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U.S. NUCLEAR REGULATORY COMMISSION

BRIEFING ON ALTERNATIVE RISK METRICS
FOR NEW LIGHT WATER REACTORS

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TRANSCRIPT OF PROCEEDINGS

Public Meeting

Before the U.S. Nuclear Regulatory Commission:

Gregory B. Jaczko, Chairman

Kristine L. Svinicki, Commissioner

George Apostolakis, Commissioner

William D. Magwood, IV, Commissioner

William C. Ostendorff, Commissioner

APPEARANCES

Panel:

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Technical Leader, ESBWR PRA, GE-Hitachi

Ken Canavan
Director, Plant Technology, Electric Power
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1 PROCEEDINGS

2 CHAIRMAN JACZKO: Well, good morning everyone. The
3 Commission meets today to receive a briefing from the staff and stakeholders on
4 potential ways to modify a risk-informed approach for possible new reactors. I
5 want to commend the staff and really all the stakeholders for taking the initiative
6 in identifying these issues and ultimately, for their high-quality work in laying out
7 all the different options that we'll have to deal with. This kind of proactive work I
8 think by the staff, by the industry is very valuable and to stay abreast of the
9 important policy issues that we have to deal with.

10 In recent years, our work on new reactor issues has generally
11 revolved around the design certifications, the actual licensing-related work. This
12 is a bit of a departure from that, but it just shows that there is still a lot of
13 significant policy issues that we need to work through as we consider the
14 possible licensing of these new facilities, so I think that's an important piece of
15 our vital safety mission and I'm very pleased to see the work that people have
16 put into today's meeting and helping, certainly me, and I hope the rest of the
17 Commission understand the complexity and important issues that we are dealing
18 with here today. So, I look forward to hearing from everyone and offer my
19 colleagues an opportunity to make comments in they would like.

20 Okay, we will begin with Biff Bradley, who is the director of Risk
21 Assessment at the Nuclear Energy Institute.

22 MR. BRADLEY: Thank you, Mr. Chairman. I would like to thank
23 the Commission for the opportunity to have this briefing this morning and I would
24 like to echo your comment; I think we have had a constructive engagement with
25 the staff over the last year and a half on these issues. Next slide, please.

1 NRC's risk-informed framework has been – there was a major effort
2 back in about the late '90s to put this into place. It started with the Commission's
3 safety goal policy statement, which is the NRC statement of how safe is safe
4 enough. And that includes qualitative and quantitative health objectives, and
5 then derived from those are subsidiary objectives that we use for decision
6 making, as outlined in Reg Guide 1.174. Currently, those are core damage
7 frequency and large early release frequency.

8 Reg Guide 1.174 is basically the motherhood document for all the
9 risk-informed applications we are currently doing and including, to some degree,
10 the ROP. The change thresholds and the guidelines for risk metrics contained
11 within 1.174 we believe have been very effective. This has been a robust and
12 effective process. We have over 10 years experience with it. And I think it is
13 important to point out that it's a risk-informed process, it is not risk-based, and
14 the risk metrics are one of five decision elements that are included in the overall
15 process. And those of you are all familiar with these, and those include defense-
16 in-depth, safety margins, performance monitoring, and there are both absolute
17 and delta risk guidelines that are included in 1.174.

18 The other elements of 1.174, the non-risk metric elements, have
19 been effective I believe in precluding in experience we've had so far the concern
20 that the staff has expressed in their paper, that you could erode the safety
21 margins of these plants through changes. If you look at the CDF trend for the
22 operating plants since the implementation of 1.174 and its related applications,
23 we have actually seen a decreasing trend in CDF. We have not observed an
24 increase. And if you also, the operating plants span a fair variety -- wide variety
25 of baseline core damage frequencies. Some of the existing BWRs for instance

1 have fairly low core damage frequencies in the low 10 to the minus six range,
2 and in essence, overlap some of the new plant designs.

3 We have not observed the degradation of margins at these plants
4 or at others. And most of the applications under 1.174 are also NRC review and
5 approval and we've seen engagement on the staff on the defense-in-depth safety
6 margins and other elements. So I think those have been effective to date in
7 precluding the concern. Next slide, please.

8 Well, as you all know, the SECY lays out three options: one is to
9 use the existing framework, two is to engage on guidance revisions or at least
10 looking at guidance to see if it needs revision, and the third option would actually
11 be to come up with new risk metrics. We have reviewed the SECY and we have
12 provided a -- even prior to the SECY coming out, last year, we provided a paper
13 to the NRC staff as well as ACRS that gave the industry position on our belief
14 that essentially supported option one of the current SECY. And I appreciate the
15 staff's inclusion of that paper in the SECY that went up to the Commission.

16 The one area that I think we would probably slightly revise from our
17 initial paper would be on the change control area. We do recognize that change
18 control for new plants does need to incorporate additional elements, so I think
19 with regard to change control and the appendix to NEI 96-07, we concur that
20 option two would be appropriate and we are already working to engage the staff
21 with enhanced guidance in that area. Next slide, please.

22 So, option two, also there are other guidance documents that could
23 come into play here. We do have a number of risk-informed applications that we
24 have implemented. Tech Specs, ISI, the maintenance rule, and of course the
25 reactor oversight process, both the mitigating systems performance index and

1 the significance determination process are all -- have elements of risk involved.
2 They're also risk informed and they have other elements as well and we have
3 gone and looked at the guidance for these applications. Go to the next slide,
4 please.

5 Our review of the guidance for the applications listed on the
6 previous slide, our conclusion is the existing guidance has back-stops, limits,
7 DID, and other considerations that have effectively already addressed NRC's
8 concern and, in fact, in practice, as I mentioned, we believe that these elements
9 have been effective in precluding the issue of risk margin degradation. And I will
10 go through a couple of examples of this in the next couple of slides.

11 And just reiterating that on change control, we do understand that
12 there are additional elements of Part 52 that make the change control process for
13 Part 52 plants more -- having had to look at more features as well, to some
14 degree, be more limiting than the current 50.59 guidance, so we will engaging on
15 that. So, go on to the next slide.

16 Just a couple of examples of applications that are out there where
17 we -- and how the guidance works. Risk-Informed Technical Specifications
18 Initiative 4B: This is basically a flexible completion time, allows you to extend the
19 current completion time of standard tech specs up to a 30-day back-stop based
20 on a rigorous risk evaluation using a PRA that meets Reg Guide 1.200. This has
21 been implemented at South Texas and we have another pilot currently
22 implementing this application.

23 The 30-day deterministic back-stop means that regardless of the
24 risk significance, no matter how low the significance of the equipment is, you can
25 only take it out of service for 30 days. So with a new plant, which has either

1 more trains or passive features, the active trains of a new plant are going to have
2 less risk importance than an operating plant. So in effect, the 30-day back-stop
3 becomes more limiting for a new plant than it would for an existing plant.

4 Also, the maintenance rule (a)(4) risk assessment and
5 management of plant configuration essentially overlaps tech specs for most of
6 the important systems. And we believe that the back-stops and other features of
7 tech specs essentially address that for the maintenance rule (a)(4) as well. Next
8 slide.

9 Just another example that I would like to mention is mitigating
10 systems performance index -- MSPI, as we call it -- and again, in a similar vein, it
11 is basically a risk-informed, if not risk-based index. But it does have a trigger
12 point for equipment failures that exceed a specified limit regardless of risk
13 significance. That is, if you have "X" number of failures on a component, it
14 triggers the index even if the risk values haven't been exceeded. Again, similar
15 to tech specs for a new plant, this would actually take effect at a lower risk
16 threshold than for a currently operating plant. Next slide.

17 Another major element of the reactor oversight process is the
18 significance determination process. As you know, this uses the risk impact to
19 assess the significance of inspection findings. And the point that we would like to
20 make here is that this is a safety-focused process and we would expect new
21 plants because they are safer, have more safety margin, to have fewer significant
22 that is non-Green findings. That's due to the fact that these plants have been
23 designed with PRA insights in mind and the individual components are just going
24 to have less risk significance.

25 We believe that this is okay. The Green findings still require plant

1 corrective action and they do receive NRC scrutiny. I would also note that many
2 of the cornerstones of the SDP are not risk informed; it is primarily the reactor
3 cornerstone. Next slide.

4 So, just to reiterate some of the issues in our paper that we have
5 provided. We do believe that option three would be tantamount to establishing a
6 new safety goal. We do -- as mentioned in the first slide, the metrics are derived
7 from the safety goal with margin to the QHOs. We also believe the basic
8 premise of risk informed is to concentrate resources based on safety
9 significance. So to concentrate resources based on low safety significance
10 would seem to be adverse to the general premise of risk informed.

11 The new plants are designed with risk insights and they should be
12 able to take advantage of that and have additional operational flexibility. And we
13 believe that the new designs should be allowed to use that margin for operational
14 flexibility within the limits and back-stops that are established.

15 There are also public perception issues, especially with co-located
16 sites where you might have different inspection thresholds or finding thresholds.
17 And we are concerned that these could disincentivize the new plants going to
18 risk-informed applications. And to some degree, I think there's been some
19 trepidation on the new plants going to risk informed applications in part due to
20 this, and it is unfortunate, in my opinion, that we haven't been able to implement
21 risk-informed tech specs or 50.69 in the COL stage, but I think there is a
22 perceived regulatory risk there.

23 So my conclusion slide, or -- well, I've got one more before I get to
24 that. Next slide.

25 Just a few technical issues and Ken Canavan of EPRI can pick up

1 on some of these in his presentation, I think. We are dealing with very low
2 numbers here. And when you start getting down below 10 to the minus six, it
3 becomes more difficult to use PRAs for operational decision making. You are
4 starting to get within the uncertainty bands of the model. We do, I think in our
5 slide show that it is a larger relative change, and that's true, but the philosophy of
6 1.174 is generally to allow a greater relative change for a lower baseline CDF.

7 We also believe that once these plants come to operate; there will
8 be a different CDF than the DCD-CDF. There is a requirement to go to the 1.200
9 current revision, which would currently pick up fire, seismic, and other external
10 events. Currently, seismic is covered through SMA and doesn't contribute to the
11 CDF. The computed CDF for the new plant designs.

12 Finally, there is a larger release issue as used as a design metric
13 that differs from large early release. It is a bit of a difficult technical problem
14 relative to the definition of large release and how you can use that in plant
15 decision making. We believe that large early release is a better metric to use for
16 that purpose.

17 So, in summary, final slide. Relative to option two, I guess I would
18 say we are at option 1.5. We are in agreement that we need to engage on
19 change control guidance. We, based on our review, believe the other
20 applications contain the appropriate limits. So I think, you know, we are close to
21 option two space in our general view. Willing to sit down with the staff and go
22 through some of these and see what we can reach mutual conclusions on these.

23 Again, I would like to emphasize that we believe these things have
24 been effective in practice. We haven't observed the concern. And we look
25 forward to the new reactors transitioning to 1.174, the metrics, as well as the

1 large early release, and we believe that maintains a consistent and coherent
2 framework. Thank you.

3 CHAIRMAN JACZKO: Thank you. We will now turn to Gary Miller,
4 who is the technical leader of the ESBWR PRA.

5 MR. MILLER: Thank you. Good morning, and I would like to thank
6 Mr. Chairman and the Commission for this opportunity to provide a vendor's
7 perspective on risk-informed guidance for new reactors.

8 As you mentioned, my name is Gary Miller. I am the technical lead
9 for the PRA for the ESPWR, which is a boiling water reactor that uses passive
10 design features. We have used the PRA and we will continue to use it in every
11 phase of the design as a means to identify the events, human actions, or
12 component issues that might cause undue risk, and so that we can address
13 those during the design phase and reduce the risk. And the ESPWR is one of
14 the new generation of reactors. There are others, of course, that have passive
15 safety features. Next slide, please.

16 I was asked to provide a vendor's perspective and what I am going
17 to do is reflect on a view things that Biff Bradley has said but I also wanted to
18 provide some insights that we have from the PRA with respect to passive
19 reactors and nuclear safety. So overall, I think I believe I should state that
20 regulatory credit should be given to the passive plants because they do pose a
21 lower risk to the public, but I also want to talk a little bit later about some of the
22 other design features that we have at a lower level that also contribute
23 substantially to nuclear safety.

24 There are two fundamental guidance issues for new reactor
25 designs, one being that vendors designing new plants must provide enhanced

1 margins of safety relative to the current operating plants and doing this by using
2 simplified, inherent, or passive means for safety. The other fundamental
3 guideline would be that new plant designs must achieve a higher standard of
4 severe accident safety performance than prior designs. So keeping that in mind,
5 we need to design enhanced margins of safety and higher standards of severe
6 accident performance, and by doing so we have significantly reduced risk as
7 measured by core damage frequency or large release frequency -- all of those
8 measures.

9 So from a vendor's perspective, as I said, regulatory credit should
10 be given. We should be given operational flexibility and regulatory flexibility for
11 all of the measures and defense in depth that we have. And this is consistent, I
12 believe, with option one using the current guidance for risk-informed regulatory
13 decisions.

14 Now, when you look at the numbers, there is a potential drawback
15 to this approach which has been analyzed and discussed repeatedly and that is
16 that the baseline core damage frequencies and large release frequencies for new
17 plants are one to three orders of magnitude lower than currently operating plants.
18 So for example, if a current plant wanted to make a design change but it did not
19 meet the risk criteria, it would not be allowed, whereas that same design change
20 for a new plant could be allowed because relative to the low core damage
21 frequency, it poses a minimal change in risk. So there is a concern that
22 licensees of new reactors could make design changes which might reduce the
23 margin of safety. So I would like to talk about that a little bit as well.

24 Before I get to that, though, let me just talk about severe accident
25 mitigation. In order to preserve these fundamental safety objectives of new

1 reactors, there should be controls to ensure that design features that contribute
2 significantly to severe accident performance are not diminished or eliminated
3 based on a conclusion that the change is justified because it constitutes a small
4 change in risk. So I think this is also consistent with the ongoing efforts by the
5 industry in option one and the NEI guidance.

6 The remainder of my presentation will be vendor insights into
7 preserving the margin of safety that is designed into new reactors and the things
8 that we have seen as vendors in the PRA area as well. It is important to mention
9 that in addition to relying on passive safety functions to reduce risk, a lot of
10 design effort is spent on making the plant run lively with high power generation
11 capability, and because of that, because these things reduce initiating events and
12 allow higher reliability, they also enhance nuclear safety.

13 Much of the debate on safety metrics centers on measuring
14 changes to the overall core damage frequency or large release frequency, but
15 my perspective is that there are sub-elements of this risk, such as initiating
16 events, controlling transients and things like that, that perhaps should be looked
17 at more as far as determining changes in risk and if they are adequate. In a
18 sense, some of these risk metrics should be deconstructed from the overall core
19 damage frequency. Next slide, please.

20 One approach that's been used for passive plants that is similar is
21 the regulatory treatment for non-safety systems where we are required to
22 perform a focused PRA and the focused PRA takes away the passive features
23 and then quantifies risk based on the remaining systems. And in that way, you
24 are able to determine now what's important given that we are not looking at the
25 safety features. So this type of information may be useful for consideration when

1 we are looking at these other elements of risk. Next slide, please.

2 To accomplish this, the overriding influences of certain passive
3 safety systems could be removed from the risk equation and allow the relative
4 comparison of the remaining systems. Next slide.

5 New reactors provide additional safety system reliability due to their
6 simplified design, such as no reliance on operator actions or AC power. These
7 features are safety related and they certainly receive a significant safety-related
8 regulatory oversight. This is roughly analogous to old cars versus new cars: old
9 cars with seatbelts, new cars with seatbelts and air bags. Air bags are obviously
10 a significant improvement on the safety to the passengers in cars much like
11 passive features are an additional improvement that we are seeing with the new
12 reactors. Next slide, please.

13 So with this added safety, though, there is an aspect of human
14 nature that in many cases adding safety features can also encourage a risk-
15 taking attitude. In other words, don't worry about the worn tires on the car or that
16 the seatbelt doesn't work because the airbags will save you. That's not the
17 approach that we want to take or believe should be taken. And also, from a
18 power generation standpoint, it is better to avoid using passive systems because
19 in some cases, they require forced outages to restore or recover and that's less
20 power generation for our customers. So as vendors, we consider these design
21 features that provide more control to the operators so that they can avoid,
22 minimize, or -- minimize operational transience or passive safety actuations.
23 Next slide, please.

24 What I am getting at here is my point is that maybe changes in
25 plant nuclear safety should be evaluated at this level and these types of issues.

1 Next slide.

2 As I said before, regulatory treatment for non-safety systems
3 identifies systems that are not passive that are important to safety and these
4 insights are translated into the -- from the design phase into the operations phase
5 by the design reliability assurance program, which just ensures that systems and
6 components that are important to safety that have been identified in the PRA
7 during the design phase are carried through in the operational phase so that they
8 are still maintained with high levels of reliability. And so saying this is further
9 assurance that this level of detail is already incorporated into the safety of the
10 operating plant. Next slide.

11 Let me skip through these and get to the conclusion. This is just
12 more information to confirm that similar concepts for evaluating the risk are
13 preventing and controlling abnormal events, such as the maintenance rule, are
14 already incorporated into these design features.

15 In conclusion, passive plant safety should be measured against the
16 absolute risk goals and we must preserve these fundamental safety objectives
17 for new reactors. And in addition to that, from my perspective, regulatory
18 attention to these active functions that prevent or control transience should also
19 be examined for acceptable performance. In other words, we are still relying on
20 the seatbelts despite the airbags.

21 So once again, thank you for this opportunity to provide additional
22 perspective from a vendor's perspective.

23 CHAIRMAN JACZKO: Thank you. We will now turn to Ken
24 Canavan, who is the director of Plant Technology at the Electric Power Research
25 Institute.

1 MR. CANAVAN: Good morning, Mr. Chairman and
2 Commissioners. As always, it is honor and privilege to get to talk to you today.

3 Before I get going too far, I only put four slides in your package
4 because knowing that I was going towards the end of the panel rather than
5 towards the front, I wanted to keep my duplication down to a minimum. But
6 today's topic is a weighty one, and I hope to give you a slightly different
7 perspective on risk metrics both today and for the future regulatory framework.
8 The current risk-informed framework has been tremendously successful. It is
9 due in no small part due to the careful consideration of the regulatory framework
10 that was put in place. Next slide.

11 The framework had some simple beginnings in the development of
12 the Commission safety goal statement, which established an acceptable level of
13 risk. This acceptable level of risk was based on comparison with other types of
14 risk normally encountered by the individuals and the society as a whole. The
15 safety goals were originally expressed both qualitatively and quantitatively, but
16 due to difficulty with implementation of those safety goals, the Commission
17 provided the additional guidance in the subsidiary safety objectives.

18 The subsidiary safety objectives contain several of the objectives
19 that we know very well: core damage frequency at one time 10 to the minus four
20 per reactor year, or one in 10,000 years, conditional containment value at 0.1 or
21 one in 10, and a large early release frequency of one time 10 to the minus five
22 per year, or one in 100,000.

23 Not many risk-informed applications went in this timeframe, from
24 the timeframe from 1990 to 1995 when they were all done individually. They
25 were all submitted individually and usually were fairly boutique style or unique in

1 their approach. In 1995, recognizing that there was an awful lot of mileage to be
2 gained in being consistent, EPRI published a PSA applications guide, TR-
3 105396. It's publicly available as well. This report recognized that there were
4 competitive forces in the electrical generation market and that PRA could
5 improve the operational cost effectiveness of the plants as well as provide a
6 unique tool to focus resources more effectively on the areas of true safety
7 significance and finally that routine application of PRA and PRA insights can
8 improve safety.

9 The application guide also introduced several key concepts which
10 Biff Bradley talked about in his talk, such as defense in depth and basically the
11 role of PRA in decision making, as well as some rudimentary criteria. And risk
12 applications at this point started to become a little bit more consistent and less
13 boutique and unique and a little bit more consistent and available for review.

14 In 1998, Regulatory Guide 1.174 was issued which took those
15 concepts, added a few more concepts and took it even further and is largely the
16 core of the framework that we have today. Reg Guide 1.174 went through a
17 revision but it still remains one of the best examples of risk informed decision
18 making processes. Reg Guide 1.174 contains acceptance guidelines graphically
19 illustrated as figures three and four. I originally had in my talk that these are
20 some of the most reproduced figures in nuclear power but I reduced that -- I
21 didn't want to be over the top -- and just made it in risk analysis circles because
22 you see it quite a bit, and I inadvertently didn't put it in my slide.

23 But -- which I guess I should have copied them again, but I do want
24 to talk about them a little bit because while I haven't provided the illustration,
25 these figures provide the numerical guides on no change regions, small change

1 regions, and very small change region when evaluating a risk informed
2 application. And that is based on the "X" axis which is the baseline risk metrics,
3 such as core damage frequency.

4 I will note a significant item about both of those charts. There is no
5 origin. If you look at the lower left-hand side of those graphs, you will not find a
6 value or a base line metric. I believe it's left off purposely indicating that risk
7 metrics of very low value are acceptable for use with this chart. And I believe
8 that that omission comes -- that purposeful omission implies that the regions are
9 applicable to the more lower levels of the metric recognizing that these metrics
10 are conservatively bounded within the subsidiary safety objectives which is
11 conservatively bounded by the safety goal which is considered an acceptable
12 level of risk and that's why you see my boxes on my chart, one inside another.
13 There have been some attempts to quantify these margins and again another
14 illustration which I don't have with me has estimated that to be a significant factor
15 or margin between the actual applications and the approved deltas in the safety
16 goal. Next slide, please.

17 To date, there has been a lot of, considerable discussion about
18 some of the new plant CDFs. It should be noted that these PRAs do indeed
19 produce lower core damage frequencies. But it should also be noted that their
20 design periods as my colleagues have pointed out and by necessity are
21 incomplete. As new information is added, such as operating experience or other
22 hazards, these values may indeed change but they also may change as a result
23 of risk-informed applications as they are developed and implemented for the new
24 plants. And I also will show in a little while, there may be more than a simple
25 correlation between the implementation of risk-informed applications and the

1 reduction in risk. The take away from the slide overall is that experience with the
2 as built and as operated plants is needed before changing or developing
3 alternate risk methods. Next slide.

4 There is such a thing as a win-win-win. The current regulatory
5 framework has indeed fulfilled a promise of something for everyone. My
6 approach to the existing risk metrics is that they shouldn't be viewed as a single
7 application or single application of risk but rather as a process. At a plant, the
8 reactor oversight protection program, the reactor oversight program as well as
9 the mitigating system performance index, maintenance rule, SDP, NOADS and
10 others result in a continuous assessment of risk. It is really a process. It's not a
11 point estimate, one time, go in and do it.

12 And as a result of this continuous process, margins from the
13 thresholds are valuable. They are desired and they have value. Continuous
14 changes to the plant in terms of design, maintenance, and operations, driven by
15 risk, cost effectively developed and implemented, increase the margin. And
16 margin, if you ask any nuclear officer or plant manager, is a really important thing
17 to have.

18 The margins and these changes are permanent. The granted
19 increase in flexibility such as NOADS or emergency tech specs tends to be
20 relatively small and transient, temporary. As a result, the process favors and
21 increases the incentives for permanent safety changes or long-term risk
22 reduction. The win-win-win is that the owners have gotten operational flexibility
23 and improved reliability. The regulator has gotten improved safety. And the
24 public has low cost safe and reliable power.

25 The graphs to the right on this slide illustrate the effectiveness of

1 the current regulatory framework by providing evidence in terms of long term
2 trends and safety significant events over time illustrated by the red bars in the top
3 graph, overlaid by the core damage frequency for internal events over the same
4 period with the blue line. The second graph provides the annual capacity factor
5 in the blue bars overlaid with the same CDF bar. The bottom line is that the
6 current risk metrics have incentivized risk margins. And with this value, they will
7 be maintained or increased to provide additional flexibility. Next slide.

8 In summary, any future risk metrics should provide a win-win-win
9 proposition and continue to provide focus on safety significant issues. The
10 current metrics provide all these features. And in the absence of contravening
11 data, risk metrics appear to be adequate. The bottom line is that if it's not broke,
12 don't fix it, especially in light of the considerable uncertainties that we have in the
13 final risk metrics and risk proposed by the new plants. And that ends my
14 comments. Thank you very much.

15 CHAIRMAN JACZKO: And we will not turn to Ed Lyman, who is
16 the senior staff scientist at the Union of Concerned Scientists.

17 DR. LYMAN: Mr. Chairman. And on behalf of the UCS, I would
18 like to thank you and the rest of the Commission for the opportunity to present
19 our views today. We did have the privilege of speaking on the issue of risk-
20 informed regulation last year and some of our concerns about its application for
21 currently operating plants, and I would say that our concerns of the application of
22 risk informed regulations in new plants that have not been built or operated are
23 even greater.

24 UCS doesn't think that the current fleet of operating plants is safe
25 enough based on the industry reported core damage frequencies, just using

1 industry supplied values and considering in a qualitative sense the external
2 events in low power and shut down modes. On the fleet wide basis we could
3 expect there is a 0.5 to one percent per year of a core damage event in the
4 United States. We think that is too high today and certainly too high to support a
5 large expansion of nuclear plants unless there is significant increases in safety.
6 Unfortunately, we believe that the advance reactor policy statement has been an
7 inhibitor to the development of significantly safer nuclear plants.

8 And I would just like to point out Commissioner Asselstine's dissent
9 from that policy statement which I think is still very interesting today where he
10 said that he does not believe that the statement provides the sound regulatory
11 basis to support a new generation of nuclear power plants in this country
12 because the statement encourages but does not require safety improvements in
13 advanced reactor design. And I think we have seen today the results of that
14 policy and there is considerable confusion as to whether the new plant designs
15 before the Commission are actually safer or not.

16 On one hand, the staff has said that the CDF estimates for new
17 reactors are typically one to three orders of magnitude lower than current
18 designs, when contributions from external events that have been quantified are
19 included. On the other hand, NEI in its white paper on risk metrics for operating
20 reactors said that when you do include all external events, including seismic, the
21 calculated risk metrics for new reactors are likely to increase and therefore be
22 closer to current plants than being portrayed today. So one of NEI's arguments
23 in this issue is that because new plants are not necessarily any safer than
24 existing plants, you don't have to worry about changing the risk metrics that were
25 developed on new plants.

1 So this leads at least to the public to some confusion over what is
2 going on here. And say while it is not clear whether the new designs represent a
3 significant advances in safety, to the extent that they do, NRC should insure that
4 those advances do not become eroded over time because otherwise the public
5 would essentially be offered a bait and switch where their acquiescence to a new
6 generation of power plant is predicated on significantly advanced safety, the
7 processes should not allow the industry to undermine those advances with
8 significant changes to the licensing basis.

9 So we believe that risk metrics from new reactors, I am sorry; I
10 haven't been advancing the slides, I should go to that Slide Number 7. We
11 believe that risk informed processes should make sense and be useful for the
12 intended application, that they need to take into account all contributors to risk
13 and all uncertainties so that there is a logic behind the use of quantitative values.
14 And that they should insure that the risk to the public remain comparable to
15 profiles upon which the plants approvals were based. And when uncertainties
16 are large, which we believe they are for new reactors, then PRA is most useful in
17 assessing relative non absolute risk. And therefore the processes you implement
18 should take into account the added value of relative risk metrics as opposed to
19 absolute.

20 Looking at certain examples of application of new risk metrics, for
21 instance, the ROP, it is intended to provide timely indications of problems so we
22 share the staff's concern that if the thresholds are too high compared to the CDF
23 the process will not be sensitive to significant declines in performance. And it will
24 become ineffective because negligence in safety matters that would lead
25 degradation of certain system could have potentially very little impact on the

1 absolute risk but could represent a significant increase in relative risk, and yet
2 that would be an indicator of significantly deteriorated plant performance because
3 you are letting major safety systems essentially go out of service. So again,
4 relative non absolute risk is a relevant parameter. Next slide, please.

5 Now with regards to changes in the licensing basis in an extreme
6 scenario, if you maintain current risk metrics for new reactors, you could allow
7 safety significant systems to be taken out of service virtually forever and again
8 without a significant change to the absolute risk. NEI has argued that the
9 deterministic back-stops built into the process would prevent such absurd
10 scenarios from taking place, for instance the 30-day back-stop in Risk Initiative
11 4B, but if the process drives all the completion times to the deterministic back-
12 stop then essentially you don't have risk informed regulation anymore, you are
13 just changing essentially the front stop completion change time to the back-stop.
14 And then I think that process doesn't make sense. If the staff has to intervene
15 every time and impose deterministic back-stops, then you are not doing risk
16 informed regulation and why even bother talking about it. Next slide, please.

17 So the UCS preferred option is generally option two, which the way
18 I read it is let's keep thinking about it and develop application specific changes
19 with the caveat that we think that reactor safety enhancements must be
20 preserved and the relative risk metrics will prove to make the most sense. So if
21 NEI is option 1.5, I say UCS is option 2.5 or so. The next slide, please.

22 One of the disadvantages of option two according to the staff is that it may take
23 too long to get an answer in order to review the risk-informed applications in the
24 current DC's and COL's for instance for the APWR's at Comanche Peak. Next
25 slide, please.

1 And we don't think that's a good reason to rush the process, we
2 think that these requests should be deferred for three reasons. One, the analysis
3 and the pilot projects needed to develop this process sensibly will take time.
4 Two, risk-informed applications are not appropriate for new reactors designs that
5 have not accumulated any operating experience to validate the PRAs.

6 We think -- I haven't seen any evidence in the documentation
7 supporting risk informed tech specs that that was ever intended to be used
8 except for a plant as built and as operated. And even with existing plants, I
9 would like to point out that there are still a lot of things that we don't know. If I
10 understand from staff reports that still roughly 30 percent of the precursors that
11 occur at U.S. plants did not appear on the PRAs or the SPAR models, meaning
12 there is still significant completeness and uncertainty even for plants that have
13 operated for decades. Next slide, please.

14 And finally, you know, we believe that the risk informed regulation
15 in general should be predicated on the development of higher quality PRAs. The
16 technologies are evolving to be able to include the entire risk profile including
17 external events and all the other modes in full power when applicable. The
18 ACRS has also pointed out the importance of site specific issues in evaluating
19 PRA and obviously those can't be addressed on the design certification level
20 anyway. So ultimately we do believe that these processes should be based on
21 full scope level three PRAs would point you to ACRS Member Stetkar in the
22 latest letter on the subject. Last slide, please. One more, please.

23 So in conclusion, we support option two but believe that when the
24 details are worked out it will ultimately look more like option three. We don't
25 believe that the staff's concern that option three is inconsistent with the advanced

1 reactor policy statement makes sense. We believe that if there are significant
2 safety improvements, they need to be preserved over the entire life of the plant
3 and therefore we are going to oppose consideration of risk informed tech specs
4 and other applications for new reactors until a meaningful regulatory framework
5 is in place and new reactor PRAs are sufficiently developed and evaluated.

6 Thank you.

7 CHAIRMAN JACZKO: Thank you. I appreciate all of the input from
8 all of you. We'll begin our questions with Commissioner Ostendorff.

9 COMMISSIONER OSTENDORFF: Thank you, Mr. Chairman. I
10 appreciate all the panelists' presentations. It was all very helpful. I want to start
11 out with a question, and I guess I will start with Gary and Ken.

12 Gary, in your Slide 11, the topic of my first question deals with
13 public understanding of safety of new advanced reactors compared to the
14 existing fleet. Gary, on your slide you 11 you talked absolute public safety goals,
15 and Ken, on your Slide 4, win-win-win, you mention the public in the last bullet.
16 And I realized that Ed may have a different perspective so I'm going to ask Ed to
17 feel free to add into this response after Ken and Gary are finished, and Biff as
18 well.

19 There's maybe some -- I am just going to assume for the sake of
20 this -- feel free to disagree -- just assume that the advanced reactor designs as
21 they are currently envisioned recognize that they are not operating yet, let's just
22 assume that they are going to be safer by some order of magnitude difference
23 compared to the existing fleet. So let's just assume that the new reactors will be
24 safer, greater margin, etc.

25 With respect to the public confidence, in essence as regulators and

1 in the industry as operators of nuclear power plants to be built in the future, what
2 do you think the public's expectations are with respect to what standards the new
3 reactors should be held to? The same as the existing fleet or is there some
4 expectation that they ought to be held to a higher or different standard? I realize
5 that it is kind of a broad question but I want to kind of get to that theme, and I
6 trust your judgment in taking your answer were you think that it is most
7 appropriate to represent your organization's perspective. Start with Gary there.

8 MR. MILLER: Okay. I don't have a lot of information on public
9 opinion right now in the United States as far as expectations for new reactors. I
10 do have some experience with and dealings with Europe and Asia as far as
11 plants there. And especially in Europe there is a much higher public expectation,
12 in fact, that's translated into the requirements and demands of the utilities that in
13 addition -- they want additional safety features, probably more so in the severe
14 accident standpoint so that not only can we avoid these severe accidents but
15 they want additional means to make sure that nothing escapes, no radiological
16 releases affect the public. And we think, of course, that has something to do with
17 the fact that the Chernobyl event did affect a lot of Eastern Europe and that area,
18 and it did affect public opinion significantly. But as far as the U.S. public, I really
19 don't have a good handle on it.

20 COMMISSIONER OSTENDORFF: Ken?

21 MR. CANAVAN: I have no problems offering my opinion here. So I
22 guess I worry more about the existing fleet of 104 plants and the incoming fleet of
23 up to, let's say, 20 new plants and them being co-located on the same sight. And
24 I think it is very advantageous to be able to say that the speed limit is the same
25 for everybody on the highway.

1 But there is an expectation that the newer plants that have better
2 design features have slightly lower core damage frequencies or they drive a little
3 slower, but the speed limit remains the same. And that in place are processes
4 that encourage good behavior and that those processes that are in place
5 encourage both owners of new plants and existing fleets to continuously improve
6 safety. And I think that we monitor that track record and make it available. And
7 that's one of the things that we try to do in the two figures that we provided. And
8 those figures were published several years ago as well and they only went up to
9 2005, the figures that you have go up to 2008. Just so that you know that's very
10 recent data.

11 COMMISSIONER OSTENDORFF: Biff, what is your response?

12 MR. BRADLEY: Sure. I would believe that the public does expect
13 that the new plants be safer, and I believe that they are, and I believe that it is
14 why Part 52 has a number of additional provisions that don't exist in Part 50
15 relative to severe accidents, tier one, tier two design features and many other
16 attributes. Our position here is not that the plants shouldn't be safer; it's that they
17 -- there is enough regulatory control in place to preserve that without the need to
18 go rethink the safety goal or the risk margins. But certainly we've benefited from
19 PRA insights at the design phase, which we didn't have for the operating plants.
20 And they are safer, and we intend to preserve that safety. My point is that it isn't
21 necessary to go reevaluate the risk metrics in order to ensure that.

22 COMMISSIONER OSTENDORFF: Well, just to clarify that, I was
23 not suggesting that you were stating that the new plants were not going to be
24 safer. Maybe I didn't artfully word this, but I think there is a communications
25 challenge with the public if the existing fleet is held to one set of safety standards

1 or metrics and then if the new reactors are held to a different set of metrics.
2 There is a possibility for misunderstanding or misinterpretation with the
3 implication being well the new reactors are being held to enhanced standards
4 therefore the existing fleet may not be as safe as we originally imagined. And
5 there is more of a communication explanation education piece, which is what I
6 am getting at. Ed, I would welcome your thoughts here.

7 DR. LYMAN: Can I also comment on that last point? Because I
8 think that is the kind of thinking that led to the advance reactor policy statement
9 in the first place. I mean, in the auto industry people understand that older cars
10 are grandfathered in and when you add air bags, you still have older cars on the
11 road and people understand that. They understand the risks of continuing to
12 drive older cars. But that doesn't mean that you shouldn't strive for insuring that
13 the latest advances that can improve safety should be effectively implemented
14 and that may not happen on a voluntary basis. So I don't see that is as big a
15 perception problem for the public as maybe the Commission has in the past

16 COMMISSIONER OSTENDORFF: Thank you all. I think we can
17 move onto another question here. Biff I want to go back to you please and I
18 appreciate your comments on the design process, design change control process
19 work the industry is looking at, looking at how new severe accident design
20 features are addressed. Do you see any value, I think there has been some
21 discussion or perhaps discussion by the staff, on how having a table top exercise
22 to kind of murder board or test run potential licensing requests or inspection
23 findings to see if the industry guidance or NRC processes are adequate or
24 appropriate?

25 MR. BRADLEY: Certainly we've had that discussion in the public

1 meetings; we have tried to get a better understanding from the staff. Tell us what
2 kind of thing you think we can do that could make it through all the checks and
3 balances in the process and still create your concerns. So I think table tops
4 would be valuable and we would be happy to support that.

5 COMMISSIONER OSTENDORFF: Are there any others who
6 would want to respond to that, who have a perspective on it, table tops?

7 MR. MILLER: I believe in pilot studies things like that have been
8 very valuable in the past. Taking something conceptually into reality and trying to
9 figure out how to apply it.

10 MR. CANAVAN: I am a firm believer in evidence and that would
11 provide the objective evidence.

12 COMMISSIONER OSTENDORFF: Ed, anything you want to add to
13 that?

14 DR. LYMAN: Yeah, I couldn't see anything wrong with the table
15 top.

16 COMMISSIONER OSTENDORFF: Okay, Gary I want to go to your
17 slide 8 and talk about the design reliability assurance program and I know that
18 the ACRS has recommended that additional risk measurement guidance be
19 provided for this program. And your prospective from a vendor profession, do
20 you think any additional guidance is needed in this area?

21 MR. MILLER: In developing the ESBWR Design Reliability
22 Assurance Program we ran into this issue of relative risk and how far to go,
23 where you draw the line on what components are risk significant or safety
24 significant, what metrics you use. And we found with the low core damage
25 frequency that if you use the current guidelines for risk importance, for example,

1 you tended to bring in a lot of components that were much less risk significant on
2 there.

3 So while I can say is that it has been difficult to make that fit but at
4 the same time the components that are in the design reliability assurance
5 process are translated into the operating plants through the maintenance rule.
6 And certainly that equipment whether it has a high contribution to core damage
7 frequency or a lower contribution, has been deemed important enough to
8 maintain a high reliability and high availability which is provided for in the
9 maintenance rule.

10 COMMISSIONER OSTENDORFF: Thank you. Thank you, Mr.
11 Chairman.

12 CHAIRMAN JACZKO: Commissioner Svinicki?

13 COMMISSIONER SVINICKI: Thank you. Good morning. I
14 appreciate all of you traveling out on this soggy morning to be here with us and
15 talk about this important topic. Mr. Bradley, I would ask you on your Slide 3, you
16 talked about recommending option one. And I did read you mentioned that the
17 staff had included with the SECY paper a white paper that the industry sent in, I
18 think it was last year, and that I felt, I interpreted that to advocate for the status
19 quo and not really to have identified any other areas where it would be useful to
20 engage with the staff in a dialogue.

21 On your Slide 3 now you are kind of indicating that as the
22 interaction with the staff evolves, you have developed maybe an area here where
23 you say change control guidance could be improved. And I thought as you were
24 giving your presentation maybe you signaled that there were a couple of other
25 areas where even though again you are clearly preferring option one, while I will

1 use Mr. Lyman's term, it was kind of a option 1.5, maybe it is more like 1.1 or
2 something.

3 Is there anything that would document these areas where you feel
4 that option one but plus there is useful engagement on a few topics. Is there a
5 meeting transcript or anything like that, that would help me understand kind of
6 some of these additional areas where it might be useful to have a dialogue on
7 this?

8 MR. BRADLEY: My position was that the one clear area we have
9 identified as change control and that's because it is a different process from Part
10 52, you have severe accident considerations, aircraft impact and various other
11 issues.

12 As a matter of fact, our draft change control guidance is for new
13 plants, the appendix is three times bigger in volume then the existing 50.59
14 guidance document we developed for operating plants. Maybe it is possible that
15 I wasn't clear. We haven't currently identified other areas but you know we
16 would certainly be willing to sit down and table top. And see if there are other
17 areas but currently we believe -- there are a lot of documents out there. There
18 are a lot of risk informed -- it touches a lot of areas so I'm not going to claim that
19 we've exhaustively looked at every single thing, but the major applications we're
20 aware of, we believe, do contain adequate provisions in the existing guidance.
21 So the one area that I think really is different is change control for the new plants.

22 COMMISSIONER SVINICKI: Is it accurate to draw from the totality
23 of your presentation as well, though, that some indication that when new plants
24 begin to operate, and you have operating experience, there may be areas that
25 would emerge that would make clear that issues that the staff contemplates or

1 forecasts now may actually at that point emerge, and then we would know that
2 they were real issues? Is it accurate to say you're at least indicating there's a
3 possibility of that?

4 MR. BRADLEY: Well, I think it would be hard to preclude the idea
5 that once these plants operate, and we get a lot more operational experience --
6 you know you can't predict everything that could emerge, so obviously, yes. I
7 think it's a question of doing it then versus now. I think it's premature at this point
8 to assume what the total risk profile will be or what issues might, but certainly
9 once the plants are operating we may learn things that would have an impact.

10 COMMISSIONER SVINICKI: Okay, so it would be your view that it
11 would be a more informed process if you evaluated these potential changes at
12 that time? And does that also have a nexus to the fact that we would have
13 greater fidelity on the risk metric values at the point because we would have had
14 incorporation of some of the site specific factors?

15 MR. BRADLEY: Yes.

16 COMMISSIONER SVINICKI: Okay. All right, thank you for that.
17 Mr. Canavan, I was kind of intrigued by your slide four where -- I think I wrote this
18 down right -- if risk margins have value, they will be maintained. And I'm going to
19 confess that this intrigues me not just for new reactors, but for operating reactors
20 as well because -- you know, I'm interested in how you can make margin have
21 value other than pure regulatory requirements. I think we see some of this
22 dynamic tension in power uprates, of course. I think that that's a clear analogy
23 to, you know, if margin has value then it's preserved, and if it's not assigned a
24 value, it might in some ways be traded away for increased power. So I'm
25 intrigued. Is there any really creative thinking on, like, market mechanisms or

1 other things that can make margin have value?

2 MR. CANAVAN: There's -- I think it's interesting in that I guess the
3 whole point of the slide was that we sort of stumbled on this really great process
4 that provides a set of thresholds that that then plant operators -- and I was going
5 to use the security blanket concept. So I'm a plant operator, and if I make some
6 very cost-effective and smart innovative changes to my operation and the way I
7 do business, it costs me some money but a little bit, but I can get a very large
8 piece of margin. And I look at that and think, that margin is great, because when
9 I need flexibility I can go to the regulator and say, I have more margin now, can
10 you give me this little flexibility for those two days? And that two days is
11 extremely valuable in terms of megawatts and money.

12 So we sort of fell on this process. I don't think there are any
13 innovative ways of sharing lessons learned or enhancing that mechanism that
14 we've stumbled upon. But you will hear discussions from many of the site people
15 about, you know, hey, we were looking at our procedures, and when we look at
16 our human actions, if we train on these, we can get lower values for these off-
17 normal events. And so by providing that training in getting a lower value we
18 create margin, but we also get better trained operators so we do get safety. And
19 that margin translates to, the day when you need it, it's available and avoids a
20 shutdown in a notice of enforcement discretion or emergency tech specs.

21 COMMISSIONER SVINICKI: And I will admit that flexibility,
22 regulatory flexibility is where my mind went as you discussed slide four. I just
23 wondered if there was any other kind of papers or studies or case studies or
24 anything like that on this topic. I just think it's an interesting -- it's just an
25 interesting notion of -- because I agree with you. If risk margins have value, they

1 will be maintained, but it's a question of, how do you give them value beyond
2 regulatory requirements? You can require certain levels of margin, obviously. I
3 just wondered if there was anything more innovative than that, so --

4 MR. CANAVAN: Nothing yet, but I have some ideas.

5 COMMISSIONER SVINICKI: All right, thank you.

6 Mr. Lyman, would you have any thoughts on that concept of making risk margins
7 have greater value to operators? Is it really the more straightforward imposition
8 of requirements that does that?

9 DR. LYMAN: Well, I think if we accept the proposition if the current
10 margins do have value to the operating plants, then all I'd say is if you maintain
11 the operating or the existing risk margins for new plants, they'll probably have
12 much more margin than they would actually be able to use. So I'm not sure that
13 extra margin gives any added value. And so that's -- so I think margins or the
14 metrics could be lowered for new plants without actually impacting that incentive.

15 COMMISSIONER SVINICKI: Okay, thank you. Does anyone else
16 want to make any comment on that?

17 Okay, all right, thank you. Thank you. Mr. Chairman?

18 CHAIRMAN JACKZO: Commissioner Apostolakis?

19 COMMISSIONER APOSTOLAKIS: Thank you, Mr. Chairman. Mr.
20 Bradley, you started out with a favorite NEI statement that PRA is only one input
21 to the decision making process, and there are five principles, and the PRA is only
22 one of them. Judging from your justification of using -- of going with option one, it
23 seems to me you're advocating now a regulatory system where the five principles
24 become only four because you are relying now exclusively on the others.
25 Defense in depth, safety margins, and PRA will play no role.

1 And also you argued a little later that the numbers are down in the
2 noise anyway. We can't trust them, so we don't really need to use that. So it
3 looks then like you are proposing a system where that would not be risk informed
4 at all, but we are relying exclusively on the deterministic stuff we would be doing
5 regardless of what happens to the risk profile of the plant. Is that a correct
6 understanding?

7 MR. BRADLEY: Not entirely --

8 COMMISSIONER APOSTOLAKIS: You wouldn't say no, but let's
9 go with that.

10 MR. BRADLEY: No, obviously, I don't believe that to be the case.
11 And much of what we do already uses relative measures, importance measures
12 we use for the maintenance rule. Much of what we do currently does address
13 relative risk, so you would still be dealing with all those issues. And I do believe
14 that once we have the complete risk profile for these plants, including seismic,
15 that you're not going to be in the noise.

16 You may be close to the noise on internal events, but the overall
17 risk profile -- and we're certainly moving in the direction of doing our decision
18 making on the basis of the overall profile now -- fire for operating plants and other
19 issues -- it's possible that for something like Initiative 4B in tech specs, it would
20 generally lead you to the back-stop and that might -- you might start to lose some
21 of the risk input there. But I don't think universally that's true and even for, say,
22 4B, you have a decision point that's an order of magnitude short of the actual
23 ICDP. These things are still going to get triggered and it might be that -- you may
24 need some tweaks to some of the guidance, but I don't believe this would obviate
25 the value of PRA and just lead you to rely exclusively on the other elements.

1 COMMISSIONER APOSTOLAKIS: But if we are still to use PRA, I
2 mean, that's what the staff is saying. Let's implement option two to see how
3 we're going to do that. In option one, you are precluding that. You are saying
4 let's stay with the metrics we have now and the numbers we have now. So either
5 option one says PRA for those very low numbers would not be used, or then I
6 have to go to option two where the staff says, "Well, let's think about it. What's
7 wrong with that?"

8 MR. BRADLEY: Because we have used PRA insights from the
9 beginning in designing these plants, to some degree it does, I think, limit the
10 value with respect to operating plants where we didn't have PRA in the first
11 place, and we went in and looked for vulnerabilities, we identified things, we
12 made changes. This is a different experience now where we used all those
13 insights from the outset. So we've already designed out most of the things that
14 PRA would have said needed to be dealt with. So in some sense I think the PRA
15 does maybe have slightly less, you know, of a role compared to the other
16 elements of the process, depending on the application --

17 COMMISSIONER APOSTOLAKIS: The question is what is that
18 role? And I think that's what option --

19 MR. BRADLEY: If you go into the minutiae of our applications and
20 you look -- it's hard to summarize these things when you've got a hundred pages
21 of guidance. There are a lot of things in there that I think would still address your
22 concern, would still be able to meaningfully use the model.

23 COMMISSIONER APOSTOLAKIS: Mr. Miller.

24 MR. MILLER: Yes.

25 COMMISSIONER APOSTOLAKIS: On Slide 11 you say,

1 "Regulatory attention to active functions that prevent, control, and limit abnormal
2 events ensures acceptable performance." But you have already told us that you
3 are for option one, so I don't understand this. What does regulatory attention
4 mean? And again that's option two, because the staff takes the pragmatic
5 approach and says, yes, there ought to be regulatory attention on these things,
6 but then what do we do? This is a decision making agency. Regulatory attention
7 doesn't mean very much, unless it's followed by now we're going to do A B C.
8 So it seems to me you're sending not a very consistent message. On the one
9 hand you say option one, on the other, though, you want something more
10 specific to be done, which is exactly what the staff is saying.

11 MR. MILLER: Okay. I believe my point on that was that option one
12 was appropriate for ensuring overall risk, and that these lower levels, these
13 contributors to risk are receiving regulatory attention already as far as items that
14 are in the maintenance rule right now, because the requirements for systems that
15 are monitored in the maintenance rule, especially ones that contribute to initiating
16 events and plant transients and such. So just to provide assurance that we're
17 not just satisfied with the low risk, we're also -- the other elements of risk are
18 being -- are receiving regulatory attention now.

19 COMMISSIONER APOSTOLAKIS: As far as I understand it, this is
20 option two. That's exactly what option two is doing. That's what the reactor
21 oversight process is doing, looking at initiating events and so on. So I'm not sure
22 what message I'm getting here. And Mr. Canavan and Mr. Bradley, you both
23 started out by telling us how successful this risk informed approach has been for
24 LWRs. I don't know how relevant this is. Why shouldn't we have done the risk
25 informed approach for new reactors?

1 And don't you agree that the whole structure of 1.174 and
2 everything else we have done is based on what we knew then about the risk
3 profiles of the existing fleet which was, you know, core damage frequencies
4 maybe 10 to the minus five or maybe six or seven, 10 to the minus six, all the
5 way up to seven or 10 to the minus five. So if that basis is changing now, why
6 shouldn't the structure change?

7 MR. CANAVAN: Well, I think I make part of your point. I think I
8 agree with part of your point and have something to put up for further
9 consideration. On Slide 4, I actually have a bullet that says, the metrics were
10 developed following an understanding of the risk picture, and, hence, all my
11 discussion about a process. I think it's a process that we fell upon that creates
12 an environment that allows for continuous improvement. I worry that if you
13 disincentivize the process, you can reverse it. You can create a situation where
14 new plants say, if the metrics are so low, and I'm going to be in the noise here all
15 the time, why do I create margin? Why do I keep trying to drive to lower
16 numbers?

17 Economically, it's not incentivized for me to continue to try -- I
18 already put in all these systems and made this tremendous investment, and if it
19 doesn't pay off in some way, increased margins for increased flexibility, the
20 investment makes no sense. If you make an investment and there's no way to
21 leverage it, then economically it doesn't make sense.

22 I guess my other point for being an advocate of the status quo in
23 option one verses option two is that isn't a change that has a delta risk of less
24 one to the minus six already kind of small and in the noise? So, arguably, you
25 can look at it in absolute for the new plant and not look at the change or you can

1 look at the change and say, is the change small? And if the change is small,
2 maybe then we can move ahead with the change. And lowering the change to
3 something like an order of magnitude lower making it a one to the minus seven,
4 does it start to bring in less focus on what's really truly important and more focus
5 again on a broader range of equipment that may not allow us to continue to
6 focus? And if I might, I had one more point, but it's escaping me at the moment.

7 COMMISSIONER APOSTOLAKIS: Mr. Lyman.

8 MR. BRADLEY: Oh, I would like to respond, too. Relative to the
9 statement that 1.174 was developed around the operating plant risk profiles, I
10 think there may be some element of that, but I think it was to a great extent
11 developed from the safety goal and the subsidiary objectives, and it discusses
12 the fact that the change thresholds that are provided have significant margin to
13 the QHOs. So I don't think -- there may have been some consideration of the
14 existing profiles, but my read of the Reg Guide is that it is derived from the safety
15 goal.

16 COMMISSIONER APOSTOLAKIS: Which safety goals also took
17 into account existing estimates --

18 MR. BRADLEY: And just to take it a little further. I do agree, these
19 are different plants, we have passive plants or multi train plants, they are
20 fundamentally different. And it's possible, once we get these plants up and
21 running, we're going to find things that are different like maybe seismic risk may
22 be 90 percent of your overall risk. So does that change the thought process of
23 how the risk-informed framework works? You can't preclude that, given that we
24 do have a different -- a whole different design philosophy for these plants. But I
25 do believe that the safety goal is the prime driver for the risk metrics part of the

1 decision.

2 COMMISSIONER APOSTOLAKIS: Mr. Lyman, I think you're
3 sending again -- not again, I'm sorry -- you're sending a message that is not self
4 consistent. In slide six, you're saying that it is not clear whether new designs
5 really represent significant advances and that maybe the new plants are as safe,
6 have the same level of safety as existing plants or maybe a little better. But then
7 later on, you argue that the safety enhancements of the new plants should be
8 preserved. So you are implicitly agreeing that there have been advancements,
9 so --

10 DR. LYMAN: Again, no, what I said is where safety enhancements
11 do occur and where they can be justified. I do think some plants -- for instance
12 the EPR that has core catcher and other features which are not required by NRC
13 regulation, do ultimately add a level, an additional level of severe accident
14 protection. What I worry about, if you look at what's happened to the EPR
15 overseas, is that they could come back and say, well, we're going to deactivate
16 the core catcher. It's going to have a low impact, or the impact on LRF is going
17 to be low, and we don't need it anymore; it's too expensive. So that's the kind of
18 thing that I think I'd like to avoid or your process should avoid.

19 So, again, I don't know. We're getting contradictory information
20 about the risk of new plants. Part of it has to do with the fact that the PRAs are
21 incomplete. And if you do a seismic PRA using the same methodology as any
22 other external event that could wash out all these small numbers completely.
23 And maybe that's the way to attain consistency, but where -- the process should
24 recognize that where there are genuine safety enhancements that can be
25 documented, that it should preserve them.

1 COMMISSIONER APOSTOLAKIS: Part of option two. Thank you,
2 Mr. Chairman.

3 CHAIRMAN JACZKO: Commissioner Magwood.

4 COMMISSIONER MAGWOOD: Thank you, Mr. Chairman. Let me
5 start with Mr. Miller. I want to sort of back up for a bit. I was thinking about when
6 the advanced plants first started to be formulated, and when the designs really
7 started to become a lot clearer. There was a coincident discussion about
8 reliability and safety. It wasn't really a separate discussion; it was really the
9 designs were configured in such a way that through the use of natural forces in
10 the case of the ESBWR natural circulation was a primary innovation brought to
11 the table.

12 These things were -- use of fewer parts, less valves, less piping, all
13 these sorts of things, fewer pumps -- these things were viewed as both a
14 selling point from an operator standpoint of reliability, lower cost, those sorts of
15 things, but were also discussed in the sort of a broader public sense as being
16 enhanced safety. And these features were really the same features; they weren't
17 separate features.

18 So what I -- and let's leave the passive some of the more passive
19 safety and severe accident management features away, like core spreaders and
20 things, let's set that aside for just a moment. I think what I've heard quite clearly
21 from both you and Mr. Canavan has been that basically reliability is safety.
22 That's sort of paraphrased. You don't really think there's a distinction in design
23 and operation of these advanced plants where there are things that you would do
24 that would -- if you do things to reduce safety you're automatically reducing
25 reliability and vice versa.

1 And therefore, part of, I think, the thesis I get from your comments
2 this morning has been, why would we do that? It would be sort of self defeating,
3 so there's no incentive, no value -- to use your term -- to make changes or to not
4 do maintenance or not do other things that would reduce safety because at the
5 same time we're taking money out of our own pocket. Is that a fair
6 characterization?

7 MR. MILLER: Yes, I think that's a fair characterization.

8 MR. CANAVAN: Yes, correlated, maybe not conditional. So the
9 two are correlated, reliability and safety.

10 COMMISSIONER MAGWOOD: Okay. So, first let me ask
11 Mr. Lyman about that. That seems to be, from the industry side, that's a large
12 part of the discussion about which way to go with the risk metrics. I just want
13 give you a chance to weigh in to that sort of more philosophical aspect of this.

14 DR. LYMAN: Well, insofar as reliability is important, I think that
15 raises another issue about our review of defense in depth. And when you're
16 talking about passive plants the only safety related systems are the passive
17 systems. We think that maybe before a number of plants are built and operated
18 that you should have greater reliability for safety -- for the active systems, and
19 that you shouldn't treat them as non-safety related from the start.

20 And I'm not a real expert on how the process works, but it seems
21 there's a little bit of circular reasoning if you're using the PRA to justify not
22 treating active systems as safety related and without knowing, again, whether
23 the PRA, the bottom line PRA itself is going to be validated through operating
24 experience. So we also have concerns about the way PRA is being used in the
25 design certification process as well. And it's just sort of a separate topic from this

1 meeting, but that's another concern.

2 COMMISSIONER MAGWOOD: Thank you. Let me bounce back
3 and talk about that -- here are some aspects of design such as large reservoirs of
4 water for extended core cooling that are strictly passive systems. And I think
5 your argument to anyone who would suggest that those systems would be
6 degraded would be that there already are processes in place to back-stop the
7 changes in the design, changes in configuration, maintenance issues, and so,
8 therefore, you think that when you look at those systems, there are mechanisms
9 in places; that's your basic --

10 MR. CANAVAN: Prudent, risk-informed processes have a
11 feedback loop that includes monitoring and then changes in treatment of margin,
12 so yes.

13 COMMISSIONER MAGWOOD: Mr. Miller.

14 MR. MILLER: Yeah, I think we've had to show that in our design
15 certification. And I'd also like to point out that, just to clarify things, PRA is not
16 used to determine safety classification, whether something is safety related or
17 not. This is not based on PRA. What PRA does is it identifies other systems that
18 are not safety related that are risk significant, and it applies appropriate attention
19 to those.

20 COMMISSIONER MAGWOOD: That's a good clarification. Thank
21 you. So one of things, I think, that we're going to have to deal with in this issue is
22 whether -- what the problem exactly that we're trying to fix would be. And that's
23 something I struggle with as I look at the various options. I want to make sure
24 we're solving the right problem, bringing the right tools to the job. Because, sort
25 of in this conversation we just had, and I've talked to the staff about this, too, it

1 seems to me that the issue of the aggregate safety of the plants is perhaps less
2 problematic.

3 You have to recognize the concerns Mr. Lyman's expressed about
4 some of the external issues such as seismic and other things. To me, it's really
5 an issue about how we deal with this on an operating basis and in the context of
6 ROP. And what I think I heard Mr. Canavan say in that regard is that, if there is
7 something that's going on, and it has a very small impact on the delta CDF, your
8 response is basically, that's not really safe; that's significant; there are other
9 things to worry about. Why worry about it? Is that a --

10 MR. CANAVAN: I guess my comment was more along the lines of,
11 if it's under a delta CDF of under one E to the minus six or something in the
12 minus sevens, it's considered small. Not so much, why worry about it, but in
13 comparison, if you were to change the metric and make it even smaller, what
14 benefit does changing the metric to something even a smaller, say one E to the
15 minus eight, what benefit is that? If the delta risk shifted, what benefit was
16 looking at deltas in the one E to the minus eight? Is that truly risk significant or is
17 it something in the minus – a delta calculated in the minus seven range?

18 So I guess my argument is the current metric of the delta of one E
19 to the minus seven being in the very small region seems applicable to me even if
20 the base metric was to drop some.

21 COMMISSIONER MAGWOOD: Mr. Lyman, did you want to --

22 DR. LYMAN: Actually, if I may, just one example: the sensitivity
23 study of the APWR PRA found that if you take one safety train out of service
24 completely that the core damage frequency increases by about a factor of four,
25 but then delta CDF is only, for internal events, is only about three times to the

1 minus six. So, in other words, if an entire safety train is not functioning, that still
2 would lead to some very low changes. It's hard to argue that their maintenance
3 practice allows safety train to be not functional, that that's not safety significant.

4 COMMISSIONER MAGWOOD: Excellent example.

5 MR. CANAVAN: I guess two comments. One is we will routinely
6 use other risk metrics which are relative, so anything that use uses a risk
7 importance measure is already relative, so most of the risk-informed applications
8 are relative. The ones that are not, in the case of taking a safety system out of
9 service, creating a four E to the minus six, that is most likely because multiple
10 redundant safety and non-safety systems are available. So while taking one train
11 of one safety system out produces this change that is because -- that small
12 change is because there were alternate systems installed in that plant that don't
13 appear in the current fleet. That's why it's smaller.

14 So this utility is getting benefit of having multiple, redundant other
15 systems that keep the risk low. And I would further argue that by regulation that
16 system is not allowed to be out of service. There are other ways -- there are
17 other things in the risk informed treatment that prevent that. So while the risk
18 number would provide flexibility in this case because the number is indeed low,
19 other checks and balances were captured in the risk informed framework.

20 COMMISSIONER MAGWOOD: In other words, to use your very
21 tortured automobile analogies, we can run this car on three wheels; we don't
22 need four. And when one of the tires blows out, well, that's life.

23 MR. CANAVAN: I would characterize it as to, I have an
24 18-wheeler, and I lose one wheel, I still have 17 remaining. And by the way,
25 that's why those wheels are doubled in the back so you can lose one.

1 MR. BRADLEY: Just echoing what Ken said, one, I think it's a
2 hypothetical question because despite the low risk significance you can't take a
3 train out of service permanently or for a lengthy period of time. Secondly, I think
4 it's a good thing that an individual train has low risk significance. I think that's an
5 indicator of the safer design of the plants, and it's not a problem; it's a benefit and
6 an improvement that the individual train is now of much less importance and
7 that's why the plants are safer.

8 COMMISSIONER MAGWOOD: Mr. Lyman, one last chance to...

9 DR. LYMAN: But then, the next utility that comes along wants to
10 build a plant can say, "Why do we need that extra train at all? And leave it out."
11 And then you have the erosion that I was referring to. So this doesn't, what I'm
12 hearing doesn't make sense to me.

13 COMMISSIONER MAGWOOD: I appreciate the dialogue. I think
14 that helped -- to me that characterizes the question. That's what I believe is the
15 real crux of the question that we have to deal with. And I think it was really
16 helpful. I appreciate Mr. Lyman sort of having a very specific example to point to
17 during that conversation. I think that's where this really comes together, and I
18 really believe that's what the Commission is dealing with. Some of these issues
19 are a little bit more philosophical, I guess. I appreciate it. Thank you,
20 Mr. Chairman.

21 CHAIRMAN JACKZO: Thank you, Commissioner Magwood, and I
22 think your questions were very helpful.

23 I have to admit, I listened to all the discussions. I think I'm more
24 confused now that I was when I started. But I think you've kind of focused in on
25 what the issue is, and I think it's interesting. I think if inherently the plants that we

1 were dealing with didn't at least have on paper CDF numbers that were different
2 from the existing fleet, we probably don't have this meeting.

3 And, yes, it seems like everybody seems -- the one thing I seem to
4 hear consistently from everyone is that the plants, at least on paper, have lower
5 CDFs, so the whole purpose here is we want to maintain that, and it's trying to
6 figure out what the best way is to maintain that. I don't know.

7 As I look all of these options I think I could hear everybody explain
8 that -- everyone thinks that each one of the options perhaps does that. I don't
9 know. That may not be something we could ever figure out until maybe we do,
10 as I think Commissioner Ostendorff suggested, to tabletop or some other pilot
11 exercise to try it out or to use the specific examples that Commissioner Magwood
12 alluded to, to actually figure out in practice how this would work.

13 I think a lot of our experience may not be a good guide here. For
14 instance, Mr. Bradley you talked about the lowering of CDF over the years. My
15 expectation is that we would not see a similar situation with the newer plants, that
16 they're designed with -- I think, as you said, they're designed with the PRA
17 insights built in, so it's not likely that we're going to see these plants moving over
18 the next 20 years at their license and build, to every year working to lower CDF.
19 Maybe you disagree, Mr. Canavan.

20 MR. CANAVAN: In my presentation and currently I believe that we
21 have not risk-informed the operational plant, so I believe that the final CDFs of a
22 new plant that's constructed and as-built do have the possibility of being reduced
23 as a result of operational programs that are put in place after the plant starts
24 operating.

25 CHAIRMAN JACKZO: Well, I appreciate that clarification because I

1 --

2 MR. BRADLEY: You're right in that the -- there is a difference in --
3 some of the things that drove the decrease for operating plants wouldn't apply to
4 new plants, but I concur with Ken that as we have safety focused operation of
5 these plants, we could see some downward trend even for the new plants.

6 CHAIRMAN JACKZO: And you started off, Mr. Bradley, talking
7 about the decreasing trend in CDF. What would you attribute that to?

8 MR. BRADLEY: Well, obviously there are many causes. Some of
9 it has to do with lower initiating of event frequencies, insights and feedback that
10 have lead us to -- we talked about reliability of equipment, that's a very important
11 driver -- training relative to human errors in procedures, common cause
12 treatment. Many factors have contributed, and to some degree we've learned to
13 model better. I'm not going to deny that some of that change is due to
14 improvements in the modeling, more detail, better state of knowledge. There are
15 many things that drive it. So you can't -- I'm not -- we're not trying to attribute
16 risk-informed applications as the sole driver of the trend that we've observed.

17 CHAIRMAN JACKZO: And, again, perhaps what is I think -- as
18 Commissioner Magwood perhaps indicated, what is probably relevant is which of
19 the risk- informed applications that we've used have, while maybe not solely
20 accounted for that, been responsible for that decrease? That seems to be the
21 crux of what we want to try and capture is which of those things are helping to
22 drive down CDF? And we want to preserve those in a way that's meaningful,
23 given the new, at least on paper, lower CDF numbers and perhaps LRF or larger
24 release frequency numbers. I don't know if, off the top of your head, you can tell
25 me what you think those are.

1 MR. BRADLEY: I would say the maintenance rule is probably the
2 single most important application. It's not voluntary. It applies to everyone. It's
3 led to significant increases in reliability. That's the one thing I would point to,
4 probably, if you were to ask me.

5 MR. CANAVAN: I find it to be relatively distributed in some
6 interesting spots, 5B for Limerick for example. They reduced control rod scram
7 testing. They used to individually scram every control rod in the reactor on
8 Sundays, every week, all of them, and then take them back out. And that's a trip
9 hazard. There's a whole bunch of risk associated with that test, and looking over
10 the hundreds of thousands of tests performed, there were almost no failures
11 within the industry. That test was moved to monthly. I hope it makes it quarterly
12 someday. We're testing for something that isn't happening, but yet has a risk.
13 And so by moving that into a longer interval, I think we've saved a lot. I think
14 what you find is that those are all over the place. There are a lot of these little
15 distributed items like that that make a big difference.

16 CHAIRMAN JACKZO: So how -- I think, going back to
17 Commissioner Magwood's point, how would you see -- what would the new
18 system have to look like in order to ensure that that kind of issue would be
19 properly captured?

20 MR. CANAVAN: I don't know. I was just sitting here envisioning 40
21 years -- right now it's really hard to envision new plants coming out with a five E
22 to the minus seven CDF and that number actually going down. But 40 years
23 from now, looking back and not being able to say those plants were safer than
24 when they were built, my children not being able to look and say, hey, those are
25 better, it's hard for me to envision as well.

1 So I don't know the process but the process can't be a situation
2 where there isn't additional margin added to the process for good behavior,
3 punishing good behavior by lowering the thresholds to a point where they
4 produce the same items. So taking the ROP and making it one E to the minus
5 seven for plants, for example; that's the decision threshold now. To create more
6 findings may not be the answer. And so preserving the win, win, win is sort of
7 where I think you need to act.

8 CHAIRMAN JACKZO: And then trying to go back to the paper, I
9 mean, does that -- I mean, it doesn't -- I think as Commissioner Apostolakis -- I
10 mean, it doesn't sound to me like that's option one. It sounds like that's
11 something in option two, and maybe we just don't know right now because we
12 don't really know how this is going to play out.

13 MR. CANAVAN: Well, I would advocate for option one until we
14 have information that leads us to option two. And in the absence of that
15 information, we know this works well, and there is no reason to suspect it
16 wouldn't work well moving forward. And we do know that deltas in the one E to
17 the minus seven range are relatively small. I think we can all agree on those
18 items.

19 CHAIRMAN JACKZO: And perhaps where my confusion is, and
20 this is very helpful; I appreciate this. I guess my assumption is that I think what
21 we do -- well, it's the fact that there is ultimately a lower CDF, baseline CDF. I
22 think that's the general assumption, perhaps, that I have that because there is a
23 lower baseline CDF, that the existing processes will not work well; that that's
24 precisely the problem we're dealing with. Because if we're talking about delta
25 CDFs in the order of 10 to minus six in the baseline CDFs are 10 to the minus

1 seven, if we're allowing changes of the order of 10 to the minus six, we've
2 bumped up the CDF -- we're adding, by an order of magnitude, to the baseline
3 CDF.

4 MR. CANAVAN: Well, I guess that's the point. Existing plants
5 have core damage frequencies in the one E to the minus six, two, three, four,
6 minus six range, and we don't see that behavior now. So why would we
7 suddenly expect that behavior to start occurring in new plants? And, like I said,
8 40 years from now it's hard to envision a situation where we look back at the new
9 plants and don't see a marked improvement over where they -- over their core
10 damage frequency.

11 So I would argue that the process is good and the numbers right
12 now seem okay, because we do know that one E to the minus seven is small
13 enough, and if we find when we get there that there are reasons to change it,
14 there's opportunities to change at that time.

15 CHAIRMAN JACKZO: I don't know if anyone had other comments
16 that they wanted to make. Mr. Lyman, did you want to add anything?

17 DR. LYMAN: Yeah, I mean, you're talking about, again, what you
18 have before you immediately is an application for a new plant that hasn't been
19 built or operated yet. I think you need to think through what is appropriate to do
20 at this point, and then, again, what's appropriate to do once you've accumulated
21 some of the data for as-built and as-operated plants. But I think you need to
22 examine how not changing the thresholds would tie your hands in the ability to
23 deny risk-informed applications that don't pass the smell test. And if you have to
24 rely falling back on deterministic back-stops all the time, then I think it can
25 undermine the whole credibility of risk informed regulation in general, so you

1 need to think about that.

2 CHAIRMAN JACKZO: I think -- if I can just ask one last question, it
3 seems, just going through some of the background material, the one issue that's
4 driving the need to do this right now are the risk-informed tech specs. Are there
5 other things that are really driving it? Right now I'm only aware of one plant
6 that's looking to use risk-informed tech specs. Are there other things right now
7 that -- is this something that we could wait to do after plants have perhaps been
8 in operation for some time so we have some experience and some idea what the
9 best way is to preserve that margin that exists now?

10 MR. BRADLEY: Well, I agree. We usually use the term
11 performance based in concert with risk informed. We have performance, but the
12 new plants need to perform. We need to monitor that performance. We need to
13 feed that back. At that time, we'll have better knowledge on what if anything
14 needs to be changed.

15 I think at this point it's very difficult to, before the fact, try to change
16 the system. But there are -- to your earlier question, I was going to mention, yes,
17 there are other significant applications; 10 CFR 50.69, to me, is an extremely
18 important risk-informed application that really has not --

19 CHAIRMAN JACKZO: Nobody's using that now.

20 MR. BRADLEY: Not currently, but there was a tremendous effort
21 put into that, and it's a significant rulemaking...

22 CHAIRMAN JACKZO: I mean, in terms of the specific licenses that
23 we're reviewing --

24 MR. BRADLEY: There are --

25 CHAIRMAN JACKZO: -- are there issues that are driving a need

1 for us to make a decision on this now other than risk informed tech spec
2 decision?

3 MR. BRADLEY: Well, I guess I'm not --

4 CHAIRMAN JACKZO: And I could ask the staff...

5 MR. BRADLEY: I'm not totally the right person answer that. It's my
6 knowledge that there are some new plants that would like to be able to pursue
7 50.69 and risk-informed ISI or PSI for pre-service inspection. There are other
8 examples. It's not -- in my opinion it's not just tech specs.

9 CHAIRMAN JACKZO: Thank you. Any other comments? I don't
10 know if the Commissioners wanted to ask any more questions. Okay, great.
11 Commissioner Apostolakis.

12 COMMISSIONER APOSTOLAKIS: Well, not to ask questions, but I
13 just want to say that I disagree with several things that were said earlier. For
14 example, when Mr. Canavan says that we will be punishing plants if we change
15 the thresholds, I don't know that the word punishing is the appropriate word here.
16 If the ROP wants to make sure that the risk profile that was licensed remains the
17 same, then if you change the thresholds, all you're doing is you're saying, what,
18 geez, something happened here, but you're not punishing them. I think that's too
19 strong a word.

20 MR. CANAVAN: Punish may be too strong of a word.

21 COMMISSIONER APOSTOLAKIS: Sorry?

22 MR. CANAVAN: Punish may be too strong of a word.

23 COMMISSIONER APOSTOLAKIS: You agree.

24 MR. CANAVAN: I do.

25 COMMISSIONER APOSTOLAKIS: Thank you.

1 [laughter]

2 CHAIRMAN JACKZO: Thanks for that clarification. Anything else?
3 Okay, thank you much for your contribution.

4 [break]

5 CHAIRMAN JACZKO: Bill, do you want to start.

6 MR. BORCHARDT: Thank you, Mr. Chairman. As was mentioned
7 in the earlier panel, the Commission encouraged but did not require the newer
8 plants to be safer and to address severe accidents. I believe that the future plant
9 owners and the NRC staff intend to operate in a way that maintains improved
10 safety for the new designs. Nonetheless, the question I think that as regulators
11 that we're struggling with is, what is the appropriate regulatory footprint for the
12 NRC to have during the 60 or more years of operation of those new plants? And
13 does that need to be adjusted? And that was a major influence in our coming up
14 with option two as the recommendation.

15 The second factor I'd just like to introduce before I turn to Mike and
16 the team to do the detailed briefing is that I think there's a benefit for us to
17 recognize the approach -- the approaches -- plural -- that are being used around
18 the rest of the world as it relates to new reactor designs. And not that we need to
19 follow that approach -- in fact, there isn't a singular approach that we could
20 follow. But I think we need to understand how it's being done in different
21 countries and be able to explain the rationale for why we're doing it our way and
22 how it compares. So with that, I'm going to turn to Mike to begin the briefing.

23 MR. JOHNSON: Thanks, Bill. Slide 3, please. Good morning
24 Chairman, Commissioners. We're here today as result of a positive
25 circumstance that's been brought on by the success of the Commission in

1 establishing clear expectations and higher standards of severe accident
2 performance and enhance safety margins for new reactors to be established and
3 the success of the industry in delivering designs for new plants that are in fact
4 safer. And I had an order of magnitude that I was going to try to give but I won't
5 do that now.

6 The Commission is faced with a situation of deciding to what extent
7 and how to maintain those gains through licensing, through the operational
8 programs provided for in the regulations, and through regulatory oversight
9 provided by the reactor oversight process. Of course, as you've heard, we have
10 processes for controlling risk informed changes. And we agree that those
11 processes are functioning well. However, we're concerned that those processes
12 may not be tuned enough to lower CVF's refining through, again the success that
13 we've had in terms of getting safer designs.

14 We believe that this is a significant policy issue and one in which
15 we need near term direction. As we've talked -- as you're heard in your earlier
16 panel, we have a license application before us today for use of risk managed
17 tech specs. And although we have some time to address oversight, we believe
18 that those two need to be addressed together in an integrated way as we go
19 forward.

20 The recommended option that the staff proposes is a middle of the
21 road approach. It doesn't assume that no changes are needed and it avoids the
22 extremes of changing risk metrics. It also provides an opportunity for us to
23 engage with stakeholders, to examine, table top if you will, explore and
24 supplement if needed our existing guidance to be clear about the Commission's
25 directions with respect to how we continue to ensure that new plants meet the

1 Commission's expectations.

2 Today's team at the table, Charlie Ader, Director of Safety Systems
3 and Rick Assessment in NRO. We also have Fred Brown who is the Director of
4 Division of Inspection and Regional Support in the Office of NRR. Don Dube, the
5 senior technical advisor for PRA in the Office of NRO. I'd like to acknowledge
6 that Don has done much of the heavy lifting in developing the products that
7 you've seen in front of you and the thinking that has gone on in the staff's
8 direction, going forward. Mike Mayfield, who is the director of the Advanced
9 Reactor Program. And I'd also like to note that we have Vic McCree, the Region
10 II Deputy Regional Administrator for operations for Region II. Charlie and Fred
11 will discuss the background options and our recommendation and its basis. Mike
12 is going to then provide progress on advanced reactive policy issues. Charlie --

13 MR. ADER: Thank you, Mike. Mr. Chairman, Commissioners -- in
14 February, we sent the Commission a white paper that identified potential
15 concerns with the current risk-informed framework with four new reactors. Partly
16 in part as discussed today because of the lower risk profiles we're seeing in new
17 reactors. And the white paper identified some of the potential areas we saw
18 problems in and also the number of potential options there were at pretty low
19 level at the time. We also indicated we would be meeting with stakeholders.

20 Since February, we've had several public meetings with
21 stakeholders because as Biff Bradley said, they were very good public meetings,
22 met with the ACRS, full committee couple times. Had a very good meeting with
23 an ACRS subcommittee chaired by a former member of the ACRS. We had a
24 very good discussion at that meeting.

25 And during that time based on stakeholder input, internally, our staff

1 views have evolved significantly since where we started out with the white paper
2 you saw in February. I also want to note that even though you're going to hear
3 about advanced reactors later in the briefing, our focus has really been on the
4 large light water reactors and the risk informed framework that would surround
5 those. Next slide, please.

6 As Bill mentioned, as we've developed the options that are
7 currently in front of the Commission, we've been guided by Commission policy
8 over the years. The safety goal policy has been mentioned and established the
9 Commission's expectations for an acceptable level of risk. The severe accident
10 reactor policy articulated Commission's expectations regarding a higher level of
11 severe accident performance for the new designs over what was then the current
12 designs the vendors had. Next slide, please.

13 The advanced reactor policy statement -- the Commission further
14 went on to articulate their expectations for, among other things, enhanced safety
15 margins for advanced reactors. In a 2008 revision to that policy statement
16 though the Commission also, in response to a public comment, made it clear that
17 the policy statement did not say that advanced reactors needed to be safer than
18 the current fleet. The current fleet was the 1987 version of plants that were
19 currently operating.

20 The new reactors that we have under review that we have certified
21 are -- will potentially be certified -- have met Commission's expectations. They
22 do have higher severe accident performance. They have a enhanced safety
23 margins. And those features are being certified in a rulemaking -- has been
24 certified for the AP1000, the APWR, System 80+. So those features are certified
25 into designs that have Commission's expectations have come true on those.

1 Next slide.

2 Commission further went on -- and this is somewhat why we're
3 here today -- when they certified the APWR, they also expressed an expectation
4 or they noted that the APWR not only met the Commission's safety goals, but it
5 in fact exceeded and provided enhanced level of safety. The Commission at that
6 time in the rule indicated it would deny an exemption to the certified design if it
7 resulted in a significant decrease in the enhanced safety of the design as
8 certified. It further went on to indicate that it had an expectation that industry
9 would reasonably maintain that enhanced level of safety throughout the life of the
10 plant. Next slide.

11 Just to review the current risk informed environment, the framework
12 that we've been looking at -- we've grouped them into four categories: changes
13 to the licensing basis, that require NRC approval Reg Guide 1.174 would fit in
14 that category and it is -- as mentioned before it's kind of the foundation for most
15 of the risk informed guidance -- changes to licensing basis -- it would be allowed
16 without prior NRC approval and this would be the 50.59 process for current
17 reactors and the 50.59 like process for the new reactors. Then the guidance that
18 supports risk informed regulation and the reactor oversight process. Next slide,
19 please.

20 For the change process that the licensing basis with NRC review
21 and approval -- the current Reg Guide 1.174, as I mentioned, is the frame
22 foundation and it includes both quantitative and qualitative objectives in the
23 review. It allows increases in risk -- small increases that are tied to the safety
24 goals as mentioned. What it does not do is it does not explicitly address
25 enhanced severe accident safety features for the new reactors.

1 I want to illustrate in the next slide -- and since Ken didn't provide
2 this figure, I guess I can provide the figure, slightly modified. The x-axis
3 represents the baseline CDF. The 10^{-6} was added to illustrate our
4 point here. It's not in the original figure. The 10^{-6} , the 10^{-4}
5 minus four spans the -- basically spans the current operating fleet. The y-axis
6 would represent a delta change that a licensed amendment an applicant is
7 proposing to change would -- it would amount to coming up the y-axis.

8 Region I represents an area that we would not entertain a change
9 under a licensed amendment. Region II, it would be a small change relative to
10 the safety goal. It's an area that would get increased NRC management
11 attention and the review of that change. And then Region III is a very small
12 change as it relates to the safety goal. Most of the changes we've been seeing
13 are in Region III. They're generally being considered.

14 The red star is trying to illustrate a currently operating reactor with a
15 baseline CDF of around two times 10^{-5} . It would request a
16 change that would amount to a change in CDF of seven times 10^{-7}
17 seven, which should be a very small change. It would represent about four
18 percent delta CDF.

19 The yellow circle would represent -- and this is a hypothetical -- a
20 new reactor that had a baseline CDF of around four times 10^{-7} .
21 Proposing a same, absolute change that would be on the order of seven times 10^{-7}
22 to the minus seven to the baseline CDF. It would represent 175 percent change
23 in the CDF if approved. It still would be very small on an absolute basis, but
24 would represent a large relative change. I will acknowledge, as other speakers
25 have said, if you included seismic, the current baseline CDFs we're seeing in the

1 new reactors, don't fully include seismic. That yellow circle may move closer to
2 the 10 to the minus six line.

3 But the point I'm trying to make is the current guidance does not
4 explicitly address how staff or industry would deal with the change out in that
5 region. It's off scale. Where we see option two is we would try to define that
6 process of how we would deal with those changes. Next slide.

7 The second bin, we have moved the risk informed framework -- is
8 the changes to licensing bases that a licensee could make prior to -- without
9 NRC approval, under some restrictions the 50.59 process for current reactors
10 and the 50.59 like process for new reactors. As Biff Bradley mentioned, there is
11 a new requirement that's certified in each of the design certification rules that
12 addresses the "X" vessel severe accident features that has a slightly different
13 change process would allow, because of uncertainties, slightly larger changes.
14 But there is no guidance for that.

15 NEI is working on a revision to NEI 96-07, which was the document
16 that was endorsed in the regulatory guide for the current 50.59 like process. It
17 has only recently come in to staff, it's not fully complete. I don't believe it
18 addresses the "X" vessel piece yet and it doesn't address the chapter 19 which
19 are some of the PRA features. It's an opportunity for us to engage with
20 stakeholders, to see if it would prevent significant decreases in enhanced safety.
21 Because this is the entry point into the risk informed process. You know, if they
22 can self-improve and have significant change, we would only see these after the
23 fact. So I think it's important that we do take the time to engage on this with
24 stakeholders. Next slide, please.

25 Just for completeness, I'll mention there is regulatory guidance that

1 implements some of the risk informed regulations, the maintenance rule that has
2 been mentioned. Risk-informed categorization, the 50.69 rule and one that will
3 probably be coming to the Commission shortly will be 50.46(a). Some of the
4 similar points made about small changes for an operating reactor -- would they
5 still be small for a new reactor are the types of things we would like to examine
6 through the interactions with stakeholders.

7 With that, I'm going to turn it to Fred to talk about the fourth
8 category, which is reactor oversight.

9 MR. BROWN: Thank you. Next slide, please. I apologize in
10 advance for being longwinded on this topic. But I think, as Commissioner
11 Magwood said in the previous panel, this is the area where we have seen
12 significant degradation in performance in a case of error and omission under the
13 current regime, the current structure. So although in the licensing space we have
14 the same reductions in margin and safety, we have found them operational in the
15 operational sphere.

16 I'd also like to start by saying it's much earlier in the process for us -
17 - the process of dialogue and table topping than it has been for Charlie and his
18 staff. With that said, with Don Dube's help we have looked at some basic
19 examples that raised questions in our minds about whether the ROP has
20 sufficient measures for protecting defense in depth and safety margin for new
21 reactors and have identified one potential gap similar to what was discussed by
22 Mr. Miller in the previous panel.

23 Let me start with three examples. In the first example, we looked at
24 the mitigating system performance indices or MSPI for new plants with active
25 safety systems. We postulated that a maintenance error introduced a recurring

1 but sporadic failure mechanism into an emergency diesel generator and that the
2 licensee repeatedly failed to effectively correct the problem. We calculated that
3 the failure would have to occur between four to 11 times within three years for
4 the MSPI to change color from Green to white. This calculation includes the
5 effect of a back-stop that exists in MSPI. For existing reactors, it would take only
6 two to four such failures to cross the same threshold and trigger a regulatory
7 response.

8 Looking at this example in terms of the policy paper, under option
9 one, we would accept that difference without further assessment. Under option
10 two, we would make sure that the ROP continues to have tools to address the
11 licensee's shortcomings in problem identification and resolution, but we would
12 not consider a fundamental change to the MSPI quantitative thresholds. Under
13 option three, we would establish a lower quantitative threshold or value that
14 would likely result in the new reactor crossing the green white threshold with
15 fewer failures than in an existing reactor.

16 In the second example, we looked at reactive inspection criteria.
17 We calculated the conditional core damage probability or CCDP for a steam
18 generator tube rupture and concluded that for a new reactor, the response would
19 likely be in the range of doing only baseline inspection or the performance of a
20 special inspection for ruptures that do not create a site area emergency or result
21 in significant approaches to dose limits -- those are the back-stops in the existing
22 criteria. For existing reactors, the response would be a special inspection,
23 augmented inspection, or an incident investigation.

24 In looking at this example, we realized that the inspection manual
25 chapter for reactive inspections does contain response criteria for conditional

1 larger early release probability, but there is not currently implementation
2 guidance for calculating this value. This will need to be addressed regardless of
3 the Commission's decision on this paper. And that work might result in a more
4 narrow range of responses.

5 Turning again to the paper though, under option one, the staff
6 would accept the wide range of potential outcomes without further analysis,
7 CCDP anyway. Under option two, the staff would ensure that we understand the
8 reason for the wide range in calculated CCDP and we would work with
9 stakeholders to further assess whether some additional guidance was required.

10 For illustrative purposes, this might be an extra-deterministic
11 criterion such as requiring that any steam generator tube rupture that produces a
12 spread of contamination off site will always result in the performance of a reactive
13 inspection. Under option three, the staff would revise the inspection manual
14 chapter quantitative thresholds -- a one order of magnitude change would result
15 in a steam generator tube rupture likely resulting in a reactive inspection.

16 In the final example, we postulated that a licensee had operational
17 and engineering failures that resulted in a significant degradation to the reactor
18 vessel head with a resultant one in 10 probability of a medium break LOCA.
19 Using the SPAR model for a new reactor with passive safety systems, staff
20 calculated a CCDP of three E minus six, which would result in a white
21 performance deficiency.

22 Staff calculated that a similar condition at an existing four loop plant
23 would produce a CCDP of three E minus four resulting in a red performance
24 deficiency. I do not believe that there are any back-stops in the existing
25 guidance that addresses this difference. Under option one, we would accept this

1 range of potential outcomes at this time. Following the postulated event, the
2 region would issue a light finding which would normally call for moving the facility
3 to column two of the action matrix and performing a single supplemental
4 inspection of about 40 hours.

5 Notwithstanding this, the ROP always allows the regions to seek
6 approval for a deviation from the action matrix, including the performance of
7 additional supplemental inspections. But the use of deviations is intended to be
8 rare. Under option two, the staff would work with the stakeholders to evaluate
9 the ROP for permanent changes to ensure that the regulatory response for this
10 scenario would be appropriate without the need for a deviation. This would be
11 done prior to the new reactor having entered operations.

12 If the staff concluded that fundamental changes to the ROP were
13 necessary to address the situation, we would consider this to be a policy issue
14 and address it in a separate options paper for Commission's consideration. This
15 approach ensures that the staff response to the actual event is predictable, which
16 is one of the core tenants of the ROP. Under option three, the degraded
17 condition would be characterized as a yellow finding based on a calculated
18 CCDP.

19 Finally, we have not yet had interactions with the industry and other
20 stakeholders on the appropriateness of applying existing mitigating system
21 performance indexes to past plants. The existing PIs evaluate the active safety
22 systems of current plants using operational data from surveillances and routine
23 operations. Application of these performance indicators to the non-safety related
24 active systems at passive plants might focus licensing and staff attention on
25 systems that are not specifically credited in the plant's design basis for accident

1 mitigation.

2 Conversely, it would seem appropriate to have discussions on how
3 the material condition and reliability of critical active and passive components in
4 passive systems can be assessed and tracked as a performance indicator. I
5 must note that Mr. Miller made some interesting comments this morning in this
6 area and I think having the table tops and the discussions with the industry about
7 how to approach this is the essence of the staffs view of what option two is.

8 So, in summary, the staff believe that the existing ROP guidance is
9 very robust in many areas but recommends that more work be done to ensure
10 that the ROP is ready to appropriately address new reactors in a manner that is
11 both predictable and captures the objectives of protecting defense in depth and
12 safety margins that are described in Reg Guide 1.174. Next slide, Charlie.

13 MR. ADER: Okay, I want to give an overview of the three options
14 and then a little bit more discussion of the pros and cons and what we would see
15 that we would be doing in option two, which is our recommended option. As I
16 noted, if you looked at the white paper from February and the current paper,
17 staff's views it evolved considerably both on internal discussion and thinking and
18 through involvement with the stakeholders.

19 The options in front of the Commission now are at a higher level,
20 more policy level than implementation detail level. The three options which have
21 been talked about, option one is the status quo. Under this option we would use
22 the existing framework for both licensing changes and for ROP. Option two
23 would be to enhance the risk informed guidance where necessary to ensure that
24 significant decreases -- and I use the word "significant decreases" because of the
25 concern on the uncertainties in the PRA numbers -- significant decreases in the

1 enhanced level of safety of the certified designs, make sure they're prevented.
2 Staff would also evaluate ways to augment the ROP to ensure that it provides
3 appropriate response to degraded licensee performance, i.e. early engagement.

4 Of course, any changes to these programs would be carefully
5 evaluated with the input from stakeholders, would be our intention. Option three
6 as discussed would actually lower the metrics for the risk informed framework,
7 both licensing and ROP. Next slide, please.

8 Option one has an advantage as discussed in the paper, is that it
9 would provide the greatest operational and regulatory flexibility with the profiles
10 of the new reactors. They would have a lot of margin with the current framework.
11 But a disadvantage is -- and this is where some of the debate -- the
12 disadvantages is staff doesn't believe that the current framework would
13 necessarily prevent the significant decrease in the enhanced safety of the new
14 designs. If the Commission selects option one, status quo is minimal -- minimal
15 resources to implement.

16 Before I go to the recommended option, to contrast option three
17 would be to lower the risk metrics for the risk informed framework. This would
18 clearly have an advantage that would reaffirm Commission and it would actually
19 strengthen Commission's expectations of enhanced safety for the new designs,
20 enhance severe accident performance for the new reactors and the margins of
21 safety. But a disadvantage is that it is inconsistent with the underlying policy and
22 technical basis of Reg Guide 1.174. It would in effect create a de facto new
23 safety goal. And it would allow less operational and regulatory flexibility for safer
24 designs, and in effect, penalizing safer plants to some extent.

25 Option two lies between options one and three. It would modify the

1 risk informed guidance where necessary to prevent a significant decrease in
2 enhanced safety to the certified designs. We believe it has the advantage that it
3 would reaffirm Commission's expectation that they expect the enhanced safety
4 certified designs to be maintained to the life of the plant. It would acknowledge
5 that there are other features of the risk informed framework defense in depth
6 safety margins in addition to the quantitative thresholds. The disadvantage might
7 be that some stakeholders would even view those changes as being inconsistent
8 under the policy and technical basis for Reg Guide 1.174. Next slide, please.

9 So if you haven't guessed, we're recommending option two. In the
10 implementation -- actually I jumped ahead a slide. I apologize. The
11 implementation of option two would be we would continue to engage
12 stakeholders. I think the engagement we've had has been very valuable and we
13 would benefit from that going forward. We would look to modify guidance
14 through table top exercises to see where we needed to modify guidance.

15 We think in some cases the current guidance would be sufficient,
16 there are deterministic back-stops. We believe in some other cases there may
17 not be a sufficient guidance there for both staff to do a review and for industry to
18 have predictability of what they would expect when they came in with the risk
19 informed application. As part of that, we might evaluate the need for additional
20 back-stops, deterministic or defense in depth issues for both ROP and Reg
21 Guide 1.174. Any of those we would try to look at to make sure it didn't have an
22 unintended consequence of penalizing the safer designs. We do want to have
23 the incentive for safer plants. Now if I can go to the next slide.

24 Staff does recommend option two. We believe that this provides
25 assurance. If we work through this, it will provide assurance that the enhanced

1 level of safety that's being certified in the new designs will be maintained for the
2 life of the plant. We believe that, you know, we've reached that through input
3 from stakeholders. We think it's a balance of concerns, of not eroding the
4 enhanced safety, as Dr. Lyman says, so the public would see this as safer
5 plants. It would allow benefits for the increased redundancy and enhanced
6 safety margins.

7 We believe option two -- internally, we've achieved a high level of
8 alignment working with the regions' internal stakeholders. This has been a tough
9 issue when you start into it. There's a lot of different views and I think through
10 those discussions, I've been really pleased how everybody's pretty much aligned
11 on moving forward with option two, at least internal to the staff.

12 So in summary, to answer a couple questions, we have some near-
13 term considerations. We have risk-informed tech specs in front of us, and we
14 also have the 50.59-like process, we have part of NEI 96-07 that's under review,
15 and, going forward in both of those, we would need to know Commission's
16 continued expectations in this area.

17 The second message -- is, again, I'm repeating myself, is I think we
18 have worked with stakeholders and we've tried to reflect their input into this as
19 much as possible and I believe we have. And we would continue to work with
20 them going forward with option two.

21 And with that, I'll turn it over to Mike Mayfield.

22 MR. MAYFIELD: Thank you, Charlie. Good morning, Chairman,
23 Commissioners. As Mike Johnson noted the purpose of this segment of today's
24 meeting is to provide the Commission with a status update on the staff's progress
25 in resolving the key policy and technical issues identified in SECY-10-0034,

1 which, you may recall, we discussed these issues with the Commission April 6th
2 of this year, and we have made some significant progress in moving forward
3 since that time.

4 The staff has developed specific resolution plans for the issues
5 identified in the SECY, and we're also working on a number of key technical
6 issues associated with integral pressurized water reactors and the next
7 generation nuclear plant program. The staff in NRO is coordinating with the staff
8 in a number of other offices, and we have arranged, in fact, briefings with the
9 office directors, with the directors of NRR, Research, NSIR, the Chief Financial
10 Officer, and the General Counsel, to ensure alignment regarding the plans and
11 resource commitments for resolving these issues.

12 Within the last year, the industry has formed groups to discuss and
13 coordinate issues associated with small modular reactors. NEI has established
14 various working groups to develop position papers on many of the generic issues
15 identified in the staff SECY paper. And we will be discussing those papers as
16 well as NRC staff activities at periodic meetings that have been scheduled for the
17 remainder of 2010 and throughout 2011.

18 NEI's expanding support for small modular reactors includes the
19 formation of a new executive oversight group described in a recent letter from Mr.
20 Fertel to the Chairman. The American Nuclear Society Special Committee on
21 Small Modular Reactor Generic Licensing Issues -- that's a mouthful -- will be
22 continuing its activities during the upcoming year, and the staff will continue to
23 participate in that committee. The ANS has prepared several white papers on
24 generic licensing issues and provides a forum for the exchange of ideas and
25 development of consensus within the small modular reactor community. NRO

1 staff has also been actively engaged with the vendors through recurring NRC
2 NEI small modular reactor generic topics meetings.

3 We have been involved with the vendors and with DOE on specific
4 pre-application activities geared towards several of the policy and technical
5 issues. For example, on DOE's behalf, the Idaho National Laboratory has
6 submitted white papers relevant to the NGNP that also address some of the
7 policy issues being considered by the staff.

8 Overall, I would have to say that the efforts to address these issues
9 from the other offices, from the industry, and from DOE, has been outstanding.
10 While we still have significant work ahead of us, we believe we are off to a
11 good start. May I have the next slide, please?

12 While the industry and DOE are aggressively developing their
13 views on how to resolve these policy issues, the staff have developed their own
14 resolution plans that are driving towards issue resolution. We are actively
15 engaged with the industry and other interested stakeholders. But if those efforts
16 do not yield positive results, we have established the plans and underlying
17 activities that will lead to timely proposals to the Commission on how to resolve
18 the issues.

19 While we could spend as much time as the Commission desires in
20 discussing each of the issues and the resolution plans, considering the time
21 available, we thought we would emphasize just a few of the more driving issues.
22 Turning first to risk-informed licensing, the issue resolution plan for risk-informed
23 licensing has been revised to address the recent Staff Requirements
24 Memorandum and Commission direction to develop a plan to apply risk insights
25 to the licensing of integral PWRs in order to improve the efficiency and safety

1 focus of our reviews. We are having internal meetings, and we have engaged
2 the DOE National Laboratories to develop possible approaches for applying risk
3 insights into the design and licensing reviews for small modular reactors. This
4 was also a topic discussed at the generic topics meeting held with the NEI
5 working group several weeks ago. As directed in the SRM, we are preparing a
6 plan for implementing risk insights into review guidance.

7 We are also mindful of the concern that we not adversely impact
8 the resolution of the policy issues. Consistent with the SRM, we are developing
9 a plan for a framework and design-specific review plans for the integral PWRs
10 and then applying the lessons from that initiative, along with ongoing interactions
11 with the NGNP program to our longer term goal of developing broader risk-
12 informed licensing structures. We expect to provide these plans to the
13 Commission in February of 2011 as directed in the SRM.

14 We've considered approaches to changing NRC annual fees
15 working in conjunction with the Chief Financial Officer's staff. We
16 have addressed public comments received in response to an advance notice of
17 proposed rulemaking that was issued last year, which sought views on possible
18 changes to the NRC annual fee structure for small modular reactors. One of the
19 NEI working groups has prepared an industry position paper on this topic, and it
20 was discussed at the September generic topics meeting. Staff is currently
21 assessing the industry proposal and will consider it along with other factors in
22 developing recommendations to the Commission. A paper to the commission on
23 this topic is expected later this year.

24 Discussion of emergency preparedness always leads to a lively
25 dialogue, so we'll see what happens this morning. Staff has recently completed

1 a series of internal meetings on possible policy and key technical issues
2 associated with emergency preparedness for small modular reactors. This also
3 is a topic of one of the NEI working groups. We will be discussing EP at several
4 of the generic topic meetings, and we will review the industry's position paper,
5 along with other assessments from the vendors, the NGNP Project, and from
6 input from other stakeholders in developing possible approaches for emergency
7 preparedness requirements for small modular reactors. We anticipate sending a
8 policy paper to the Commission in late fiscal '12.

9 Security requirements are one area where the staff has taken a
10 position from early on, that small modular reactors must meet the existing
11 security requirements. However, since these are the first plans where security-
12 by-design is a truly practical consideration, the means by which the vendors meet
13 the requirements are a matter of considerable interest to the staff. This is
14 another topic we are addressing through routine meetings with the small modular
15 reactor community and for which we expect to receive position papers from NEI.
16 We also anticipate more detailed information from the vendors, and, in fact, we
17 are getting ready to send letters to, particularly, the integral PWR vendors, urging
18 them to provide us early information on their approaches to security so the staff
19 can be ready to move once we receive the applications.

20 We will inform the Commission and, if it's appropriate, we will seek
21 Commission direction on the activities and approaches being pursued by the staff
22 the vendors and the likely licensing applicants. The staff has anticipated that
23 issues with licensing multi-module facilities would generally be a matter of
24 addressing legal and process issues. We have initiated discussions with the
25 General Counsel to address an appropriate framework. However, as we've

1 looked more closely at the other issues, we find that the multi-module issue has
2 tentacles in virtually all of the others. So, we're having to reassess what we're
3 doing about multi-module aspects in the other issue resolutions.

4 So we're taking a closer look at how these issues interact and how
5 we need to be dealing with it. Examples include the need to address risk
6 assessments for multi-module reactors, the handling of the fee structure for multi-
7 modules, as well as the requirements for liability and property insurance.

8 The status of the major policy and key technical issues being
9 addressed by the staff are discussed in the latest quarterly report to the
10 Commission. The staff will continue to use this as a vehicle to communicate with
11 the Commission on the status of these issues. As I've noted, we're working
12 closely with stakeholders in addressing the issues. We also have specific plans
13 to bring proposed resolutions to the Commission. We're working to drive these
14 key policy and technical issues to closure to support timely reviews of the small
15 modular reactor design certification and COL applications. As part of those
16 plans, we will provide specific commission papers in response to the recent Staff
17 Requirements Memorandum and as part of the resolution of the various policy
18 issues.

19 Sir, this concludes the staff's presentation.

20 CHAIRMAN JACZKO: Thank you. Any closing comments, Mike?

21 Okay. We will start then with Commissioner Ostendorff.

22 COMMISSIONER OSTENDORFF: Thank you, Mr. Chairman. I
23 have some questions, but I want to first tell you, Fred, a comment on your portion
24 of the briefing, your recitation of the various examples on Slides 13 and 14 with
25 how different scenarios would play out under different options, that was

1 extraordinarily helpful. And that was one of the best presentations I've heard in
2 my six months here, to really put in perspective what options -- implications
3 would be on the execution side, so I thank you for that detail.

4 MR. BROWN: Thank you, sir.

5 COMMISSIONER OSTENDORFF: I just want to follow up on one
6 piece of that -- I'm assuming that your discussion of those options and examples,
7 that's a precise example of the type of discussions that might occur between the
8 staff and the industry with the table top exercises? Is that --

9 MR. BROWN: Exactly right.

10 COMMISSIONER OSTENDORFF: Okay, thank you. That was
11 very well done.

12 At the end of the last panel, I want to start out with Mike Johnson, a
13 question from you. And the Chairman had, in the last panel, I thought, a very
14 productive line of questioning talking about do we have sufficient information to
15 make a change? I think everybody, at least I think most people, are cautious and
16 prudent about not making a change unless you have sufficient information to do
17 so. And under the mantra, "If it ain't broke, don't fix it," that was used by
18 somebody in the previous session, I wanted to kind of want to get to that piece
19 because I'm just struck by the fact that there have been some excellent
20 presentations by both panels, but the reality is that we do not have any
21 operational experience with the advanced new reactors or with the SMRs.

22 So, Mike Johnson, in your presentation, you made the comment
23 that we need near-term direction; I believe that was the phrase you used. And if I
24 were just, for the sake of a hypothetical, to postulate that, well, maybe we don't
25 have sufficient information right now to make a decision, if that were the case.

1 And if we're not ready to make a decision to change the existing metrics, what
2 implications would that have for you and your NRO team if the Commission did
3 not adopt the change at this point in time, recognizing you have an application
4 before you?

5 MR. JOHNSON: Well, Commissioner, I think that is exactly the
6 point. I think my point about a near-term guidance is that we do have an
7 application in front of us and we want to know where the Commission stands with
8 respect to that. We talked about the change process and wanting to get
9 Commission direction with respect to that. Much of what has been said about
10 getting additional operational experience actually has merit, I think, but I would
11 note that we do need to work on those immediate things. And also, post-COL
12 issuance, we anticipate that there will be additional risk-informed application.

13 So, my perspective is I'd like us to start early. I think we need early
14 direction from the Commission because some of these things will take time to
15 work through. With respect to oversight, we're going to need -- we know we're
16 going to need a longer lead time to work on those, and so that's my sense of
17 urgency with respect to getting nearer-term direction from the Commission.

18 COMMISSIONER OSTENDORFF: Well, let's just suppose there
19 were no direction provided to make a change to the status quo now. What would
20 be the practical implications of that decision for your team? Anybody or whoever
21 wants to field that question.

22 MR. BORCHARDT: I don't know if I'm answering your question
23 directly head-on, but, at the very least, I'd like to get the Commission's
24 endorsement for the staff to proceed down and at least develop what would
25 happen under option two. Even if the Commission didn't want to decide we were

1 going with that, let us do the work. You could answer whether or not you want to
2 go into implementation phase a little bit down the road. But if we don't do
3 anything and then get faced two years from now with the decision that we want to
4 go with option two, we're in a bad situation.

5 COMMISSIONER OSTENDORFF: That's very helpful does
6 anybody want to add to that?

7 MR. ADLER: If I could add we had three options on the table, so if
8 the Commission said option three that would affect the current risk-informed tech
9 specs. I'm not hearing we're not recommending, and I'm not hearing anybody
10 say option three. I think the backstops on the tech specs, option one or option
11 two, we have enough from the risk metric perspective to proceed on that.

12 There are other issues on the process part of that that the staff is
13 working through. But from the -- do we need different metrics? The sense from
14 staff is that the back stops are fine. The review of the 50.59 like process is in
15 place right now. My expectations is staff would be reviewing that with well we
16 think the Commission wants us to maintain enhanced safety, so would be coming
17 at it from that angle and industry would be probably coming at I'm guessing I
18 don't want to put words in their mouth, they would be coming at it from status
19 quo. So we would be facing over the next several months what's the guiding
20 principal we're trying to accomplish as we negotiate that guidance.

21 MR. BORCHARDT: I'm sorry, one additional point. You know the
22 status quo decision in my mind is not a no decision. It's really deciding that the
23 plants that have significantly safer metrics CDF, fall within the construct of what
24 we developed in the 1980s and 1990s. We weren't envisioning these safer
25 plants when we did that. So you'd be broad -- the status quo decision was really

1 a decision to expand the population of plants into that construct, the 1.174.

2 COMMISSIONER OSTENDORFF: I want to continue one minute
3 more on this same line. Charlie, to a certain extent, I'm also reacting to your
4 Slide 16. I almost need to seek maybe some clarification. You have
5 disadvantages and the -- option one status quo, if that were the Commission
6 decision that we would -- if I have that number correctly, it was option one status
7 quo, my Slide is Number 16. But it says, "Would allow significant decrease in
8 enhanced safety if the Commission made a decision for option one."

9 I just want to make sure that I understand, is that -- I mean, you
10 know -- I appreciate the different regions; you talk about Region I, II, and III. Is
11 the message that as a Commissioner I should take away from that is that this is a
12 decrease in relative or absolute safety if status quo is maintained for new
13 reactors?

14 MR. ADLER: Let me make two points. On the first one I would
15 agree that I would not expect, based on the current experience large increases.
16 I wouldn't expect new reactors with the correct framework to walk away from
17 enhanced safety. So we're talking changes that are in this margin of potentially
18 significant decrease. From an absolute point of view with the Commission safety
19 goals they would be acceptable level of risk; they would be under that.

20 So the current -- the point I was trying to make in maybe its
21 overstated is that we're concerned that the current guidance could allow
22 significant decreases in the enhanced level of safety as it is currently written.
23 Part of what I'm trying to do is get this predictability, if the Commission's real
24 intent is that we -- staff look to maintain that and ensure it doesn't erode, you
25 know, to go through the options of where we need to change the guidance to

1 make it clear that certain changes, because I expect that licensees will start
2 taking departures under the normal process, that certain changes would come in
3 for staff review. I don't know if that answered your question.

4 COMMISSIONER OSTENDORFF: It did. Thank you. Okay, now
5 I'm going to shift a little bit to option two a little bit and focus on a question, and
6 I'm not going to pretend to have a full synthesis or integration of all the different
7 efforts around the agency that inform how risk is approached under the
8 Commission. Commissioner Apostolakis and Chairman Jaczko supported -- put
9 forth a memo that we supported a few months ago dealing with risk-informed
10 metrics, looking at some of these issues. I think that initiative had broad
11 Commissioner support.

12 I've had two briefings the last few months dealing with the state-of-
13 the-art reactor consequences analysis, the SOARCA Report. I know that we're
14 scheduled to receive, I think, sometime maybe, summer 2011, a report from
15 Brian Sheron and his team in Office of Research, and I found that very
16 informative. And I know that there's some significant departures from the earlier
17 Sandia study in the early 1980's that at least with initial thoughts, and the final
18 study is not complete yet. But that just struck me as one body of work that is
19 underway that might possibly have a nexus with making an informed decision as
20 to how to proceed with risk assessment under option two.

21 I'm curious if any of you can comment on your gut reaction to
22 whether or not this SOARCA Report might have some bearing on what option --
23 on how option two might be developed?

24 MR. ADLER: I kind of come from it from a different perspective of -
25 - if SOARCA and the results I'm seeing would tend to show that the plants have a

1 lower risk profile, but I'm tending to come from it from the 1.174 thresholds are
2 tied with the Commission safety goal. So if the plants are safer, I would think
3 there would be additional regulatory and operational flexibility they would have.
4 But I wouldn't see that as changing the principals that we would be regulating as
5 far as a risk informed -- the overall the higher level risk-informed framework.

6 COMMISSIONER OSTENDORFF: Anybody else want to add to
7 that? Thank you all.

8 CHAIRMAN JACZKO: Commissioner Svinicki.

9 COMMISSIONER SVINICKI: I had some questions about exactly
10 how staff would proceed if option two were approved, but actually I think
11 Commissioner Ostendorff's questions and Bill's answer was very helpful in giving
12 me a better sense of that.

13 But I do want to ask, on the same theme, some questions of you.
14 Fred, I agree that your presentation was very informative; that means it
15 engendered some questions, so I appreciate that. But first I would ask you,
16 maybe thematically, do you feel that the current ROP is ill suited to new reactors
17 if it does not result in the same number of white and yellow findings at plants?

18 MR. BROWN: No, absolutely not. It's interesting Charlie referred
19 to the evolution of the thought process. I have to admit when the question first
20 came to me, my assumption was that there would be a different standard
21 because of the different licensing basis. And as we talked through the
22 Commission's policy as stated to date and looked at the examples, I've moved
23 away from that. We went through the same thing as we reached out to the
24 regions to build consensus on this issue about linking ROP licensing basis in one
25 paper or keeping them separate and where we had option one, two, or three.

1 We've, I think, moved towards a recognition that it's desirable that
2 new plants be built with designs that are safer as analyzed in the PRA, and then
3 part of that is going to result in -- some things that resulted in risk significant
4 findings for old plants not resulting in finding risk significant for new plants. So I
5 think if you look at the examples we've used, option two does not in any way aim
6 to target a number of outcomes in finding space.

7 COMMISSIONER SVINICKI: But if I look at your examples one,
8 two, and three and I don't want to repeat them, I do have the detailed description
9 in front of me here. For example on the first one about sporadic failure and
10 emergency diesel generators, under option two and this is -- these are your
11 words, "We would make sure that the ROP continues to have tools to address
12 the licensee shortcomings in problem identification and resolution."

13 So thematically here as I looked at this, how would you react to this
14 statement is that option two might leave you with a somewhat of an ad hoc
15 approach to these individual incidents that might occur? Would there be some
16 sort of system-wide threshold that was established, or does it appear ad hoc to
17 me because this is a bit of a table top then in and of itself that you're presenting
18 to me here but you would have a consistent way of addressing these things?

19 MR. BROWN: Yeah, absolutely the latter and I think that's why we
20 talk about -- I talked about predictability. We'd like to sit down before we are
21 faced with the event and work through what tools do we use. One tool in the
22 ROP, of course, is the action matrix and we can enter the action matrix through
23 changing the thresholds in the MSPI, and that would be option three. I think the
24 staff's concluded we would not propose -- we could certainly do that. I mean, it's
25 a policy matter so option one, two, three--these are all policy matters that we can

1 do any of them.

2 Our recommendation would be that we work -- keep the basic
3 framework the action matrix with an entry point in a quantitative way that's tied to
4 the E minus six threshold, but then look at the other tools in the ROP and make
5 sure that they will in fact be effective to address 11 repetitive failures for a
6 component in a safety related system, that as we look at systems that are no
7 longer -- as a application of Appendix B changes, corrective action program
8 changes, 50.69 changes, what's subject to corrective action. Those things
9 change, and that change is what's a Green finding.

10 And we just need -- I think the concept in option two is have the
11 systematic way to table top through the process to ensure we understand when
12 you bring all these changes together at the same time what are all of the
13 implications. Sitting here today, I can't tell you that what's a Green finding today
14 and rolls into a crosscutting issue will be -- will have the same effect for a new
15 reactor. So the concern becomes if the action matrix entry margin grows greatly
16 and we also make other changes that reduce our ability to address the
17 crosscutting, we may end up with some real unintended consequences.

18 But I think your basic question was is the intent to change action-
19 matrix-threshold entry points so that we get the same hook, and I think the EPRI
20 speaker referred to it as, you know, addressing good behavior in a bad way.
21 That is not the staff's intention by any means.

22 MR. BORCHARDT: Commissioner, I think you hit on one of the
23 key policy implications of what we're struggling with. I'd like to make a couple
24 points. It really has to deal a lot with what does risk-informed mean and how
25 does it get implemented on a day-to-day basis. We wouldn't end up with an ad

1 hoc process; that's why we want to go through a formal very interactive
2 developmental process so that we have -- end up with a transparent system
3 that's predictable. So, now --

4 COMMISSIONER SVINICKI: Well, option three I will confess I had
5 that fleeting thought, perhaps it's only attractor is that it would be very clear.

6 MR. BORCHARDT: I will stop there

7 [laughter].

8 COMMISSIONER SVINICKI: But I do think I know that option two
9 can't just be, you know -- and, again, we as a regulator, we hear complaints
10 about the subjectivity of perhaps like the substance of crosscutting issues, and
11 there are parts of the ROP that are a bit more -- lend themselves a bit more
12 clearly to you know metrics and hard metrics that we can tune ourselves to, but
13 option two, you know, I think if I had the sense that it was any given new reactor
14 might not know how an incident at their site was going to be adjudicated through
15 the ROP that would be really unattractive in terms of regulatory stability in my
16 view. I would then also ask on option two one of the talking points was, or it was
17 used repeatedly, option two will ensure that significant decreases in enhanced
18 level of safety of the certified designs are prevented; prevented means the same
19 to me as prohibited.

20 So it gets very -- the word significant becomes very key there. And
21 my question before Commissioner Ostendorff's Q and A was going to be, would
22 the staff take it upon themselves then to determine significance? Would they
23 interpret approval of option two as well we leave it up to you that significant is a
24 matter of the staff's judgment? Because I heard in the back and forth with the
25 first panel that there may be a lot of perspectives on significance and this whole

1 issue of relative versus absolute risk. Would you -- at what point would you be
2 checking back with the Commission on something of that kind of -- the
3 significance of significance?

4 [laughter]

5 MR. ADLER: The words were there and we try to focus on
6 significant degradation for a couple reasons. I think, one, the Commission had
7 that in their certified rule; they wouldn't grant an exception unless -- if there was a
8 significant decrease, and then the SOC, if I remember right, they were talking.
9 And some of that becomes case specific as you look at. It may not be a real
10 definition.

11 But the other thing I was trying to capture is, I think, where the
12 industry panel was. If I have extremely low internal events CFC and seismic
13 CDF of upper 10 to the minus seventh, personally I would be entering into this
14 process that I wouldn't be -- I would be trying not to be too hung up on 10 to the
15 minus eighth going to two times 10 to the minus eighth because its bounded by a
16 much higher level of a risk. So that was trying to get some context of significant -
17 - it's not going to be an order of magnitude of 10 to the minus eighth change, but
18 it's somewhere a little bit higher up in there and that's what would have to be -- I
19 think we need the interactions with stakeholders to see what makes sense on
20 that.

21 COMMISSIONER SVINICKI: Well, when you think about some of
22 the challenge for the Commission when options are structured this way because
23 it's not that option two is, "We intend to risk inform this process in the following
24 ways, do you agree that we should risk inform this process." So it's a little hard
25 to peer into where you might get to in your dialogue and what kind of policy

1 issues might emerge along the way. So I think it was helpful, the previous Q and
2 A where you tried to explore exactly how you would interpret the approval of
3 option two; that was helpful.

4 And I might ask Mr. Mayfield, because you had kind the tack on
5 issue here, but I appreciate -- you covered a lot in a small period of time. I think
6 the list of the small modular reactor issues is really impressive and daunting, and
7 I sometime kidded the small reactors, small modular community -- the issues
8 they have on that list are still subject, to use your term, a lively debate with the
9 operating reactors we have now, things like security requirements and fee
10 structures and other things, so how do you feel when you think about -- as you
11 canvas and pulse industry interest in actually submitting a license application for
12 something, how do you feel or how nervous are you about our ability to get some
13 of these issues resolved in a timely way?

14 MR. MAYFIELD: Mike Johnson and I have this debate -- been
15 having it weekly. I've convinced him to go to monthly. The -- I don't lose any
16 sleep over solving these issues. The industry may not like the resolutions the
17 staff proposes to the Commission, but we can bring these -- these are not new
18 issues. They've been with use 10, 15 years. As we said last April, the difference
19 now is that we have to resolve them -- we will bring defensible proposals to the
20 Commission on how to deal with these. The part that worries me is what haven't
21 we thought about yet?

22 And so we've initiated a thing we're calling the issue identification
23 and ranking project. Mike objects to my characterization of IIRP project but we --
24 we haven't come up with a better phrase for it. We're using a PURT like process
25 so it's that -- that formalism that bit of structure -- working with the staff to work

1 back through, starting with these ten policy issues and looking at what are the
2 tentacles? What haven't we thought about yet that needs to be brought to the
3 table and worked on? So, in terms of these 10 issues that we identified in the
4 SECY, we will bring those to a proposal to the Commission.

5 The ones that worry me -- what haven't we thought about? And
6 frankly, the first of the -- these IIRP projects, we looked at emergency
7 preparedness just because that was a good way to test the process. And that
8 was where the multi-module issue and the impact that one has on the others
9 really started to focus for us. We were saying, "Well, wait a minute, wait a
10 minute. This thing really is a much bigger factor than we had anticipated." We
11 thought we were going to work with Steve's staff and bring this, you know, nice
12 little regulatory process to closure. It's more challenging than that.

13 So, in answer to your question, we will solve the 10 that are on the
14 table. The industry, as I said, the industry may not like the proposals, but we will
15 bring credible proposals to the Commission. The challenge is what haven't we
16 thought about, and to not have a show stopper show up when the first of the
17 vendors bring in their design certs. So that's one of the things we will be sharing
18 with the Commission as we go along; how these things have started to evolve as
19 well as the progress we're making, you know in closing.

20 COMMISSIONER SVINICKI: Okay, thank you very much. Thank
21 you, Mr. Mayfield.

22 MR. JOHNSON: And Commissioner. if I could just add also I would
23 agree with what Mike has said. I would just add that a part of the anxiety is that
24 we are working these issues as the industry is finishing their designs in this area
25 so it's working those together, getting information in that enables us to resolve

1 these issues. I think Mike has it right; we'll be ready.

2 COMMISSIONER SVINICKI: Okay, thank you.

3 CHAIRMAN JACZKO: Commissioner Apostolakis?

4 COMMISSIONER APOSTOLAKIS: Yeah, my question is related I
5 think to the last exchange. If I look at the -- well, first of all, several times today
6 the question of operating experience came up and so on, but I don't want to say
7 that operating experience is not useful; it is, but if you look at the history of LWR
8 development, major changes in the recent assessments for LWRs -- the current
9 fleet -- have occurred because of some analysis that somebody did, not because
10 of operating experience.

11 In 1981, we had the external events that the analyses were done
12 for Zion and Indian Point and those changed the profiles and we had the
13 significance of the low power shutdown contributions. All these were analysis.
14 So, if I look now at the new designs and I really believe in history, maybe
15 something similar will happen.

16 And unfortunately these things don't happen the first two years.
17 So, for example, you know, we make a big deal out of the passive system
18 performance and the reliability is one and all that, well maybe, I don't know, 10
19 years down the line we'll find out it's not one. How would that play in developing
20 the option two? In fact, Mr. Lyman actually said, "Don't rush," said, UCS
21 opposes consideration of risk informed tech specs for new reactors until new
22 reactor PRAs are sufficiently developed and validated which is a very related
23 issue. How does staff plan to handle that uncertainty in the future? I mean, shall
24 we wait? If we wait, for how long? We can't wait for 30 years right? So is that
25 something that a question that has an answer, or may have an answer or --

1 MR. DUBE: I don't know if it has an answer other than, the fact that
2 one of the differences between the new reactors and current fleet is that by
3 regulation, the new reactors have to maintain and update the PRAs for the -- life
4 of the plant. So as operational experience is built into it, the PRA models will
5 reflect that. So the key, I think is to make sure that whatever changes we
6 propose are flexible enough to evolve as new insights are incorporated into the
7 PRAs.

8 Discussion has been made earlier that so far certain external
9 events have not been incorporated in the PRAs, such as seismic, and so there's
10 a large amount of uncertainty. But it is another regulation that at the time of initial
11 fuel load, the PRA has to meet standards that the NRC has endorsed one year
12 prior, and at the present time that means internal events, all the external events,
13 means a full seismic PRA. It'll probably also mean low power shut down and
14 also it may even involve level two and even level three PRA if we're looking five,
15 six years down the road.

16 So, I guess I have a deal of confidence that, moving forward, that
17 the PRAs will first reflect the state of the yard, but also will be able to evolve to
18 take into account new -- new insights and PRA methodology.

19 COMMISSIONER APOSTOLAKIS: So basically your answer is
20 yeah we recognize this may be an issue and we're willing to reconsider this new
21 information --

22 MR. DUBE: The one possible approach, for the sake of moving
23 forward with some of the risk informed initiatives, is to add a little bit of
24 conservatism, additional back stops that we might not otherwise have. And as
25 new insights move forward, assuming that the risk profiles are not increasing

1 dramatically, to eventually back off. I mean, all of these programs are living
2 programs. Nothing is fixed in concrete.

3 MR. JOHNSON: And I would just add, we are going to be -- we are
4 where we are with respect to moving forward on this. We are four years, six
5 years away from operational experience; so maybe even before, beyond that.
6 We are years away from, perhaps, new analysis that would give us new insights
7 that would inform how we go after this, but we're months away, or a few years
8 away, from needing to implement the process status quo, our existing processes
9 or some process that we've looked at, thought about, in a deliberative way and
10 tuned, if we need, for new reactors.

11 So I would say we need to move forward with option two, involving
12 stakeholders in a considerate way, making changes, not leaving the premise or
13 the fundamental tenets that we have in place for the operating plans but tuning it,
14 I think that we need to do that in the near term and then we will continue as we
15 always do to gain insights and tweak our processes. But we need to build on
16 something is my perspective; and something -- I'm not able today to say that
17 what we have in place is sufficient for new reactors.

18 COMMISSIONER APOSTOLAKIS: Well, but with even -- with
19 option two is an approach but there may be issues with, you know, option two.
20 Like we had earlier, a slide with the four broad categories where risk information
21 is being used. There may be in one of those four, for example, the question of
22 whether the CDF is really ten to the minus seven is so crucial that they may
23 decide to postpone any action, but maybe there other issues like risk informed
24 tech specs. I'm pretty confident that what I'm doing will survive, even if the CDF
25 increases. So that kind of thinking I think would be important because certain

1 things you might not want to rush into. It's just -- it's not that I know how to do it;
2 it's just something that bothers me.

3 Mr. Mayfield, I know that the SRM said that, you know, you should
4 focus primarily on the integral PWRs, but then I hear that people are thinking
5 about the lead bismuth cold reactors and sodium cooled. Obviously these will
6 not come before the Commission at the same time scale as the integral PWRs,
7 but I'm wondering when you develop your plan, should you consider also as an
8 additional criterion to whatever you develop, maybe that it should be as
9 technology neutral as possible? I don't think we use those words in the SRM but,
10 you know, like you guys with option two we learn too.

11 [laughter]

12 COMMISSIONER APOSTOLAKIS: Will that be something that --

13 MR. MAYFIELD: Some of us have tried to excise those words but
14 unsuccessfully.

15 CHAIRMAN JACZKO: Which words?

16 MR. MAYFIELD: Technology.

17 [laughter]

18 But the answer is yes. As the plan we're putting forth, the SRM
19 lays out things in at least two categories. The near term was on the integral
20 PWRs; to move forward on those and move forward quickly.

21 That -- so that's the first focus. One of the notions is to build on
22 that effort and to make it an integral part of the plan, but with a much longer term,
23 to look at a risk informed performance-based licensing approach that is
24 technology independent to the degree that you can reasonably make it so.
25 That's something that we built in. We have, going back a number of years now,

1 requirements for the staff to take NUREG-1860, the infamous technology neutral
2 framework as I characterize it, and take it out for a test drive on the NGNP
3 project.

4 As DOE's schedule for that keeps slipping out we're getting a little
5 uncomfortable with that time frame. We have requirements to report back to the
6 Commission in 2013 on that test. DOE isn't doing design work until 2013 so
7 we're going to have to come back and move those dates. We're starting to look
8 at dates 2014, 2015 and we're not sure those really are helpful to the staff or the
9 Commission.

10 So one of the conversations we were having with Research earlier
11 this week goes along the lines of jettison the old thinking that we've got to use
12 something other than light water reactors, pick up on the idea of the maybe using
13 the small PWRs as a test case to look at, what can you do with the technology
14 neutral approach for design other than a large light water reactor? With the
15 notion that with time you're going to have to expand that to other designs where
16 you can really test it but to try and build in that thinking earlier rather than wait
17 until something happens with NGNP, or one of the other fast reactor designs, or
18 something else shows up.

19 So short answer is, we agree, we're trying to move forward. Don't
20 have something crisp to give you. We will have some of that thinking in the
21 paper you see in February.

22 COMMISSIONER APOSTOLAKIS: Thank you very much.

23 CHAIRMAN JACZKO: Commissioner Magwood?

24 COMMISSIONER MAGWOOD: Thank you. Before I get into my
25 questions, a couple of preambles. First, let me echo my colleague's comments.

1 I thought that today's presentations were excellent, particularly your examples
2 Fred. I thought they were very, very helpful.

3 Secondly, the discussion about the policy issues we'll be dealing
4 with on the small modular reactors. I have a sense of urgency about dealing with
5 those; I'm sure you do as well. It's very clear that, as you pointed out, industry
6 may not like, you know, where things go with those issues and if that is the case,
7 it certainly makes sense to get those decisions made as soon as possible so that
8 we don't have the energy kind of moving down these chains for two years or
9 whatever and then at the end of that, we decide well, we don't like what you're
10 doing. We actually get these decisions made very quickly, so I to sort of put it
11 out there for -- to state the urgency.

12 The final preamble, I think is a very, very, important to put on the
13 record. While it was yesterday, not today, that, you know, we, in Pittsburgh,
14 we're celebrating the 50th anniversary of Mazerowski's home run to defeat the
15 Yankees in the 1960 World Series, and I just think it's vital that that be put in
16 record everywhere it possibly can --

17 [laughter]

18 CHAIRMAN JACZKO: I suggest that that might be worthy of a
19 COM.

20 COMMISSIONER MAGWOOD: It probably is. It not like it
21 happened all the time. The one thing I think -- I think it was you Fred -- that a
22 little while ago, you said it's important and this was sort of echoing some of
23 industry comments that we not treat good behavior in a bad way, but I think what
24 we're struggling with also is that we don't necessarily want to treat bad behavior
25 in a good way.

1 You know, and so that's why I think, at least in the ROP side of this
2 discussion that it really presents a struggle; and can you sort of, elucidate a little
3 bit further on that? I mean, what -- that's really, I think, a practical matter as you
4 think 10 or 15 years down the road. How do you take -- if we don't make any
5 changes, if we stay with the status quo on option one, how would the staff be
6 able to deal with actions or inactions taken by licensees if the delta CDF doesn't
7 put them into another column?

8 But you know it's also I think important which Commissioner
9 Svinicki suggested which is you're also not here just to sort of hit a target list of --
10 we want to have three on, you know, three this year or four next year, or
11 whatever. Can you discuss that a little further?

12 MR. BROWN: Well, yes. And thank you, and actually the earlier
13 panel today talked about how we're not going to do things that result in a
14 reduction of safety, because at some point you get to the compliance issue and
15 Commissioner Svinicki referred to prohibited. Well, what were dealing with in the
16 ROP, every instance essentially is where they were non-compliant and they
17 acted in a prohibited way.

18 And your point is dead on, Commissioner. The oversight staff in
19 looking at this; one of the reasons option two doesn't have more flesh on is it is a
20 challenge to work through how we would move the ROB to have the disincentive
21 -- the incentives for licensees to put the effort into maintaining the kinds of
22 programs that ensure compliance, and that the PRA risk numbers are based on.
23 How do we get those incentives there? Through having a way to engage early
24 and interact without disincentivising a safer plant.

25 I can't tell you how we would do it in option one because I can't tell

1 you how we would do it in option two, but it is a real concern within the regions
2 and within my staff that we would struggle to have effective early engagement
3 under option one. Not that we wouldn't work it out, we would, if that's the
4 Commission's direction. But I can't tell you how -- what it would look like today.

5 MR. BORCHARDT: I think I can tell you what it would look like;
6 and it would be awful.

7 [laughter]

8 Because we would be driven by regulatory outrage and not by any
9 established criteria. We're already, on occasion, driven by regulatory outrage
10 and how we respond as an agency to certain events and issues. This would
11 cause that to happen all too often, and so we would be dealing in a process of
12 exceptions and exemptions, not exemptions from requirements but exceptions to
13 our policy, which I sign very, very few of those today. I think if we stayed with
14 option one, we'd be driven by many influences to do that far more often.

15 COMMISSIONER MAGWOOD: Okay. Let me sort of follow up a
16 little bit with that. Because one concern I have and I'm still struggling with, I think
17 everyone here is struggling with option one versus option two, but one of the
18 things I do struggle with is this; that clearly most of the new plants that industry
19 has applied to build would be replaced at existing plant sites.

20 And I don't -- I worry less about the philosophical debate about
21 whether the licensing basis of the two plants would differ, but if you have a
22 different impact on the ROP, you may very well create different behaviors in the
23 older plants versus the newer plants, because in the newer plants, well, you
24 know, doesn't really cause you that much grief but you don't get a lot of
25 inspection from NRC if these things happen, but in the old plants, you do. So

1 you create sort of a dichotomy on the plant site. Something I've considered.

2 Have you thought about that aspect of this?

3 MR. BROWN: Yes sir, although in all honesty, that's cut a little bit
4 both ways. We have considered the effects on people of option one and the
5 issue of complacency that we can't really do anything that's so bad that it has a
6 negative consequence. And we've also considered the consequence on
7 inspection staff of option one. We can't find anything that has any significance so
8 why do we look?

9 Now, I'm not saying that we wouldn't address that, and I'm not
10 saying the licensees wouldn't address it, but it is something that we've
11 considered that part of the tool was a soft tool, so it's a tool around a message
12 for how licensees run their staffs, how they get consistency between units and
13 how we interact with our inspection staff on the importance of what they're doing.
14 It does cut a little bit both ways. Even today at a site with two different reactor
15 technologies, there can be differences in the risk outcomes and we are going to
16 have to address that at the new facilities. I believe the best way to answer to
17 your point is, what's important is we think through that and try to find, as
18 Commissioner Svinicki said, some kind of hard lines by which we can have
19 predictability in the outcome, but that do ensure that complacency doesn't get
20 built in process-wise to the operation of the facilities. I hope that's responsive to
21 your question.

22 COMMISSIONER MAGWOOD: I appreciate it. I want to bounce
23 back to the three versus four train deal where you take one of the wheels off the
24 car, that's the example. Wondering if you could, and I appreciate your examples,
25 they're very helpful.

1 I'm curious, as to sort of, hear your reaction to the thought that a
2 licensee that had a four train plant maybe 10 years from now, might look at the
3 operating record and decide, you know, really that fourth train, it's just a lot of
4 extra maintenance, we don't really need it; it doesn't really do a lot for us. If we
5 don't, if we stay with option one, particularly -- Bill, also I'd like to hear your
6 thoughts about how option two would respond to this -- and this licensee
7 basically says I will like to sort of shut this one down, we don't really need this.
8 What -- how would the system respond to that initiative? And this is different
9 because different from your examples because your examples are maintenance
10 issues or whatever else. This is a request to change the licensing basis.

11 MR. BORCHARDT: Let me try to save Fred because he's not a
12 new reactor guy, specifically? But the scenario you just described would cause
13 off all kinds of problems with violating the design certification rule and all the
14 design criteria that the design had established by requirement.

15 COMMISSIONER MAGWOOD: Does that mean you couldn't do it?

16 MR. BORCHARDT: Right. But not without going in for a new
17 rulemaking or exemption, new licensing action.

18 COMMISSIONER MAGWOOD: Okay.

19 CHAIRMAN JACZKO: Steve did you -- I'm sorry -- Steve, did you
20 want to add something to that or?

21 MR. BURNS: No, I think I'll stay out of it.

22 [laughter]

23 No, I don't disagree with Bill. I think as you say -- it's that -- the
24 only thing I would sort of furrow my brow about, it's a translation of a design, then
25 into the COL, but then of course with the COL you have your ITAAC to confirm

1 the design is there.

2 But if you went beyond that, you have license requirements and
3 how a license -- I mean, excuse me, how a plant is operated, under what
4 conditions. And so those things about just pulling something out and shutting it
5 down, involves license amendments and changes like that that you have to
6 review, I think. I'll leave it at that. I think I'll leave it at that.

7 COMMISSIONER MAGWOOD: Okay. It looks like there's
8 universal agreement on that point; that you simply could not do it without a major
9 rulemaking or something. Okay. Yeah, please.

10 MR. ADER: For the major safety trains, the certification says that
11 you're going to have four trains, but there are other systems there. You may
12 have diesel driven fire pumps that support -- provide response to loss of off-site
13 power that may not be in the tier one. So that would be a tier two departure and
14 depending on the 50.59 change process, could they take that out? It may have a
15 non insignificant change on the core damage frequency. Or would it come in for
16 license amendment under 1.174 to cross the first threshold? And then if it's off
17 scale how would staff respond, saying, well this is not a trivial change in the
18 overall risk profile, but it's still somewhat absolute, you know, on an absolute
19 scale it's somewhat small. So there are systems that could be taken out or
20 modified their performance that may not be a tier one.

21 COMMISSIONER MAGWOOD: Under option one you would be
22 able to pursue those sorts of changes. And, option two, what would happen?

23 MR. ADER: Well, option two, that's where we would look to -- do
24 we need to enhance the guidance? Do we need to, for the lower risks,
25 supplement the 50.59 like process to decide is this something that they should be

1 allowed to make without prior approval? Should it come in for a license
2 amendment if it's a risk informed license amendment? Would the guidance in
3 1.174 be reasonable, or would we be talking -- well debating -- that's you're
4 taking away a safety margin and being in a debate.

5 And again it comes back to, I think staff would be saying we have
6 Commission's expectations, we don't significantly erode this enhanced safety.
7 But it's not written down in the guidance exactly how that would work in process.
8 And that's where my view is. We're trying to get ahead of the game on that one
9 and at least walk through it, and talk through it, and understand how we would
10 handle those changes.

11 COMMISSIONER MAGWOOD: Okay. I appreciate that. And I
12 guess I'll close, Mr. Chairman, just by noting sort of echoing Commissioner
13 Svinicki's comment, that option three would at least simplify the situation.

14 [laughter]

15 CHAIRMAN JACZKO: But I appreciate that. And I thought since
16 nobody's talking about option three, I would -- maybe I'll start right there. It is
17 interesting, I mean I think as both Commissioner Svinicki and Commissioner
18 Magwood raised, as I'm hearing the discussion, I'm not sure that option -- I'm not
19 sure that I know what option two is. Option two seems to me, almost, if I could
20 use this term, a performance-based Commission policy, mainly the performance
21 metric being, let's do something to the Reg Guides, to the guidance document so
22 that we don't have an erosion of the margin. You know, licensing basis contacts
23 and probably in NROP contacts that we still have the ability to identify adverse
24 trends to be able to take effective early action. That, I guess, as I heard the
25 discussion, to me, is what option two means.

1 The difficulty, it seems like, in front of the staff, is how to actually
2 implement that. Which leads me to say that -- or not leads me to, but leads me
3 to think about -- isn't option three the easiest way to do that? Simply redefining
4 the risk metrics. Because then the infrastructure, everything stays the same, we
5 don't any ROP contacts to look at different back stops and hard stops from a
6 deterministic stand point, we simply have different risk metrics that takes into
7 consideration the recognition that we have an inherently safer plant that we want
8 to stay inherently safer.

9 I don't know if there's a question in there. Well, I guess there is a
10 question. The question I'd ask fundamentally, what is, and maybe I'll ask this in
11 a leading way -- it's always safer that way -- it seems that what I'm hearing for
12 option three, really the disadvantage of option three, is that it would cause us to
13 reevaluate the safety goals. Because that's really the underlying basis for Reg
14 Guide 1.174, presumably then that gets us ten to the minus six for CDF that
15 feeds in then to the various thresholds that we've established for the ROP and all
16 of these things that kind of fit together. As I go back and look at the safety goals,
17 they are not, in my mind, immutable; nor do I necessarily read from them that the
18 Commission ever envisioned that while nuclear power reactors may get
19 inherently safer, the rest of the world might get inherently safer too.

20 So I, again, this is perhaps a leading question. I don't know if
21 anybody has any comments on that. I mean was there an expectation that the
22 Commission thought that when they came up with those safety rules that they
23 were going to give us risk numbers that were permanent and fixed in time? Or
24 are they more a relative look -- I mean and if you read them they're more of a
25 relative risk. Anyone want to take on that challenge?

1 MR. ADER: I should point to someone.

2 [laughter]

3 CHAIRMAN JACZKO: No? If you don't answer it, I'll probably

4 answer it myself but --

5 MR. ADER: There were questions in the public comment period on
6 safety goals, and this kind of goes back to the SORCHA question, at that point in
7 time there was the view that the new source term -- the alternate source term
8 that showed that the risk from reactors was less than had been perceived.

9 And there was a question, if I remember right, and don't hold me
10 exactly to this, that well, if we find out that the reactor profiles, the reactor risks
11 are actually safer than we thought, should we lower the safety goals? And that
12 kind of defeated the, what's an acceptable level of risk? That you keep moving it
13 down to where you can get to, as opposed to establishing what made sense
14 from you know, one tenth of one percent -- that's how the safety goal gets
15 translated; is one tenth of one percent of the risk an individual's exposed to is a
16 reasonable number. Clearly, the Commission can -- it's a Commission safety
17 goal so --

18 CHAIRMAN JACZKO: Well, in that -- and again I think that's one of
19 the issues. If you look at the safety goals in that way, it's not the one tenth that
20 would have to change. But should we recognize that the -- that of which we're
21 calculating the one tenth has in of itself changed? I mean, the safety goals are
22 written in terms of safety relative to other electricity generating sources and to
23 other risk areas. You know, we've talked about the car profile. We make cars
24 safer every day.

25 So, if we're maintaining that one tenth of one percent, isn't that

1 really a recognition of what we've done with the reactors? We are inherently
2 going to lower risk numbers. We make planes safer, we make cars safer, we do
3 more to reduce the risk of cancer. All of the things that drive into the external
4 factors to which nuclear reactors were compared have, at least in theory -- I don't
5 know maybe George knows the numbers there -- have gotten safer. So why isn't
6 it okay for us to say that following along consistent with the safety goals, our
7 numbers should be lower too? And, again, that's not really a fair question to ask
8 you as well. I'll just leave it at that unless Steve wants to take it.

9 MR. BURNS: But, no, no, I mean is it -- from the legal perspective
10 this is you know sort of dodge the question in a way is that clearly the Atomic
11 Energy Act is that one of these old, in effect, a new deal type statute in terms of
12 language with this broad, very broad standard, public health and safety, common
13 defense and security; and within that framework, the agency, the expert agency
14 has room to move and it has different values -- stability as well as achieving the
15 safety goal.

16 And I think, as Charlie alluded to, and I think you, Mr. Chairman,
17 alluded to, is that when the safety goal policy statement was adopted about 25
18 years ago, it talked about, in terms of looking at the risk relative to other societal
19 risks that we all live with everyday. And there, again, I think what you have is,
20 not a debate, but a tension and a healthy tension between stability and also
21 assuring safety. And within the regulatory or legal framework you have, there is
22 a fair degree of discretion. You know, the famous quote about the almost -- the
23 unique discretion that this agency has in achieving its goals.

24 CHAIRMAN JACZKO: Well thanks, I appreciate that. As I said, I
25 don't know that there's necessarily a clear answer here but it's just an

1 assumption that, you know again, while, again there may be some merit and I
2 won't necessarily say in option three -- there may be merit in option three in
3 terms of the mechanism for how we accomplish what's in option two; and that's
4 perhaps -- I don't know if that's what Mr. Lyman was hinting at where he said
5 option two may just drive you to option three anyway.

6 But the last point I make and I think, again, this, you know, it's just
7 trying to think about this I think in the way Commissioner Svinicki states, which I
8 agree very much with her, particularly on the ROP space; and I think as Bill said,
9 we want a rigorous system that is not subject to regulatory outrage, I think is the
10 term he used. And again, as I think about these things, I'm not sure how we get
11 there other than through really changing the risk numbers, but that may be more
12 like option three but... It also seems to bring up a bit of a discussion about
13 whether we're really -- you know, that we're talking about risk informing and not
14 risk basing.

15 And that what we may actually be doing, and I think again this was
16 alluded to, is that we may be making the risk information or the PRA piece of the
17 risk informing process, less and less significant. That we drive to issues that are
18 not as driven by the PRA calculations. It may be that what, you know, if we look
19 at it from an ROP perspective, we're looking at substantive cross cutting issues
20 rather than white findings. Because we may take, under option two, this incident
21 that gives you ten green findings, and for another -- an older generation reactor
22 would give you a white or yellow finding; those ten green we may have more
23 opportunities there to see a cross-cutting trend, and that actually shows up in the
24 ROP then as a substantive cross-cutting issue rather than as a white finding.

25 So we're driving ourselves than more to that aspect of the ROP,

1 which in my mind is not as robust as the other elements. It maybe gets you back
2 into a space where you've got more potential for regulatory outrage to drive some
3 of these things, because it's not as objective and it's a little bit more of a
4 challenge. So you know, again, these are more just questions. I don't know that
5 you all have answers but it, you know, it does -- I think as Commissioner
6 Ostendorff said, you know it's maybe something that we can't necessarily decide
7 now.

8 I think Bill made a good point that that doesn't mean that we
9 shouldn't get the infrastructure ready to go and ready to try and see what -- how
10 it really works. But I suspect this will be something -- it's not the last time we'll
11 probably be discussing this issue, and that whatever we go forward with will
12 probably need to be tweaked and modified no matter what. Again, if anybody
13 wants to make any comments. I'm not sure that those -- any of those were fair
14 questions or -- but if you agree or disagree feel free to say whatever you like.
15 okay, okay, good.

16 Any other comments from Commissioners? Well, we, obviously we
17 have a paper in front of us. I don't know there's anything specifically under this
18 SRM that people wanted to work towards or the paper is really to place to
19 conduct the discussion.

20 COMMISSIONER APOSTOLAKIS: I would come back to what I
21 was saying earlier; that I really would like to see more thought given to the issue
22 of how the CDF or LRF might evolve, and how that would affect the actions of
23 the staff. That's my only comment.

24 CHAIRMAN JACZKO: Any more comments?

25 COMMISSIONER APOSTOLAKIS: Well, it -- another thing is, I

1 think that the seismic risk eventually will be a very dominant contributor perhaps
2 if the internal event CDF estimates survive. And I'm not sure that the existing
3 regulatory system has -- because at that time internal events were very important
4 -- I'm not sure to what extent seismic risk calculations have influenced the
5 existing system, and what kind of changes would be necessary for the new
6 reactors. So that another question mark in my mind and maybe staff can give it
7 some more thought.

8 CHAIRMAN JACZKO: Well, it sounds like a good thing -- certainly,
9 I'm sure, in briefings and things like that. I want to thank everybody for a very
10 interesting presentation. I certainly learned a lot, not only from the staff but from
11 hearing my colleagues as well, so thank you. I think we're adjourned.

12 [Whereupon, the proceedings were concluded]