going to come out on that, but I did just  
22 want to mention that.

23 So, please, you've presented kind of the staff's assessment. There's  
24 no need to respond to that. I'm still taking a hard look at it.

25 With that, Commission Baran.

1                   COMMISSIONER BARAN: Thanks. Well, I thought we had a good  
2 discussion the first panel about focusing on updating and risk-informing tech specs were  
3 necessary, rather than on developing a process to allow long-term non-compliance with  
4 tech specs. So I'm very interested in the risk-informed tech spec completion time  
5 initiative.

6                   As I understand it, the staff initially approved the implementing guidance  
7 but then withdrew the approval when the staff determined that the guidance didn't  
8 address the conditions previously established by the staff. I'm trying to understand  
9 where things currently stand. I know, Bill, you talked a little bit about the Vogtle review.  
10 Can someone walk us through the staff's main concerns today with respect to the  
11 guidance document?

12                  MR. DEAN: So let me start and then hand it off to Joe because Joe  
13 has been intimately involved in this for the last number of years. I think what we're  
14 struggling with as we were trying to come to closure on the Vogtle safety evaluation was  
15 that the number of branches that were incorporated into looking at that expanded beyond  
16 those that were involved in developing the original guidance associated with the  
17 TSTF-505. And this led to sort of this collision, as you will, of those that are, you know,  
18 more embedded in the traditional deterministic approaches struggling with understanding  
19 and giving up the licensees the authority to change, you know, allowed outage times  
20 based on probabilistic arguments.

21                  So I think that led to a lot of issues that were raised by a number of our  
22 staff that we had to resolve and deal with, and some are very challenging and very  
23 complicated. So that caused us to kind of take a step back and spend the time, and Joe  
24 talked about, you know, the effort over the last number of months to collaborate, as  
25 opposed to have sort of separate entities. Let's get all the people in the room, the risk

1 practitioners and the technical staff that had the more deterministic, you know, traditional  
2 engineering judgment type, and let=s get them to sit down together. And I think that was  
3 very beneficial to us, ultimately, working through some of these very challenging and, in  
4 some cases, emotional issues.

5 MR. GIITTER: The only thing I would add is with TSTF-505, first off,  
6 Vogtle was a pilot for 4b but they weren=t following TSTF-505 exactly. And so we had  
7 applications that came in before we completed the pilot, and so we dealt with, we had  
8 many situations with the TSTF where NEI-0609 was the guidance that was developed and  
9 the staff did a safety evaluation on that and they had some limitations and conditions.

10 When the TSTF was developed, it never carried those staff=s, the  
11 staff=s limitations and conditions over into the TSTF. So the TSTF didn=t represent the  
12 guidance that was approved by NRC of the NEI-0609 guidance. So there are some  
13 inconsistencies there. And we also saw in a number of the TSTF-505 applications that  
14 licensees didn=t follow the TSTF. And my own assessment is I don=t think the TSTF  
15 guidance was really that good. It was developed ten years ago, and it needed some  
16 work, so that=s why we made a decision strategically let=s focus on getting Vogtle issued  
17 and then let=s go back and work with the TSTF to get that addressed, and that=s the  
18 strategy we=ve followed. We=re still reviewing the TSTF applications we have in house.

19 But I think, in the longer term, it was necessary to take those steps  
20 because we were headed down a path that we didn=t want to go on, similar to what we  
21 started off with with NFPA-805. We felt it was important to get it right first, and then, in  
22 the longer term, we believe we=re going to see improvements in efficiency, clarity, and  
23 reliability, which are the, you know, major components of the principles of good regulation.

24 So without taking those steps, we felt that we were going to be asking for trouble later  
25 on.

1 I think we=re there now. We=ve completed the Vogtle safety  
2 evaluation. We=ve got a meeting next week with the TSTF. We=ve given them some  
3 suggestions for how to change the TSTF. And if we can come to agreement on that, I  
4 think we=ve got a good resolution path and we=re optimistic we can start completing  
5 some of these reviews.

6 COMMISSIONER BARAN: Okay. On the first panel, we heard the  
7 concern that the Chairman alluded to that conservatisms built into the fire PRAs are  
8 resulting in, essentially, an overestimate of fire risk, as compared to other plant risks.  
9 And if that=s accurate, then licensees and NRC inspectors may be focusing more  
10 attention on fire risks and less attention on other risks, like flooding, seismic, or station  
11 blackout risks.

12 What does the staff think about that concern? Do you think the fire  
13 PRAs are skewing our view of the relative contributors to overall plant risk?

14 MR. GILBERTSON: You know, the staff has evaluated risk significance  
15 sequences that are revealed in fire PRAs and compared them against operating  
16 experience and have been found that there is consistency there. For the most part, you  
17 know, things like --

18 COMMISSIONER BARAN: Oh, there is consistency --

19 MR. GILBERTSON: Yes.

20 COMMISSIONER BARAN: -- with operating experience?

21 MR. GILBERTSON: Right.

22 COMMISSIONER BARAN: Because that=s very different than what we  
23 heard on the first panel.

24 MR. GILBERTSON: Right. And I think maybe the differences  
25 between talking about the absolute risk and the scenarios themselves, so the risk insights

1 if you will. But we do also acknowledge that there are known conservatisms and  
2 non-conservatisms.

3 One of the things that the staff has done to better understand the  
4 conservatisms has gone out to the plants and find out what these issues are. One of the  
5 main issues is related to cable tracing, and so when licensees don=t, when they opt not to  
6 spend the resources to do the cable tracing, then they choose instead to incorporate a  
7 conservatism in their modeling and they just, you know, something is lost entirely, as  
8 opposed to refining the level of detail.

9 And so if you incorporate that, you=re going to have conservative  
10 results. But I think one of the things that we, an important point is that the insights that  
11 we=ve gained appear to be consistent with the operating experience.

12 COMMISSIONER BARAN: And so it sounds like, in the case of just fire  
13 PRAs, in an effort to move through that work, the NFPA-805 work, there may be cases  
14 where, well, this is a particularly challenging element to figure out in the PRA, we=ll take a  
15 conservatism and move on. I guess I just want to make sure that taking a step back, in  
16 order to get the fire PRA piece done and NFPA-805 done, we haven=t left ourselves more  
17 globally in a position where, you know, kind of what the pie chart that we saw in the first  
18 panel where, oh, it=s majority or 65-percent fire risk and we think that=s actually not true.

19 I mean, Bill, do you have a thought about that? That concern came  
20 through pretty clearly from the first panel as kind of maybe a fundamental premise of the  
21 discussion there. Am I hearing that you disagree with that premise and you don=t agree  
22 that that=s the case?

23 MR. DEAN: Well, now you=re going to hear my own personal opinion,  
24 and so that may not necessarily mesh.

25 CHAIRMAN SVINICKI: Is this a case where close-to-retirement people



1 get honest?

2 MR. DEAN: Yes. Well, I=ve never had that issue I think in my whole  
3 career, Chairman. You know, I do think industry makes a valid point that I would not  
4 have anticipated that fire would be considered to be such a dominant contributor risk as  
5 their graph would show. I would offer that and Joe and I have talked about this in the  
6 past that when we embarked upon NFPA-805 we probably did not have the appropriate  
7 quality and granularity and the guidance for developing fire PRA models. And so, you  
8 know, maybe if we had taken more time to do that at the outset, perhaps we wouldn=t  
9 have some of these examples that exist that industry points out.

10 But that being said, I think the NFPA-805 effort, even though it costs  
11 much more for industry than maybe they anticipated or we anticipated, has clearly  
12 resulted with the insights that have been developed in significant, in many cases  
13 significant risk improvements, and C.J. talked about a number of these.

14 So while I think maybe for individual licensees it may have been painful,  
15 and, while Anders also talked about areas that we need to continue to look at, I do think  
16 that it is probably over, we are over-conservative in our fire PRA. That=s my personal  
17 perspective.

18 MR. GIITTER: Any other last thoughts on that issue?

19 CHAIRMAN SVINICKI: Joe is not retiring, so he passes.

20 COMMISSIONER BARAN: If you were going to say something though,  
21 don=t pass.

22 MR. GIITTER: I think there are areas where fire PRA has  
23 conservatisms, and I think there=s probably some non-conservatisms, as well. And how  
24 those balance out, I=m not sure. But I agree with what Bill and Anders said because, you  
25 know, when we heard how much fire PRAs were costing for NFPA-805, we went out to a

1 number of sites and we asked a lot of questions, and I came away with the understanding  
2 that I think a lot of licensees, a lot of the costs of NFPA-805 and fire PRA was actually  
3 doing the cable tracing. And when you're doing the cable trace and you don't know  
4 where all the cables go, you have to make a conservative assumption that if you have a  
5 fire and there's a cable tray that's a target, you have to make an assumption that every  
6 one of those cables is going to be affected whether or not it's going to be. And then you  
7 don't know where the cables go, so you make some conservative assumptions. And if  
8 you're doing that, you're going to come up with conservative results.

9           And so I completely agree with what Bill said. I think when we went  
10 into NFPA-805 we had joint guidance developed by NRC and EPRI, and it was really  
11 meant as kind of a screening tool. And many applicants applied it as, you know, the  
12 screening tool. And when you apply a screening tool, you're going to come up with  
13 conservative results.

14           I do think that, just like internal event PRAs, it will take some time. But I  
15 do think there will be more realism added to fire PRA, and you heard about some of the  
16 efforts we have ongoing with industry right now to do that. And I think with time and,  
17 unfortunately, some money, it will take, we will be in a position where we do have more  
18 accurate fire PRA results. But I think it's probably reasonable to say that they're  
19 somewhat conservative.

20           COMMISSIONER BARAN: Okay. Thank you.

21           CHAIRMAN SVINICKI: All right. Well, thank you all again. A lot of  
22 very substantive and important information was shared today and issues were teed up, so  
23 more to come. And we are adjourned.

24           (Whereupon, the foregoing matter went off the record at 11:56 a.m.)