

UNITED STATES OF AMERICA  
U.S. NUCLEAR REGULATORY COMMISSION

MEETING WITH THE ADVISORY COMMITTEE ON  
REACTOR SAFEGUARDS (ACRS)

JUNE 6, 2011

10:00 A.M.

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

### ACRS Members:

Said Abdel-Khalik  
Chairman

John W. Stetkar

Harold B. Ray

Michael T. Ryan

Dennis C. Bley

## 1 PROCEEDINGS

2 CHAIRMAN JACZKO: Good morning everyone. The Commission  
3 meets today to hear from the members of the Advisory Committee on Reactor  
4 Safeguards. I'd like to begin by thanking the members of ACRS for their  
5 tremendous work over the past few months. The ACRS has experienced a very  
6 high workload and to their credit, processed it in a timely and thorough manner  
7 that they are known for.

8 You may, or may not, be pleased to hear that it appears that your  
9 workload may hopefully stabilize and perhaps slow down a bit over the next  
10 couple months as a lot of important work comes to completion. But as we all  
11 know, there are many important issues that the agency will be addressing over  
12 the coming years. The ACRS will have a very important role as the Japan Task  
13 Force completes its work and the Commission considers the long term  
14 implications of the events in Japan for domestic nuclear safety. As a result, there  
15 will probably be little rest for the weary on either side of this table. But during  
16 today's meeting, we'll have an opportunity to discuss several important issues, in  
17 addition to hearing briefly about issues related to Japan. We'll be hearing about  
18 fire protection, small module reactors, the fuel cycle oversight process and the  
19 AP1000 reactor design certification.

20 As always, we have benefitted from the ACRS's independent  
21 expert perspective on these important questions. So with that, I offer my  
22 colleagues an opportunity to make any opening remarks if they'd like to. Well, I'll

1 turn it over to you, Dr. Khalik, if you'd like to start.

2 DR. KHALIK: Thank you. Before I start, I'd like to point out that  
3 several ACRS members are not in attendance today because of the unusual time  
4 in which this meeting has been scheduled, namely ahead of, rather than during  
5 the full committee meeting. So there is no message being sent here, we all  
6 appreciate the opportunity to meet with you today. Next slide.

7 I'd like to begin by offering a brief summary of our current and  
8 planned activities in response to the events at Fukushima. In a nutshell, we are  
9 gathering information from all stakeholders so that we can understand the details  
10 of the event; distill the lessons learned, and ultimately, make recommendations  
11 for appropriate follow-up actions by NRC in order to enhance the safety of the  
12 American public. To that end, we have formed a sub-committee of the whole to  
13 address all Fukushima related issues. Next slide.

14 We have received briefings from the NRC staff and other  
15 stakeholders and plan to hold additional sub-committee meetings. An overview  
16 of the event was provided to us by the staff on April 7. We have also been  
17 briefed by both DOE and NEI on May 26, 2011. We expect to be briefed by Mr.  
18 Virgilio, the Deputy EDO at the next sub-committee meeting on June 23, and  
19 have arranged for INPO to brief us on July 12.

20 As you are all well aware, we have been tasked to evaluate the  
21 staff's longer term review and we expect to report back to you as requested  
22 before the end of February. It is our intent to also review the near term report to  
23 be prepared by the task force in July. And it is our hope that the task force will  
24 facilitate that review. In addition to reviewing these two staff reports, we may  
25 issue additional reports as warranted based on interactions with all stakeholders.

1 Next slide.

2 At this time, I'd like to move on to our other activities. Since our last  
3 meeting on November 5, we have issued 32 reports on a wide range of topics.

4 Today my colleagues will brief you on four of these topics, transition to NFPA  
5 805, comparison between ISA and PRA for Fuel Cycle Facilities, use of risk  
6 insights to enhance the safety focus of small modular reactor reviews, and the  
7 design certification amendment and COLA reviews of the AP1000. Next slide.

8 Next slide. Slide seven please.

9 We have also reported on a wide range of other topics as listed on  
10 the next five slides: containment accident pressure in analyzing the use of  
11 containment accident pressure in analyzing ECCS performance in postulated  
12 accidents, emergency planning rule, safety culture policy statement, and  
13 standards review plan for renewal of dry cask storage licenses and certificates of  
14 compliance. Next slide.

15 Other topics of note on which we reported include: revisions to the  
16 generic license renewal documents, the license renewal for Palo Verde,  
17 Kewaunee, and Salem, and the extended power upright for Point beach. Next  
18 slide.

19 The list goes on. We have also reported on the advanced reactor  
20 research plan, human factors considerations associated with emerging  
21 technologies and the efforts of the groundwater protection task force. Next slide.

22 Finally, as listed on the next two slides, we have reviewed several  
23 regulatory guides on a wide range of topics from welding of low alloy steel to the  
24 use of computers in safety systems. Next slide. Next slide please, slide 12.

25 At this point, I'd like to move on to ongoing activities. In the area of

1 new plants, ongoing activities include review of the design certification  
2 applications and associated safety evaluation reports for the US EPR and the US  
3 APWR, long term cooling for the ABWR, the reference COLAs for the ABWR,  
4 ESBWR, U.S. APWR, and U.S.EPR and subsequent COLAs for AP1000. The  
5 point to be made here is that we continue to complete all our reviews promptly,  
6 as the documentation becomes available. Next slide.

7 In the area of license renewal, our license renewal subcommittee  
8 has performed interim reviews of Diablo Canyon and Crystal River and will  
9 perform interim reviews of Seabrook and Columbia later this year. Next slide.

10 In the area of power upgrades, we will review EPU applications for  
11 Turkey Point, Nine Mile Point, Grand Gulf, and Monticello as the staff completes  
12 their safety evaluations. Later this week, we will review a topical report on the  
13 applicability of GE methods to extended operating domains for BWRs. Next  
14 slide.

15 Finally, this is a partial list of ongoing and future activities including  
16 50.46b, SMRs, 10 CFR 61 and the construction reactor oversight process in  
17 addition, of course, to Fukushima.

18 Let me conclude by saying that we continue to work on all  
19 cylinders. Yet we continue to meet our commitments by providing thorough and  
20 timely reviews of technical matters, important to the mission of this agency,  
21 protecting the health and safety of the American public and the environment.  
22 Thank you, that concludes my presentation. I'd like to call on my colleague, John  
23 Stetkar.

24 MR. STETKAR: Thank you Said. First slide please. I'm going to  
25 try to give you a brief overview of our work regarding transition to NFPA 805.

1 This is quite a complex issue and there are a lot of topics to cover, so you'll have  
2 to excuse a rather rapid fire presentation here. As you're aware, 10 CFR 50.48c  
3 was issued in 2004 and it allows licensees to adopt and maintain a risk informed  
4 performance based fire protection program that meets the requirements of NFPA  
5 standard 805, as an alternative to deterministic requirements in 10 CFR 50.48b  
6 or the plant specific fire protection license conditions. Next slide.

7                   June 25, 2010, a Staff Requirement's Memorandum was issued to  
8 the ACRS which requested that we should conduct a review and report back to  
9 the Commission on the current state of licensee efforts to transition to NFPA  
10 Standard 805. In particular, the review should include methodological and other  
11 issues that may be impeding the transition process, lessons learned from the  
12 pilot projects and recommendations to address any issues identified. Next slide.

13                   And the review should determine whether the level of conservatism  
14 of the methodology is appropriate and whether any adjustments should be  
15 considered. Next slide.

16                   As a context, you're aware that two pilot plants -- two plants were  
17 selected to pilot the transition process: Oconee and Shearon Harris. Shearon  
18 Harris safety evaluation report was issued in June 2010. The Oconee safety  
19 evaluation was issued in December 2010. Of note for Oconee is that the  
20 issuance of that safety evaluation started a time clock for -- a six month time  
21 clock for other applicants who have expressed a desire to transition to NFPA  
22 805. We are now nearing the end of that nominal time clock. Next slide please.

23                   Regarding our review of this transition process, we initiated several  
24 efforts. One effort involved a consultant we hired, Marty Kazarians who went out  
25 and interviewed industry practitioners and NRC staff to try to gain information

1 and insights from people who are actually performing the work and reviewing the  
2 work. It's a little bit different insight than you might gain through a public  
3 meeting. Our reliability and PRA sub-committee met twice on the issue in  
4 November and December of last year. The full committee completed their review  
5 in February and we issued our report on February 17. Next slide please.

6 I'd like to go through a few of the conclusions and  
7 recommendations from our report. First of all, a conclusion is that the guidance  
8 in NUREG CR-6850, EPRI 1011989, provides a sound technical basis for the  
9 development of fire PRA models and analyses to support the transition. Focused  
10 departures from that guidance will be necessary to address some plant specific  
11 issues, that's happened already; it will continue to happen. The staff has  
12 accepted those departures during the pilot plant reviews, provided that they have  
13 adequate technical justification and basis. Next slide please.

14 The PRA that's developed to support the transition is something  
15 that I'll call a baseline PRA. It includes typically simplified models and bounding  
16 values that are used for screening specific fire hazards and locations with more  
17 fully developed, best estimate models and numerical values for refinements of  
18 those initial analyses. This baseline fire PRA supports the staff's determination  
19 of assurance that overall safety will be maintained under the risk informed  
20 framework; however, the baseline PRA may retain conservative simplifications  
21 and assumptions. Next slide.

22 After a plant has made the transition and it's been approved by this  
23 staff, that PRA will then be used to support risk informed licensing applications.  
24 Excessive conservatism in those PRA models may affect the quality of decisions  
25 that are made during those post-transition applications, so conservatism in the



1 PRA is important for post-transition use of the PRA, less so for the PRA to  
2 support the transition. Conservatism is especially important for licensee self-  
3 approved changes, which are allowed under the framework, provided that the  
4 change introduces a minimal increase in risk. Because of this, further  
5 refinements of the models in data are needed for more realistic estimates of  
6 absolute risk and its relative contributors going forward after the transition. Next  
7 slide please.

8           We specifically were requested to examine sources of  
9 conservatism in the PRAs that are being developed for the transition process.  
10 We looked at possible sources of conservatism in the methods themselves and  
11 we identified three potential sources that are listed on this slide. One possible  
12 source would be arbitrary unilateral decisions and inflexible guidance that just  
13 dictate a particular methodology. We found no substantive evidence of that type  
14 of guidance.

15           Many people have indicated that the current methods are  
16 characterized as being immature. The methods that are presented in NUREG  
17 CR-6850 are based on fire analysis methods that have been evolving since the  
18 mid-1980s. In fact, the guidance in NUREG CR-6850 compiles that information  
19 and develops substantial enhancements in many cases to the methods. So it's  
20 really not appropriate to just generically characterize that guidance as immature.  
21 It is indeed developed based on a long history of practice.

22           The third possible source of conservatism in methods is not really  
23 due to the methods themselves; it's due to analysts decisions regarding the plant  
24 specific level of refinement that is applied within a particular PRA analysis.  
25 These are plant specific decisions, they're governed by a myriad of issues that

1 are too numerous to discuss in this forum, but it's a real decision. Decisions to  
2 retain simplified bounding models will inherently retain a certain degree of  
3 conservatism in those analysis. Next slide please.

4           We also looked at sources of numerical conservatism which is a  
5 little bit different than modeling conservatism. One possible source is a  
6 systematic bias in the numerical use of parameters. In fact, there is some  
7 evidence that this may exist primarily due to the interpretation and application of  
8 rather limited available fire test data. It's often been noted that there are very,  
9 very large uncertainties in many of these parametric values.

10           We noted that uncertainties by themselves are not a source of  
11 numerical conservatism. If the uncertainty adequately captures our current state  
12 of knowledge about a particular parameter, then the mean value is not a  
13 conservative value; it is indeed our best estimate for what that parameter is. We  
14 may be able to reduce the uncertainty later, but simply large uncertainties are not  
15 inherently conservative. Next slide please.

16           With respect to uncertainties, we noted that uncertainties were not  
17 quantified in either of the pilot plant PRAs nor are they currently being quantified  
18 in any of the in progress, what I'd characterize as "mature" PRAs that were  
19 discussed during our subcommittee meetings. We recommend that uncertainties  
20 should be quantified consistently with currently accepted methods and guidance.  
21 We believe that the quantification and display of uncertainties would enhance our  
22 understanding of the perceived numerical conservatisms in these results, and  
23 sources of that perceived conservatism and a full display of the uncertainties  
24 would enhance the characterization of the results for post-transition risk informed  
25 changes. Next slide please.

1           Regarding the overall plant risk profile, there has been some  
2 emphasis on keeping the results from fire risk assessments separate from the  
3 results from internal risks and other contributors. We don't feel that's  
4 appropriate. We feel that fire risk results should be fully integrated with the  
5 results from internal hazards to provide a better understanding of all the  
6 contributors to risk and their relative importance. That being said, when you're  
7 using these PRAs to evaluate post-transition changes to the plant, we feel that at  
8 the current time, it's appropriate to separately characterize the effects from  
9 changes in that risk from fires and from internal events in addition to the  
10 integrated effects. We feel that would be appropriate to better understand the  
11 context of the proposed change and the information that's available from the  
12 underlying PRA analyses. Next slide please.

13           In our report, we recommended a sequential submittal schedule  
14 that follows the industry's recommendations with a target completion of the  
15 submittals of June, 2012. So instead of having all of the submittals come in at  
16 the end of June of this year, an extension of that schedule allowed over the next  
17 12 months. We believe that this extended schedule would provide the ability for  
18 analysts to fully incorporate the lessons learned from the two pilot plant projects,  
19 provides time for industry peer reviews and resolution of technical issues that are  
20 identified during those reviews. We think that the sequential schedule would  
21 provide improved technical quality of subsequent submittals and allow the staff to  
22 focus on plant specific technical issues during each of those subsequent reviews  
23 rather than repeating generic concerns in each of the re-submittals. Next slide.

24           With regard to departures from the methods that are presented in  
25 NUREG CR-6850, it seems that the industry peer reviews are quite effective in

1 terms of evaluating the studies and the contributors and the effects from those  
2 departures. However the problem is that the schedules are very limited by the  
3 number of technically qualified independent experts. There just aren't that many  
4 people available to perform a very qualified review. We encourage the active  
5 engagement of an industry senior technical review group that's been established  
6 to evaluate departures from the methods and their generic applicability across  
7 the industry. And we also encourage timely staff communications of their  
8 technical positions with regard to issues that might have generic applicability.  
9 Next slide please.

10 EPRI in particular has a very well developed research program with  
11 regard to fire issues. Their short term research emphasizes primarily  
12 improvements to the fire events database. We encourage that because the use  
13 of actual plant operating experience should always be factored into risk  
14 assessment. We caution about use of the most recent fire experience over the  
15 last eight to 10 years, for example, and how that's integrated with the historical  
16 experience from -- that extends back over 20 to 30 years. We recommend that  
17 the enhanced database explicitly account for plant to plant variability as a  
18 contributor to the uncertainties in the fire event frequencies. We also  
19 recommend expedited development of data for what's characterized as  
20 complement level fire frequencies compared to the current plant level fire  
21 frequencies. It's an important issue. Next slide please.

22 I'd like to speak a little bit about the topic of electrical cabinet fires.  
23 They're typically identified as the most important contribution to fire risk, both in  
24 the two pilot studies and in the in-progress studies. The issue is very, very plant  
25 specific. The risk is determined by the location specific fire hazards, the

1 geometry of those fire hazards and targets, specific cables in the area and the  
2 functions of those cables in terms of the circuits that they carry. Realistic  
3 analyses of fire ignition, growth, detection, and suppression within these  
4 configurations are rather complex. I'd say even very complex. Next slide please.

5           Carrying on in the topic of electrical cabinet fires, NUREG CR-6850  
6 defines one general category of things called electrical cabinets. That approach  
7 is retained in all of the near term research activities to compile data and develop  
8 better information regarding these fires. We feel that that general category  
9 should be subdivided into more distinct functional groups. We think that that  
10 subdivision would facilitate improved treatment of the fire ignition frequencies, the  
11 potential fire severities and the risk effects from specific plant locations, rather  
12 than using kind of a one size fits all approach. Next slide please.

13           A couple of interesting observations from our investigations. One is  
14 that there has been very limited use of fire models for evaluating post-ignition  
15 growth severity and propagation to date. That's true for the pilot plants and it  
16 remains true at least for the more mature in-progress studies that we were  
17 briefed on. Those studies rely primarily on parametric values and rather  
18 simplified empirical correlations to develop information about fire growth and  
19 suppression. It's a complex topic, one of the reasons, I think, for that is there are  
20 relatively limited test data available to support anything more complex. And in  
21 many cases, the amount of information that's required to develop a more  
22 complex model, regarding specific geometry, ignition sites, combustible material  
23 loading within a cabinet, for example, or within a larger fire area, is very  
24 resource-intensive to develop. So the amount of work that's required to develop  
25 that information is substantial. Next slide.

1           The final interesting observation -- and this, quite honestly, came as  
2 a bit of a surprise initially -- is that, not surprising, is that multiple spurious  
3 operations, sometimes characterized as "hot shorts," are often very important  
4 contributions to the fire risk. However, that general topic of the evaluation of  
5 multiple spurious operations was not identified as a significant impediment to the  
6 NFPA-805 transition process; that was a bit surprising. When we spoke to the  
7 analysts, they explained that a comparable effort is required these days to  
8 identify the routing of cables, look at the circuits that are contained within those  
9 cables, and examine the effects of spurious operations, for both deterministic and  
10 probabilistic requirements.

11           The amount -- given the work that's required to do that -- the  
12 incremental amount of work to fold those results into the PRA is relatively small,  
13 compared to all of the other tasks involved. So, this in total is a large task, but it's  
14 required regardless of which path you go down, the probabilistic or the  
15 deterministic path. And with that, I will conclude my presentation.

16           CHAIRMAN JACZKO: Thank you.

17           DR. KHALIK: At this time, I'd like to call my colleague Harold Ray.

18           MR. RAY: Thank you, Said. Thank you for this opportunity to  
19 share our experiences with an ongoing project, the transition of an existing  
20 certified design to support the first construction of the plant. Next slide. 37.

21           These five letter reports were issued between December 2010 to  
22 February 2011. And as I will discuss in a bit, they include a comment that's a  
23 little unusual, saying that the ACRS requests the staff to review with us any  
24 changes in commitments which deviate from those described during our review.  
25 Normally, we review final product; In this case, that was not possible. And this

1 provision, therefore, was included in our letters, and we look forward to any  
2 additional review that's required. Next slide.

3           This review was conducted in an 18 month period. And as I've  
4 suggested, I think it's a learning experience for all concerned. It was definitely  
5 successful, in the Committee's judgment, because both the staff and the  
6 applicants were committed to support even responsive interactions with the  
7 ACRS. And that commitment was maintained throughout. The reference COLA  
8 was initially Bellefonte and was revised to become Vogtle by the design center  
9 during our reviews. So that was another difference from what we would think of  
10 as the norm.

11           Initially, we used a parallel review process for the design  
12 certification and the reference COLA. And it seemed logical at the time, but we  
13 changed to what I'll characterize as a "priority based review." And what this  
14 means that initially, it seemed logical that we would review a reference COLA  
15 safety evaluation report chapter at the same time we reviewed the corresponding  
16 design certification amendment chapter. But after one of our initial two-day sub-  
17 committee meetings in July 2009, when we had 45 separate and distinct  
18 presentations in that two day period, we thought it was clear that we needed to  
19 change our approach, and I think everyone agreed.

20           Reviewing an amendment to a certified design is a different thought  
21 process than reviewing an initial application. And I think that's one of the things  
22 we all need to recognize. You're looking at a change to something that's been  
23 certified, on the one hand, or you're looking at it a de novo application, describing  
24 a particular topical area, on the other hand. And these two things don't work too  
25 well when they're combined in this way.

1           So we assigned our first priority to review of the design certification  
2 and then only reviewed the reference COLA when there was no design  
3 certification material available at that point in time for our review. This required a  
4 great deal of scheduling flexibility by all concerned, and it was successfully  
5 achieved, I believe. Next slide. 39.

6           The DCA review process, one lesson that we learned also,  
7 although I'm not sure how much we can incorporate this lesson; but it's a lesson,  
8 nevertheless, is the definition of the changes is vital to an effective ACRS review.  
9 And what we mean by this can be illustrated as follows: When submitted in  
10 2008, revision 17 to the design certification contained 590 changes, only 27 of  
11 which were classified by the applicant as editorial.

12           So, each substantive change then affected somewhere between  
13 five and 10 text pages, we figured. And the roadmap that correlated these two  
14 things, that is all the text changes to the many chapters with the individual  
15 changes in design, was 93 pages long. So although an effort had been made to  
16 correlate the changes with the text, it was very, very difficult to implement as we  
17 proceeded with our review.

18           The number of changes, as I said, started out at 590 and grew over  
19 time. And it continued throughout our review period, which gave us an  
20 opportunity at the end, as I'll mention, to reinforce the lesson that I'm focused on  
21 here. The chapter-by-chapter review of the text revisions makes the change  
22 definition difficult, as I've said. And oftentimes, you're looking at material that has  
23 been changed by -- or altered -- the text has been altered by many different  
24 design changes.

25           By contrast, we had a category of changes called "late submitted



1 changes.” During our review process, it was late, anyway. And these were  
2 reviewed individually, not on a chapter-by-chapter text basis. And this contrast  
3 demonstrated to us, anyway, the benefit of reviewing these changes individually,  
4 rather than as hundreds of changes superimposed in the same text. But we  
5 recognize the chapter-by-chapter staff reviews, on the one hand, and the ACRS  
6 review of individual changes, on the other hand, would be a scheduling  
7 nightmare and require a lot more time. So it may be that this is a situation for  
8 which there isn't any clear and obvious solution. It's just something to be well  
9 aware of.

10           Of course, this is because of staff review of necessity is organized  
11 on a chapter-by-chapter basis. And the ACRS review of a change could not  
12 occur if we reviewed the changes individually until all the chapters have been  
13 reviewed. Next slide, 40.

14           In addition to this challenge, we had scheduled the parallel DCA  
15 and COLA reviews that I mentioned already. And we established priorities for  
16 conducting the review with the DCA ahead of the reference COLA. And then  
17 that, of course, ahead of the S-COLA. And we were able, in the end, to identify  
18 more clearly than otherwise we would have been able to do the changes being  
19 made to the certified design.

20           And I want to again acknowledge the Design Center as having  
21 greatly facilitated the management of the reviews during this evolving process.  
22 They had to respond to many changes so that we could use our time  
23 productively, as it became available, while adhering to priorities that we had  
24 established. And of course, also, as I mentioned, the Design Center enabled us  
25 to make the transition quite smoothly from Bellefonte to Vogtle.

1           A consequence of the parallel reviews that was of some concern  
2 was that the COLAs required revisions -- do require revisions -- following the  
3 ACRS review, to reflect the finalized design certification. And our -- as I  
4 mentioned already -- our letters, therefore, already include provisions seeking to  
5 have the staff come back to us with any changes or commitments, which deviate  
6 from the presentations that were made to us, and we anticipate that that may  
7 occur. Next slide, 41.

8           Conclusions. The ACRS feels that the changes to the certified  
9 designs should be presented to the ACRS as individual changes, rather than as  
10 revisions to the effected text on a chapter-by-chapter basis. In the case of the  
11 AP1000 design certification, with over 500, as I've said a couple of times  
12 changes going in, some big, but many small. The effect of doing this on the  
13 review schedule is unclear and therefore, we don't want to do more than merely  
14 make it as an observation, not as something that we would insist to be done in  
15 the future, but take it into consideration.

16           This is the way, of course, that the applicant develops changes, is  
17 change by change, not on a chapter-by-chapter basis. And therefore the logic  
18 that we would apply to reviewing the change is much easier to do on that basis.

19           Finally, the COLAs referencing a certified design should be  
20 reviewed after the design certification is completed. That, of course, is the  
21 process that was contemplated in Part 52, was not able to be implemented here.  
22 And I believe we successfully managed the process. Normally, I think it will  
23 naturally be the case that the COLAs will come forward with an established  
24 certified design already in place. That completes my conclusions. And turn it  
25 back to you.

1 DR. KHALIK: Thank you, Harold. At this time, I'd like to call on our  
2 colleague Mike Ryan.

3 DR. RYAN: Thank you, Said. Good morning, Mr. Chairman,  
4 Commissioners. It's my pleasure to present the Committee's insights to the  
5 comparison of the techniques of integrated safety assessment and probabilistic  
6 risk assessment for fuel cycle facilities. Next slide, please.

7 The staff was directed in a May 12, 2010 Staff Requirement  
8 Memorandum, to prepare a paper that compares ISAs for fuel cycle facilities to  
9 probabilistic risk assessment methods and to seek the ACRS's review. The  
10 subsequent SRM from August 4, 2010 stated that it disapproved the staff's plan  
11 to develop a revised fuel cycle oversight process and looked forward to the ISA  
12 PRA comparison paper and the ACRS letter to better inform the proposed  
13 enhancements to the oversight process.

14 It gave the direction to the staff on how to enhance the oversight  
15 process, for example, to offer incentives to maintain a strong, corrective action  
16 program, give credit to licensees for maintaining an effective issues identification  
17 and resolution program, as examples. Next slide, please.

18 The earlier letter, in 2002, from the Advisory Committee on Nuclear  
19 Waste letter also recommended that the staff enhance their overall  
20 understanding of total system risk and to use ISA as a logical path to PRA to  
21 enhance treatment of dependencies, to acknowledge the importance of  
22 aggregated risk, and to increase quantification and treatment of uncertainties. In  
23 the letter -- 2010 ACRS letter -- the Committee also noted that the term "risk" is  
24 defined differently within an ISA framework, that is, where scores -- where  
25 individual accident sequences are scored rather than evaluated numerically. It's

1 not consisted with the standard PRA practice that aggregates scenarios into an  
2 overall measurement of risk. Next slide, please.

3           The ACRS noted, during its review of the paper, that ISAs were  
4 acceptable for meeting Part 70 requirements. There are important differences  
5 between ISAs and PRA methods, and there are advantages to moving the ISA  
6 processes systematically in the direction of PRA and in particular PRA insights  
7 may be useful in determining the risk significance of inspection findings.

8           Additional points made in the ACRS letter were that ISAs provide a  
9 structured framework for capturing sequences, ISAs may be qualitative or  
10 quantitative, ISAs do not provide an overall system risk perspective, and ISAs  
11 are used to assure that performance requirements in 10 CFR 70.61b and c are  
12 met; namely that the frequency of high consequence events must be highly  
13 unlikely that the frequency or intermediate events must be unlikely or the  
14 consequences must be reduced so that they are no longer a higher intermediate  
15 consequence event. There's little ISA guidance on how to treat common-cause  
16 failures, systems interactions, or human actions within the process.

17           Some key PRA advantages to consider are the use of PRAs within  
18 the regulatory processes is well-established. Applicants for certified power plant  
19 designs are required to perform and submit a description of their design specific  
20 PRA. Operating plant licenses use PRAs to assess safety performance and to  
21 enhance plant operation. The NRC uses PRA models to support safety  
22 evaluations of operating reactors to the reactor oversight process. PRAs are  
23 realistic and they provide relative risk importance of contributors to risk. Relative  
24 risk helps in a number of areas, including plant inspections and maintenance  
25 activities. Next slide, please.

1           Some key points to consider are that ISA methods are adequate for  
2 simple facilities, while PRA methods have an advantage when applied to  
3 complex facilities. For more complex facilities, insights from PRA can be used to  
4 risk rank systems, structures, components, and human actions or errors. Risk  
5 ranking can be used to provide an integrated perspective to better allocate  
6 resources for inspection, monitoring, and maintenance on maintaining items  
7 relied on for safety.

8           The conclusions reached by the ACRS are -- it's in the next slide,  
9 please. Got it -- the staff comparison study provided a clear exposition on the  
10 advantages and disadvantages of ISA versus PRA. The Committee agrees that  
11 ISAs are adequate for licensing fuel cycle facilities under Part 70. The  
12 Committee continues to see an advantage in moving the ISA process  
13 systematically in the direction of PRA. PRA provides better treatment of  
14 dependencies, human error, and uncertainties. And PRA has the ability to risk  
15 rank safety systems, components, and can enhance regulatory decision-making.  
16 Next slide, please.

17           The staff should continue to develop and test the use of focused  
18 PRA-like analyses to help assess the risk significance of inspection findings at  
19 fuel cycle facilities. PRA can help to focus inspections on risk significant areas  
20 and PRA also provides a more objective perspective when assessing risk  
21 significant findings. Next slide, please.

22           The Committee continues to support the use of PRA over ISA,  
23 especially for complex facilities with high consequences. The Committee plans  
24 to continue to interact with the staff on the cornerstones of safety for fuel cycle  
25 oversight process and matrices to evaluate performance at fuel cycle facilities.

1 Thank you very much for your time and attention.

2 DR. KHALIK: At this time, I'd like to call on our colleague Dennis  
3 Bley to present the final presentation.

4 DR. BLEY: Thank you, Said. I'll be talking about -- I'm recently on  
5 small modular reactor reviews. Slide 53, please.

6 Just as background, I wanted to remind us all of the SRM and the  
7 SECY that was written in response to that. Your SRM of August last year  
8 directed the staff to integrate risk insights and develop risk-informed licensing  
9 review plans for small modular reactors. They had to build on the SMR and  
10 NGNP review insights and NUREG-1860, the so-called "technology neutral  
11 framework," to develop a new risk-informed licensing framework for the longer  
12 term. And finally, it asked that they identify resolution strategies for policy issues  
13 related to SMR licensing described in SECY-10-0034.

14 In response, with SECY-11-0024, risk insights and SMR reviews,  
15 the staff laid out a plan for a risk-informed framework for integrated PWR  
16 reviews, for risk-informed design specific review plans, also for each iPWR  
17 design, and in the longer term, a new risk-informed regulatory framework. On  
18 the next couple of slides, we'll dig into some of the details on the proposed staff  
19 approaches. Slide 54.

20 First, we'll talk about the iPWRs. Staff has developed a risk-  
21 informed review framework for near-term iPWR designs. The framework is  
22 included in the revised introduction to the SRP. And it's consistent with current  
23 regulatory requirements and Commission policy statements. It asks for a graded  
24 review, based on safety and risk significance. They also laid out an approach for  
25 developing design-specific review plans, tailored for each iPWR design, which is

1 important to adapt the SRP to examine unique design features of each iPWR and  
2 to eliminate aspects of the general SRP that don't apply to those designs. Next  
3 slide; 55, I think.

4 In the longer term, staff proposes a multi-step process for working  
5 toward a risk-informed performance based new regulatory framework. The first  
6 step of that process is to acquire insights pertinent to iPWR designs by  
7 conducting a pilot review of an iPWR design application, applying the principles  
8 of the technology-neutral framework, in parallel with the formal review, using the  
9 design-specific review plans.

10 The second step is to focus on the HTGR designs and that would  
11 have them compare and contrast the proposed NGNP regulatory approach with  
12 the principles of the -- that were in the technology-neutral framework.

13 The third step would be looking at liquid metal designs. And there,  
14 it would compare that same general approach with whatever approaches have  
15 been developed for the liquid metal designs; and right now, they're talking of  
16 picking those ideas from international forums and ANS 54.1.

17 And finally, step four would be to consolidate all of those insights  
18 from the earlier steps to put forward a risk-informed performance-based  
19 regulatory framework recommendation to the Commission. Next slide,

20 We issued a letter on the staff plan in March of this year. And in it  
21 we said that the draft framework for near-term iPWR application review -- this is a  
22 good first step; it still needs to be tested and worked out in more detail. We also  
23 said that development of those design-specific iPWR review plans is really a very  
24 crucial step to ensure high safety standards are maintained for these unique  
25 designs, and that that development is closely linked to the development of

1 complete and stable designs.

2           Continuing on. We asked that they consider a PIRT-like process to  
3 guide development of the design-specific review plans. And there, we were just  
4 saying, "Come up with a scheme for identifying the most important issues and  
5 ranking them to make sure that they get factored into those design-specific  
6 review plans." In the longer term approach, for license review of the non-LWR  
7 SMRs, the approach taken is really the logical extension of NUREG-1860, to  
8 develop design-specific frameworks. And that's consistent with our past reports  
9 on these issues.

10           And finally, the proposed pilot studies can provide necessary  
11 information for full development of a new framework, while not putting the  
12 licensing process in risk, because it's being doing in parallel with the first  
13 approach that was developed.

14           We note that sometime after our letter, in May of this year, you  
15 issued an SRM that approved the framework for iPWRs and approved the  
16 longer-term development of a new licensing structure. Slide 57.

17           Additional considerations that we have outlined. Staff has begun  
18 incorporating the lessons learned from recent design certification reviews into  
19 those design-specific review plans for iPWRs, and we were pleased to hear that.  
20 The risk-informed aspects of some anticipated SMR applications have indicated  
21 that they will require more thorough and complete PRAs available at an earlier  
22 stage than has been necessary for what's been going on for the design certs  
23 under Part 52, because they're actually trying to implement some risk-informed  
24 features into the designs. To do that, we think it requires a site-specific PRA or a  
25 PRA that somehow bounds the external events for a range of potential sites. I'm



1 not changing the slide. I just have my notes up here.

2 And finally, if these SMRs end up being selected for use in some  
3 remote and harsh environments, it could require specialization of data and  
4 design assumptions beyond that that's covered in the general approach. Next  
5 slide, please. 58.

6 And going forward, we look forward to following the staff's  
7 implementation of the proposed frameworks and resolution of strategies of  
8 related technical and policy issues. We did make note that some of these novel  
9 designs, proposed for some of the SMRs, highlight a concern we've been -- is  
10 growing, I guess, in the Committee. And that's that there is some need for  
11 criteria defining when experimental demonstration of predicted plant performance  
12 is needed to provide confidence in complex computer models. Some of these  
13 models are getting more and more complex, and are justified by referencing  
14 other computer models, and some where you need a link back to the real world.  
15 And that concludes it.

16 DR. KHALIK: Thank you, Dennis. That concludes our formal  
17 presentation.

18 CHAIRMAN JACZKO: Great. Thank you. We'll start with  
19 Commissioner Magwood for questions.

20 COMMISSIONER MAGWOOD: Thank you, Chairman. Well, first,  
21 at the risk of sounding like I'm repeating accolades given on Veterans Day -- this  
22 has nothing do with you guys, so just stand by for a moment. I always like to  
23 point out points of history that are important. Today is D-Day plus 67. And I  
24 always like to have the opportunity to meet veterans of World War II. I don't think  
25 there is any in the room. If there are, please let me know. But if you do know a

1 World War II veteran, please shake his hand today and thank him.

2 As for you folks, welcome. It's a great pleasure to have you again.

3 I wanted to reiterate the Chairman's comments that we appreciate the great work  
4 that the ACRS has done. And I know it's been a lot of work. And I wanted to  
5 start with a very general question, just to make sure that in all the work that  
6 you're doing, do you have all the resources, the information, cooperation from the  
7 staff, whatever else that you need to do it.

8 DR. KHALIK: By and large, we do. There are maybe some  
9 specific cases where the staff's scheduling may not permit the sort of prompt  
10 transmission of information that the Committee needs, but by and large, we have  
11 the cooperation of the staff in all aspects of our review.

12 COMMISSIONER MAGWOOD: I appreciate that. Let me ask a  
13 question about the fire PRA. I know, one of the things in the ACRS's work, and I  
14 think in your comments today that came out on several occasions is that there  
15 does, in some cases, there is a dearth of actual empirical testing data. Has that -  
16 - have those requirements or those needs, weaknesses been clearly identified  
17 anywhere? Or is there anyone, at least, whether it's anybody doing the research  
18 on it. Or is it well characterized?

19 MR. STETKAR: I think the need for the research is well-  
20 characterized. NRC Research is aware of all of the issues that have evolved  
21 from both the performance of the fire PRAs for the pilot plants and more  
22 generically, in terms of the methods developments, through NUREG CR-6850.  
23 Scheduling the resources to perform the necessary testing, to support the  
24 derivation of that data is a separate issue. Research has a very well developed  
25 plan that identifies the required tests. Getting them implemented in a timely

1 manner, I think, is a bit of a challenge.

2 COMMISSIONER MAGWOOD: And that -- I imagine that includes  
3 the cabinet?

4 MR. STETKAR: It includes fire testing on cables is reasonably well  
5 developed. Fire testing on cabinets is in the plan, but it moved out a little bit on  
6 the schedule. And in many cases, resources of obtaining real cabinets with real  
7 inventories of actual, you know, cable material and what else is in there is  
8 difficult. It costs money to actually, you know, to find these things. So, it is a  
9 challenge to get that testing done. And then, as you know, it's rather expensive  
10 to perform the tests. So you need to tailor the test program to make sure that it's  
11 responsive to the needs of the people doing the work, which is a bit of the  
12 problem with the much earlier test data that's available, primarily from the early  
13 1980s. Those tests were not performed for the specific purpose that the results  
14 are now being used.

15 COMMISSIONER MAGWOOD: That kind of echoes a comment  
16 that Dennis made at the end of his presentation, there is a, you know -- I don't  
17 want to call it a "fad" or anything, but there's certainly a lot of energy being put  
18 into computational methods to solve a lot of these issues. And I think the  
19 question about whether they're all being fed by empirical data or whether they're  
20 being fed by other calculations is a question mark.

21 MR. STETKAR: In truth, Commissioner, that's -- what we've seen  
22 is a lot of the work done, let's say in the late '90s, in terms of methods  
23 development was exactly that problem, in the fire area, where we're developing  
24 much more sophisticated codes to evaluate, let's call it the "fire physics of the  
25 problem." They were derived primarily from earlier simplified codes, without the

1 underlying empirical data to verify the models.

2 COMMISSIONER MAGWOOD: Speaking of codes, I recall that in  
3 the, I wrote down the February 17 letter, you had some issues with the software  
4 that was being used for the PRA. I wondered if you -- has the -- what's  
5 happening in the intervening time? Have you resolved any of those issues?

6 MR. STETKAR: No. And in fact, in the letter, I think we were fairly  
7 careful to qualify that. The comments on the software were something that we  
8 obtained, both in our sub-committee meetings and from the interviews with the  
9 practitioners. That was simply volunteered as information about why they were  
10 not propagating the uncertainties. We didn't have the opportunity to do more in-  
11 depth review of what -- if real problems are, what the real issues are. And we  
12 haven't had any follow up meetings in that regard.

13 COMMISSIONER MAGWOOD: It's a question.

14 MR. STETKAR: It's still an open question. We made a clear  
15 recommendation to try to quantify and propagate the uncertainties. Whether  
16 that's being implemented in the current PRAs that will be submitted in the near  
17 term, we don't know.

18 COMMISSIONER MAGWOOD: Let me jump back to Dennis for a  
19 moment on the small modular reactors. I appreciated the letter. I thought the  
20 analysis you've provided was interesting. One question I had that always come  
21 to mind for me -- I ask this question a lot, so I thought I'd ask it today. Is there  
22 anything you're finding, as you go through the discussion about the framework for  
23 small modular reactors, particularly using the risk-informed frameworks, that is  
24 particularly unique to small modular reactors? Is there anything in what you've  
25 seen so far that makes you think that small modular reactors ought to be handled

1 in a fashion that's specifically different than you would handle any other reactor?  
2 I mean, aren't they just reactors? Or are the differences small.

3 DR. BLEY: I think that's a very interesting question. We have not  
4 looked at any small modular reactors as yet, as a Committee. We haven't seen  
5 any designs. We haven't gotten into them at all. We've only looked at these  
6 higher level documents. We've been informed a bit, and that's where that -- the  
7 one comment about the models comes from. There are assumptions that, yeah,  
8 these are just light water reactors and we can just use models we've had from  
9 before. And I think there's a general feeling on the Committee that we don't  
10 know that's true yet. And it needs to be examined. But I don't think we can  
11 address that definitively until we actually start looking at some designs. Now,  
12 some of our members have seen designs, but not as part of our work. Anybody  
13 else have --

14 COMMISSIONER MAGWOOD: Yeah, I was going to see anyone -  
15 - any other comment on that point. Excellent. Thank you very much. Thank  
16 you, Chairman.

17 CHAIRMAN JACZKO: Commissioner Ostendorff?

18 COMMISSIONER. OSTENDORFF: Thank you, Mr. Chairman. I  
19 want to join my colleagues also in thanking the ACRS for your significant  
20 contributions to the NRC and to the safety side; I appreciate your leadership.

21 I want to start out with Mike on the ISAs and PRA paper. And I  
22 want to talk about it, maybe bore down a little bit here. With expect to using a  
23 PRA approach to looking at human factors, human errors, can you talk a little bit  
24 about what we know about human errors in the fuel cycle arena, and maybe  
25 draw any comparisons to human errors in the power reactor side?

1 DR. RYAN: I'd be happy to, but Dennis is really our expert --

2 COMMISSIONER OSTENDORFF: Okay.

3 DR. RYAN: -- in this area. So I'd ask Dennis to answer the human  
4 reliability aspect of it.

5 COMMISSIONER OSTENDORFF: Okay.

6 DR. BLEY: Yeah, there are some things that are different.

7 Because in -- we're talking about process plants here, and people involved in  
8 generally automated process plants, but at the place where people interact with  
9 that automation. There's a lot of work done in other industries, in the process  
10 industries in this area.

11 Staff has done some research and put together some beginnings of  
12 approaches for how they would like to deal with human error in those kinds of  
13 situations, but I think they can borrow from work that's been done in the process  
14 areas. And the people on staff who were involved in that have actually had some  
15 experience working on those other fields. So there's a lot of things that are -- that  
16 are more routine -- just making sure the process works. It's not generally like  
17 responses to events in the reactors. We have all the emergency procedures.

18 Some things we saw in other chemical areas were when automated  
19 processes had to be stopped because of problems and people had to go in and  
20 do maintenance. And I saw a lot of this done for the Army and their chemical  
21 weapons programs. One of the most common kinds of problems is you stop the  
22 process, you remove the material you were working on, you do the maintenance,  
23 you fix everything, you put it back together, and you put whatever you were  
24 working on one step further down the process than where it was when you took it  
25 off. And all of a sudden, it's not ready for the next step and problems happen at

1 that point. That kind of error was very important. And it's not the kind of thing we  
2 see a lot, except in some maintenance activities in the reactor plants.

3 So, it's more like the kinds of human reliability work that you do for  
4 maintenance activities in the reactor plants than it is like the emergency  
5 procedures. And there may be places where, in fact, it's more of the emergency  
6 procedure kind of operation, but I think that's not the bulk of the work.

7 COMMISSIONER OSTENDORFF: Let me follow up with one other  
8 question. Either Mike or Dennis, however you want to respond on this one,  
9 related. Mike, one of your slides talked about the use of ISAs in the chemical  
10 industry. Any commentary has the chemistry or chemical engineering refineries,  
11 large processing, the Duponts, the Dows, et cetera, have those big chemical  
12 companies looked to using PRA as part of a methodology to help them improve  
13 safety? Or are they strictly wedded to the ISA approach?

14 DR. RYAN: I think the answer is in part, the larger chemical  
15 industries, and Dr. Banerjee, who is not with us today, can address that more  
16 fully, do use PRA-like kinds of analysis. It's not a full-blown PRA, but they do  
17 evaluate risk information, particularly for high-hazard activities and high-hazard  
18 materials. But are they using full-blown PRAs, as we would in a reactor?  
19 Probably not exactly.

20 DR. BLEY: Well, some are and some aren't. The ones who are  
21 that I've worked with don't share it with anybody. It's very proprietary. And so  
22 you don't get to see it. Again, the Army, with their chemical weapons destruction  
23 facilities, are process plants. They did a lot of it. But after 9/11, they took back  
24 most of what they'd had as public information and tried to pull it back in, although  
25 it was in depository libraries around the country for a long time.

1 COMMISSIONER OSTENDORFF: Okay. Thank you. John, I'll  
2 turn to some fire questions for you here. Same line of thought, asking, you know,  
3 Dennis and Mike about the chemical industry. Are there any industries outside  
4 the nuclear sector, where you and your efforts have looked at, to maybe glean  
5 some best practices on fire protection and approaches?

6 MR. STETKAR: Not from my personal experience. I think that my  
7 experience is that other industries tend to use standard industrial fire protection  
8 guidance, in terms of developing their fire protection plans. I'm not aware of any  
9 other industries. I don't know, Dennis, if you've seen anyone do a -- the type of  
10 integrated probabilistic treatment of fires that we've done in the nuclear  
11 business?

12 DR. BLEY: I've seen it in two places. Again, the Army's done a fair  
13 amount of it. And a couple of the -- driven by the air quality management district,  
14 out in California -- some of the refineries have done some of it.

15 COMMISSIONER OSTENDORFF: Okay.

16 DR. BLEY: But I don't think it's general practice.

17 COMMISSIONER OSTENDORFF: Okay. Dr. Ryan, on one of  
18 your slides, one theme that appeared to be there was there were a lot of site-  
19 specific, location-specific approaches. Are there any concerns that there is such  
20 a specificity to some of these analyses that you don't have sufficient  
21 harmonization across the board for the commercial reactors?

22 DR. RYAN: One topic we've taken up in part is that there's a very  
23 wide range of material facilities. A very simple fuel manufacturing, you know,  
24 that produced centered, you know, pellets of uranium and put them in fuel pins,  
25 all the way up to very complicated chemical processes with lots of organic solids



1 containing wastes that are going to be processed by combustion. So, that wide  
2 range of facilities, unlike reactors, where there's a fairly close envelope around  
3 them -- makes answering that question a little bit complicated, because you really  
4 have to define what part of this range of risk of very small risk, radiologically or  
5 chemically, up to high radiological consequence and lots of chemicals. I mean,  
6 for example, at the Savannah River site, we understand there are 13,000 IROFS,  
7 as opposed to a dozen. So, it's a very different range of environment, which  
8 makes it a more complicated question to answer. So, with that, John --

9 COMMISSIONER OSTENDORFF: John, and then -- thank you.  
10 And in the fire protection area -- harmonization question.

11 MR. STETKAR: Harmonization is a difficult issue. For existing  
12 plants, existing operating reactors in the U.S., the evaluation of fire risk is a very  
13 plant-specific issue, primarily because many of the decisions about electrical  
14 cable routing, which tends to be the most difficult issue to address in a fire PRA --  
15 were done by the particular architect engineers. So even though you might have  
16 two nominally identical units, same vender, same nuclear design, issues that  
17 affect the fire risk of those plants may be very, very difficult, simply because one  
18 architect engineer decided to use one set of criteria for routing cable trays and a  
19 different architect engineer used the same licensing criteria but a different routing  
20 scheme.

21 You can use the same general methods to evaluate each of those  
22 configurations, but it requires a very, very plant-specific analysis to both identify  
23 particular fire hazards and the particular vulnerabilities, because those circuits  
24 affect different pieces of equipment. So, unfortunately for the current operating  
25 fleet, it becomes a very site -- very plant-specific analysis. Same general

1 methods, perhaps very different conclusions for two otherwise, what you might  
2 consider nominally, very similar plants.

3 Many of those issues become less important with the new reactor  
4 designs, that tend to be more standardized, both in terms of the actual plant  
5 design and configuration and more standardized in terms of the actual geometric  
6 layout of the plant.

7 COMMISSIONER OSTENDORFF: Thank you. Thank you, Mr.  
8 Chairman.

9 CHAIRMAN JACZKO: Commissioner Svinicki.

10 COMMISSIONER SVINICKI: Well, thank you all for your service on  
11 the Committee. And that extends of course to your colleagues who've not yet  
12 traveled in for your meeting this week, so I thank all of you. I'm going to start with  
13 fire protection, because I was listening carefully, John, to your answer to  
14 Commissioner Ostendorff. I had a similar question about all the site-specific  
15 approaches in the NFPA 805 license amendment request. But it was a little bit  
16 different. I was going to ask you if in looking at the pilots and the staff's review  
17 process, the Committee had found in any instances that we had perhaps  
18 needlessly overcomplicated the assessment. I've expressed, I think, publicly, an  
19 aspiration that I have that the staff's review could maybe, after the pilots, take  
20 less time than it has taken for the pilots. And, you know, we also wanted to have  
21 lessons learned that would inform the subsequent license amendment request.  
22 Did you identify any instances where, you know, frankly, we kind of maybe  
23 overcomplicated the process and we could approach it? I know you mentioned  
24 the component level as opposed to the site-specific analysis, but what's your  
25 assessment of how much efficiency could be gained there?

1 MR. STETKAR: I really can't comment on that because,  
2 unfortunately, as a Committee, we have not been involved in either of the pilot  
3 plant projects. We've not reviewed the staff's review of those submittals, so as a  
4 Committee, we're not in a position where we can comment on, you know, your  
5 concerns about resources or complexity of the reviews and things like that.  
6 I think -- the only comment I can make, from what we did learn during our  
7 investigations, is the pilot plants have provided, I think, a very, very valuable  
8 learning experience, both certainly for the industry, the people doing the  
9 analyses, and for the staff. The staff was developing their guidance and  
10 understanding of how to do these reviews, kind of in real time for those pilot  
11 plants. I know that they're -- the staff is developing or has developed, I believe  
12 it's still in progress, a lessons learned paper from those reviews. We've not seen  
13 that yet.

14 COMMISSIONER SVINICKI: Okay. Thank you. That's helpful.  
15 In the -- turning to the small modular reactor area and the Commission has  
16 directed the staff to prepare a Commission paper that will explore the feasibility  
17 of including risk-information and categorizing SSCs as safety-related or non-  
18 safety-related, and I wondered if the Committee could offer, in the area of small  
19 modular reactors, any considerations they might have identified, in terms of the  
20 feasibility of that assessment. And I guess, underlying the question is, if we can't  
21 get completely away from deterministically designating what is and isn't safety-  
22 related, how far -- do you have any thoughts about how far we could go in that  
23 direction?

24 DR. BLEY: I don't think there's anything unique here, for the small  
25 modular reactors. But I think we've seen enough to be able to say if they do

1 thorough risk assessments, then from that they can define the things that are  
2 important to risk. And, you know, you have this historical thing where we have  
3 important, safety-related, not safety-related, important to risk, not important to  
4 risk. It's a bit messy, isn't it?

5           The risk assessments, if they're done thoroughly, could let you  
6 identify what's important to risk. And that's about the best I think we can say on  
7 that. Otherwise, if you put together a thorough basis in framework for identifying  
8 those things, I think the distinction of safety-related, not safety-related could  
9 eventually go away, but you'd need a solid framework to get there. And right  
10 now, the traditional basis for coming up with safety-related, not safety-related,  
11 gives us an anchor point that I don't think you'd want to release until you had a --  
12 and we haven't talked about this in detail, so this is just me speaking. But I think  
13 you wouldn't abandon that until you had a really solid framework for identifying  
14 what's important to risk that gave you confidence and considered uncertainty  
15 completely.

16           COMMISSIONER SVINICKI: And your letter report of March 16; it  
17 did have this statement. I think this probably has applicability broader than  
18 SMRs, but this was a statement that the Committee made in their report.  
19 "Experience has shown that initial use of simplified models to make preliminary  
20 risk determinations with later development of a more complete PRA should be  
21 avoided because that process will likely introduce inefficient and counter-  
22 productive review iterations as the SSC populations in each significance category  
23 change over time."

24           I guess what I'd ask you about that -- so, that's what the Committee  
25 advocates to be avoided. Can you just, at a very high level, indicate what you

1 would recommend be done? Because it sounds like the recommendation is to  
2 start with a fully informed -- and produce a fully informed PRA. That doesn't  
3 strike me as being terribly realistic.

4 DR. BLEY: Would you prefer to address that, or shall I?

5 MR. STETKAR: You can start.

6 [laughter]

7 DR. BLEY: We've had a lot of concerns about, you know, shortcut  
8 first looks at dealing with this, and worries that maybe, if you start that way, it's  
9 hard to add the more important things to the list later on.

10 COMMISSIONER SVINICKI: But that is really the nature of how  
11 we develop and evolve a lot of analytical methods. So, why is it particularly  
12 problematic to you here?

13 DR. BLEY: We tend not to -- I have to be a little careful on this one.  
14 We tend not to make, if this is fair, regulatory decisions, shortcut analyses.  
15 We've developed a structure for doing rather thorough analysis that are put in  
16 place first. On the PRA side, we've seen examples of cases where people tried  
17 to take a PRA of something that's a little similar, and just make a few changes to  
18 it, and assume it was okay. And when you dig into the details, the risk really  
19 comes from the -- from the interactions among systems. When you have a well-  
20 designed system, independent, single failures aren't important, it's the  
21 dependencies that get you in trouble, it's the interfaces between systems that  
22 meet design rules but aren't quite aligned in the optimal way, and you don't see  
23 that until you dig in some detail. So we've seen that those kinds of analyses that  
24 don't look at the detail, often come up with a lot of gaps, and we're not sure when  
25 those gaps get filled. I think you might want to add a little to that.

1 MR. STETKAR: I think that that's a large part of the problem. A  
2 second part of the problem is that, unlike deterministic design analyses, PRAs  
3 develop a numerical value. You have a numerical value of core damage  
4 frequency, or a large early release frequency, or whatever metric you want to use  
5 for that particular analysis.

6 Initial PRAs develop an initial estimate of that numerical value.  
7 That numerical value then starts to take on a life of itself, and enhancements to  
8 the PRA to identify other contributors to risk, as Dennis mentioned, as you do  
9 more thorough evaluation of dependencies, of other possible contributors that  
10 you may have, for whatever reason, screened out in your initial simplified study.  
11 There's an inherent reluctance to admit, quite honestly, that they may increase  
12 the value of that numerical parameter. So if you're not careful about assessing  
13 all contributors in your initial study, even with a numerically conservative  
14 bounding analysis, not discarding things but including them, so that your initial  
15 study develops a truly maximum value for that estimated risk, which can then  
16 later be refined, you run a real risk of evolution of these studies that have the  
17 possibility of, I have to be careful about how I say this, but the possibility that  
18 there may be incentives to not increase the numbers. Let's just leave it at that.  
19 That's another one of our concerns --

20 COMMISSIONER SVINICKI: Ok, and, and --

21 MR. STETKAR: -- about doing the, sort of, simplified studies,  
22 especially where those simplified studies discount things, rather than explicitly  
23 including them, perhaps, with either a bounding analysis or an appropriate  
24 characterization of the uncertainties about --

25 DR. BLEY: If you could cover the uncertainties well, I think you can

1 do it, but it's hard to get people to do that and it's hard to do it yourself, thinking  
2 about what are the balance on things that you haven't modeled explicitly, and  
3 you have people saying well you haven't proved it's that way and --

4 COMMISSIONER SVINICKI: Well, and I wondered if it was really  
5 something at bottom that was that simple. John, I appreciate your candor  
6 because, again, the statement in the letter report says what you want people to  
7 avoid is initial use of a simplified model to make preliminary determinations with  
8 later development of more complete PRAs. So what you're saying is people get  
9 a number and they then want to only elaborate on their model to the extent it  
10 keeps that number or diminishes the risk. So it's human nature is what--

11 MR. STETKAR: And if a license is issued based on those  
12 decisions, it's very, very difficult to change that thought process later.

13 COMMISSIONER SVINICKI: All right, thank you. Thank you Mr.  
14 Chairman.

15 CHAIRMAN JACZKO: Our mess with GSI 191, but --  
16 Commissioner Apostolakis.

17 COMMISSIONER APOSTOLAKIS: Thank you Mr. Chairman.  
18 John, on slide 24 the Committee concluded that excessive PRA conservatism  
19 may affect quality of decisions for post-transition risk-informed applications. I'm  
20 wondering why you don't think that, during the transition, the decisions may not  
21 be optimal because of excessive conservatism. I mean the licensee due to  
22 conservatism may be forced to do things that a realistic PRA would not justify.

23 MR. STETKAR: That's an excellent question and I think it's difficult  
24 for us, as a Committee, to answer that question because, as I mentioned, we  
25 were not involved in the reviews of the two pilot plants, which are the only things

1 that are available for us to base any conclusions on. We were told, both by the  
2 staff and by the two licensees for the pilot plants that, although the PRAs retain,  
3 for those two licensed, those two plants, do retain conservatism, the staff had  
4 done an appropriate evaluation of that conservatism for them to make, to draw  
5 the conclusion of reasonable assurance that the plant would be operated safely  
6 under the Risk-Informed Fire Protection Program. We did not receive any  
7 particular feedback from the two licensees that indicated that those residual  
8 conservatisms affected their decisions about actual modifications that they did  
9 make to the plant, and both of the licensees did, indeed, make reasonably  
10 substantive modifications to both fire detection and, in some cases, other  
11 hardware modifications in the plant, in response to those PRAs.

12 COMMISSIONER APOSTOLAKIS: Sorry, so it's, judging from your  
13 answer, you just don't know --

14 MR. STETKAR: We don't know because we haven't, we haven't  
15 looked at those two particular examples and they're the only two examples that  
16 are available.

17 COMMISSIONER APOSTOLAKIS: All right. Harold, I read the  
18 letter of the Committee and there was an interesting comment by Mr. Brown and  
19 Dr. Armijo. It has to do with squib valve post-seismic testing, and they give a  
20 reason why they want more evidence that these things would work, and then  
21 they use a somewhat strong language at the end saying that, in their opinion, it is  
22 incongruous to now conclude that the valve's critical to ensuring post LOCA  
23 passive long-term cooling will perform satisfactorily without post-seismic  
24 qualification prototypical operational testing, when, of course, we're spending a  
25 lot of resources trying to understand the phenomena during the re-circulation



1 phase and all that. My question is what is it that the Committee didn't like about  
2 this and it did not become part of the letter? Why is it only two members?

3 MR. RAY: Well, I can only, I don't have, as you would well know,  
4 Commissioner, a Committee answer to that question. I can give you my own  
5 opinion --

6 COMMISSIONER APOSTOLAKIS: I assume there were  
7 discussions Saturday afternoon --

8 MR. RAY: Indeed, there was --

9 [laughter]

10 MR. RAY: The, let me tell you what my feeling was, and I'll leave it  
11 at that; and that was there wasn't a sufficient demonstration, in my personal  
12 opinion, that doing the test after seismic qualification testing was required, given  
13 the design.

14 COMMISSIONER APOSTOLAKIS: I'm sorry, there was no --

15 MR. RAY: There was not a requirement to do a qualification test,  
16 post-seismic testing, that is a demonstration test that the squib valve would  
17 operate, after you had done the seismic qualification test.

18 COMMISSIONER APOSTOLAKIS: When you say there was no  
19 requirement, what do you mean? That it's not logically required or there is  
20 nothing in the books?

21 MR. RAY: Well there is nothing in the books and I didn't feel that it  
22 was a requirement that we should, that the Committee should impose. Again,  
23 that's just my personal opinion, and that judgment was based upon having done  
24 a lot of seismic qualification tests, as you might realize from California, and  
25 having looked at equipment, in this case the design, and asking myself, is it

1 necessary to demonstrate the operability of the valve after it's been seismically  
2 qualified, or not?

3 COMMISSIONER APOSTOLAKIS: So you're judging, then, that  
4 you have sufficient confidence in the reliability of the squib valves.

5 MR. RAY: The only issue at hand here is whether the seismic  
6 qualification test, or the subjecting the valve to a seismic shaking force, would  
7 affect the operability or the ability of the valve to perform its function and, given  
8 its particular design, my judgment was that it did not.

9 COMMISSIONER APOSTOLAKIS: Okay. Mike, slides 48, 49, and  
10 50. First of all, let me start with what my impression of ISA is. If you read the  
11 report that says what an ISA should be, it's very nice, but then if you look at the  
12 applications of ISA, they vary a lot, and, first of all, there is no peer review, right,  
13 like we do in PRAs, it's a major omission here. When you say on slide 49 that  
14 ISAs, in combination with practices required by current regulations, are adequate  
15 for licensing and then in the letter you say that human reliability analysis is not  
16 done well, even though most of the accidents are human induced, I'm having a  
17 problem. Now, how do you conclude that they are adequate? Are you relying  
18 more on the judgment of people on other things, and the ISA is a small part of it?

19 DR. RYAN: I think so.

20 COMMISSIONER APOSTOLAKIS: So it's really not the ISAs that  
21 are adequate, it's the overall process --

22 DR. RYAN: Well, the overall process, and, again, I think what  
23 we're struggling with, and what I struggle with, is how complex is the facility and  
24 how detailed is the integrated safety analysis, the process has its analysis, or  
25 that one step short of a PRA.

1           COMMISSIONER APOSTOLAKIS: But I keep hearing that the  
2 ISAs produce the accident sequences. If the accident sequences do a poor job,  
3 including human performance, then I don't know that they're very good. And,  
4 again, I agree with you that it depends on the level of risk. I mean, some facilities  
5 deserve a more thorough review than others, but let's talk about the facilities that  
6 do deserve that more thorough review.

7           DR. BLEY: I think the one thing that allowed us to say what we  
8 said in the letter is that IROFs that are put in place are put in place to protect  
9 against human events as well as others. There's not a really thorough, human  
10 reliability analysis. There's not an extremely good dependency analysis, but for  
11 everything that the people who did the ISA, and the reviewers at NRC, could  
12 dream up in those lines, they put another line of defense in. So they build so  
13 much defense-in-depth against these things that, to me, it was convincing that  
14 they've lowered the opportunity. Now, the other thing is, for most of these  
15 facilities a hazard, especially the hazard to the public, is very small no matter  
16 what happens --

17           COMMISSIONER APOSTOLAKIS: No, I agree--

18           DR. BLEY: That's a big piece of the reason this looks okay; and  
19 the other piece is, for many of these facilities, not only is the hazard small, but  
20 the system's very simple. So the protections you can put in place are fairly  
21 convincing. So, given the way the rule language is written, it appears that they  
22 meet the standards of the rule with many lines of defense in-depth.

23           COMMISSIONER APOSTOLAKIS: Okay.

24           DR. BLEY: That's why we were convinced that it was, generally,  
25 okay.

1           COMMISSIONER APOSTOLAKIS: Now, one thing that bothers me  
2 a little bit when people talk about ISAs and PRAs, they're talking as if they were  
3 two different things, and, I mean, if the ISAs have produced, again, I'm talking for  
4 facilities that deserve such a treatment, not the trivial one, and there is also,  
5 people mention the excessive cost for doing a PRA, how much would it take to  
6 take an ISA and make it a PRA? Is that cost excessive?

7           DR. RYAN: I've never paid for one so --

8           [laughter]

9           DR. BLEY: Let me just do a couple simple things first, the problem,  
10 the risk is a probability and the consequences, and it's made up of those triplets  
11 of scenarios, likelihoods, and consequences, and that complete list of those  
12 triplets is the whole risk. The ISA does the scenarios pretty thoroughly, the ISA  
13 does some of the likelihood, it does it either in some qualitative ordering or it  
14 actually quantifies it, and the ISA does a bit of consequence analysis.  
15 Sometimes it's coarse, sometimes it's more thorough. So the ISA is the first cut  
16 of the PRA. Now, what's it take to get it good enough, we've had arguments, we  
17 don't have a position on that. Some of us think it's worry, that if you said you  
18 need a PRA, then the most thorough detailed analysis would be applied to every  
19 possible scenario no matter the consequence. My own belief is, if you applied  
20 reasonable considerations of those things, in many cases the PRA would be  
21 cheaper than the ISA, certainly for the complex facilities --

22           COMMISSIONER APOSTOLAKIS: That's why I raise the question  
23 because I see in many places, PRA versus ISA, and I agree with you that a lot of  
24 the work, the expensive work, that the PRA requires is already done, maybe to  
25 various degrees of perfection, in the ISA. So, really, we should be talking about

1 the additional cost and what it takes to get there. I have one more question?

2 CHAIRMAN JACZKO: Sure, brief, brief answer. You can have a  
3 long question but it's got to be a brief answer.

4 [laughter]

5 CHAIRMAN JACZKO: I can't do anything to control them.

6 [laughter]

7 COMMISSIONER APOSTOLAKIS: I want to come back to an  
8 issue that Commissioner Magwood raised, and I don't think the answer was  
9 addressed directly. The question was, is there anything in the staff's proposal for  
10 the regulatory system for the new regulations for the SMRs? Is there anything  
11 there that is really unique to SMRs? And I'll give you my answer, no.

12 CHAIRMAN JACZKO: Ok then, we don't need an answer from  
13 them.

14 [laughter]

15 COMMISSIONER APOSTOLAKIS: You said that --

16 CHAIRMAN JACZKO: Not yet --

17 [laughter]

18 COMMISSIONER APOSTOLAKIS: Your answer was, we have not  
19 reviewed the SMRs; we don't know the issues. That's a different thing. But what  
20 they propose in terms of classification, in terms of taking advantage of the  
21 performance-based requirements and reducing some of the analysis. So, I don't  
22 think that has anything to do with the fact that there small reactors. Okay, good,  
23 thank you.

24 CHAIRMAN JACZKO: That was pretty easy. I wanted to turn to --  
25 back to the AP1000. One of the points that the Committee stressed in its letter

1 was the importance of the commitments being confirmed by the staff and then,  
2 ultimately, by ACRS. Do you have a plan right now? I know there's a REV-19  
3 submittal, do you have a plan to review elements of that submittal currently, or is  
4 that not planned?

5 MR. RAY: It's not planned to the extent that it does not contain  
6 anything that deviates from what was presented to us, and we asked the staff to  
7 make that judgment.

8 CHAIRMAN JACZKO: Okay, so you're waiting on an answer from  
9 them, if there is a need, or do you have a committee or subcommittee that you  
10 could put that onto an agenda to deal with in the next couple of months, if  
11 necessary?

12 MR. RAY: Yes, sir.

13 CHAIRMAN JACZKO: Okay, thank you. The issues on the  
14 ISA/PRA are interesting issues and I think we've had a lot of discussion back and  
15 forth about those, and I think it's been a very interesting discussion. One of the  
16 things that I want to take a step back and just approach it from a different  
17 perspective, which is, namely, the goal here, ultimately, is to develop a better  
18 process for looking at the oversight of fuel cycles. We have gotten into a  
19 discussion about ISA versus PRA and, I guess the first question on that, there's  
20 been a lot of discussion about, and I think as Commissioner Apostolakis said, the  
21 facilities that might need it. I mean, has the Committee looked, I mean, with all of  
22 the fuel cycle facilities that are out there, how many of them fall into the category  
23 of the complex facilities for whom a PRA would actually be beneficial? Or do  
24 they fall more in those, I mean, are most of the facilities ISA-type facilities?

25 DR. RYAN: I think they cover the broad range, you know, fuel

1 fabrication's fairly straight forward with low-enrichment uranium oxide, make  
2 pellets, put the pellets in a fuel pen, and off they go, you know, up to thermal  
3 destruction facilities that have liquid solvents, toluene, xylem, and they burn them  
4 with radioactive material in it, in a very dynamic and active process. So, I think --

5 CHAIRMAN JACZKO: So which of the -- we're categorized by  
6 number of facilities. How many facilities do we license and regulate in those  
7 categories?

8 DR. RYAN: I do not know the answer.

9 CHAIRMAN JACZKO: I'm not sure of what facilities you were  
10 referring to in the last, your last comment.

11 DR. RYAN: A facility in Tennessee, Kingston, Tennessee it's a  
12 thermal destructive facility for mixed waste.

13 CHAIRMAN JACZKO: Okay, and that would be -- that's a facility,  
14 which, in your mind, would necessitate a PRA, now that is not a, and I believe --

15 DR. RYAN: That's an Agreement State licensed facility.

16 CHAIRMAN JACZKO: -- an Agreement State licensed facility, it's  
17 not an NRC licensed facility.

18 DR. RYAN: Correct.

19 CHAIRMAN JACZKO: Yeah, okay. So, of the NRC licensed  
20 facilities, how many of those would you say are of the complex facilities that  
21 would require the PRA?

22 DR. RYAN: I wouldn't hazard a guess at this point because we  
23 really haven't studied in detail how many would fit from the Committee's  
24 collective opinion, on my own, individually, how many would be in each category,  
25 but it's a good question.

1 CHAIRMAN JACZKO: Okay, so, sorry --

2 DR. KHALIK: I think people feel that that number is relatively small

3 --

4 CHAIRMAN JACZKO: Small, okay, yeah, I think that's probably,  
5 my assumption is that is a fairly small number. Okay, well, I appreciate that.

6 DR. RYAN: If I may, Mr. Chairman --

7 CHAIRMAN JACZKO: Yes.

8 DR. RYAN: I think the fact that many of them are in Agreement  
9 States, and tend to be licensed under Agreement States, shouldn't fall away from  
10 our attention because that is a different scope of facility when they're not directly  
11 regulated and interacting with the NRC on a routine basis.

12 CHAIRMAN JACZKO: I mean, it's an interesting question because  
13 I think, as I said, the goal here we're trying to do is come up with a better  
14 oversight process. We don't dictate, necessarily, the oversight process, I don't  
15 think, to an Agreement State, per se. I'm looking to Mike Weber to get a sense  
16 from him. So, if the goal of the ISA versus the PRAs is to enhance, and fit in the,  
17 and make the fuel cycle oversight a better process, so, namely, we have some  
18 decision-making process to determine significance of findings. I mean, that's  
19 basically what we're looking at. So, if it's in a fuel cycle oversight perspective,  
20 which I think is what the Commission really asked for, not necessarily is ISA or  
21 PRA an unacceptable practice from an overall regulatory perspective, because I  
22 think that's a whole different question and I'm not sure, necessarily, that -- that's  
23 necessarily what I think the Committee was getting at either.

24 So, if we're really looking at, kind of, a back end or an input to the  
25 fuel cycle oversight, it seems like the ISA, for the facilities that we regulate, it



1 seems to have merit and value. Not that there couldn't be value in eventually  
2 getting to PRAs, but I think we -- I would hate that we lose the initiative to make  
3 enhancements to that process because we're going to require PRAs. We're still  
4 working with the PRAs and the fire side for the power reactors, so it's not a trivial  
5 process, I think, to get there but I think maybe, if someone were to listen this  
6 discussion, what they might be hearing is that ISAs are not an acceptable  
7 regulatory approach, whereas I think what we were looking at is are they a useful  
8 tool for informing the fuel cycle oversight process, or is PRA a better tool to do  
9 that? So I think that's a question that, hopefully, the Commission will continue to  
10 explore and move this issue forward because I think there is, ultimately, value in  
11 an enhanced process.

12           John, if I can turn to you a little bit on the fire protection, we had a  
13 little bit of discussion about, I think Commissioner Svinicki raised the issue of  
14 site-specific challenges to PRA, or to the fire protection PRA, I mean, it was  
15 commented on in the letter. Is that something unique to fire PRA or is that  
16 something that is an element as we develop and refine the PRAs more  
17 significantly? If you looked at the very first PRAs we did in the power reactor  
18 side, did they suffer from the same kind of challenges as we're seeing right now,  
19 as we develop these first round of fire PRAs?

20           MR. STETKAR: If you go back far enough in history, back in the  
21 early 1980s where people were taking an approach of sort of a generic design  
22 class PRA, which, in many cases, focused primarily on, what we call, a frontline  
23 safety systems, injection systems, feed water systems, and so forth, and did not  
24 do a very thorough evaluation of inter-system dependencies of support systems.

25           What we very quickly learned in the early 1980s is analogous to the

1 statement made regarding fire, is that, in many cases, the detailed design of  
2 those support systems, cooling water systems, electric power supply systems,  
3 ventilation systems, instrument air systems, was dictated by a particular  
4 architect, engineer. The details of those designs were different from plant to  
5 plant, even under the same architect or the same nuclear system supply. What  
6 we found was that differences in those parts of the physical design of the plant  
7 were very important to risk, in many cases. So we learned in the 1980s that you  
8 could not do a generic PRA, let's say for a Westinghouse, 4 loop-1000 Megawatt  
9 plant, and apply it to all of those plants because of the dependencies and support  
10 systems. Doing a fire analysis just raises the bar because it introduces not only  
11 the physical dependencies among all the support systems; it introduces  
12 geometric dependencies of how the cables are routed, with respect to specific  
13 fire hazards, in a location. That's yet another issue of plant-specific complexity.

14 CHAIRMAN JACZKO: And so, I mean, but the models that you're  
15 seeing in the plants are, and have you, did you review any of the PRAs?

16 MR. STETKAR: We did not. We have not seen any of them.

17 CHAIRMAN JACZKO: Okay, but is your understanding of the  
18 guidance basis, or the industry consensus standards, that they do need to do  
19 that level of specificity in the models --

20 MR. STETKAR: Oh, absolutely they do, absolutely.

21 CHAIRMAN JACZKO: Okay, so it is an issue that, again, if the  
22 PRAs are done appropriately, they're capturing that information.

23 MR. STETKAR: If they're done appropriately, they will capture that  
24 information. I think that's, the amount of effort that's required, both technical  
25 understanding and just plain resources, time and manpower, I think that's one of

1 the reasons why we've seen the issues regarding scheduling of submittals of  
2 these PRAs. I think that over the last three or four years, as the industry has  
3 started to do this work, the pilot projects being the initial efforts, they've  
4 discovered that amount of complexity and the need to actually evaluate it on a  
5 plant specific basis, that you can't do it generically.

6 CHAIRMAN JACZKO: Well, thank you, I'm turning to, and this isn't  
7 necessarily a topic that you all had touched on but one that I'm interested in your  
8 thoughts on going forward. We've seen with Crystal River challenging issues  
9 come up with containment performance, namely, the delamination that they  
10 experienced there. Seabrook is also addressing an issue with concrete and the  
11 performance of some of their concrete structures as a result of, what I know is,  
12 alkali silica reactions, but beyond that, I don't know much about it. To what  
13 extent is the Committee looking at these kinds of issues, in particular, some of  
14 the concrete integrity issues, as we go forward.

15 DR. KHALIK: Our license renewal subcommittee, as I indicated,  
16 performed a preliminary review of Crystal River and, at the time, that was before  
17 this reoccurrence, the Committee questioned the validity of the model that the  
18 licensee has proposed to ascertain that the process for restarting the facility will  
19 be adequate, and the Committee had requested a full review of that model, of  
20 course the subsequent events indicated that our concern was actually justified  
21 and that --

22 CHAIRMAN JACZKO: So you believe it was the, their model for  
23 the tensioning did not properly account for whatever --

24 DR. KHALIK: That was our original assessment of the process,  
25 and we have not had the opportunity to revisit that issue because we have not

1 been briefed on the model itself, even though we had requested that a  
2 subsequent meeting be scheduled for that purpose.

3 CHAIRMAN JACZKO: Okay, well, I appreciate that and I'll certainly  
4 think we can make sure to get that additional briefing done because, well there  
5 may be some time too before they move forward at all on that particular facility.  
6 Have you been briefed on the, has the ASR issue come up, that would be  
7 Seabrook, and the Seabrook license renewal so that one may just not yet have  
8 come to the Committee.

9 DR. KHALIK: It has not.

10 CHAIRMAN JACZKO: Okay. Well, again, I want to thank all of you  
11 for being here, and all those who are in the well, as well, and appreciate your  
12 continued service to the Commission, to the staff, and your efforts in nuclear  
13 safety. Thanks very much.

14 [Whereupon, the proceedings were concluded]