

1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 MEETING WITH THE ADVISORY COMMITTEE ON REACTOR

5 SAFEGUARDS (ACRS)

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7 FRIDAY

8 MARCH 7, 2014

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10 ROCKVILLE, MARYLAND

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12 The Commission met at the Nuclear Regulatory  
13 Commission, One White Flint North, Commission Hearing Room,  
14 11555 Rockville Pike, at 10:00 a.m., Allison M. Macfarlane, Chairman,  
15 presiding.

16

17 COMMISSION MEMBERS:

18 ALLISON M. MACFARLANE, Chairman

19 KRISTINE L. SVINICKI, Commissioner

20 GEORGE APOSTOLAKIS, Commissioner

21 WILLIAM C. OSTENDORFF, Commissioner

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ACRS COMMITTEE MEMBERS:

MR. JOHN W. STETKAR, ACRS Chairman

DR. J. SAM ARMIJO, Member

DR. MICHAEL L. CORRADINI, Member

DR. MICHAEL T. RYAN, Member

DR. STEPHEN P. SCHULTZ, Member

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

(9:57 a.m.)

CHAIRMAN MACFARLANE: So today we are going to have briefings from the Advisory Committee on Reactor Safeguards, and today's briefers are clearly a subset of the larger Advisory Committee. And let me take this moment to thank the entire Committee for their work. We do very much appreciate all your hard efforts and take all your work very seriously. It really helps us with our decision-making on the Commission.

The Commission has had a number of complex issues to consider since our last meeting with you, and I regret that our last meeting with you we were -- this meeting -- we were supposed to have in December, and all we have had is cancellations from snowstorms, et cetera. Or maybe that was a government shutdown. Really, it has been an interesting year.

The ongoing efforts to address Fukushima Lessons Learned have figured prominently in the issues that you all have considered, and they are rightly featured in the bulk of today's discussions.

To begin with today, we will start with Mr. John Stetkar, who is the newly elected Chairman of the ACRS, who is going to provide an overview of the activities of the Committee since our last meeting, which was not in December. Actually, I don't even recall when our last meeting was, but it was sometime.

1                   That is going to be followed by a discussion of the  
2 staff's efforts to address Recommendation 1 of the Fukushima Near-  
3 Term Task Force by Dr. Stephen Schultz, and then we are going to  
4 hear from Dr. Sam Armijo on the Japan Lessons Learned Tier 3 issue  
5 concerning the expedited transfer of spent fuel from pools to dry  
6 casks.

7                   And that will be followed by Dr. Michael Corradini,  
8 who will discuss the interim staff guidance developed for hardened  
9 containment vents. And then, finally, we will hear on a non-  
10 Fukushima-related topic from Dr. Michael Ryan, who will provide the  
11 final briefing on the proposed revisions to 10 CFR Part 61.

12                   So we really look forward to hearing your thoughts on  
13 all of these issues. And without further ado, I am going to turn it over  
14 to Mr. Stetkar.

15                   MR. STETKAR: Thank you very much. We are  
16 pleased to have finally an opportunity to brief the Commission on our  
17 accomplishments and continuing activities. With that, if I could get the  
18 slides up, it would help me. Or not. Can we go to the next slide,  
19 please?

20                   Our last meeting was on July 11th of last year. Since  
21 that meeting, we have issued a total of 17 reports. Because we are a  
22 little bit pressed for time, you will hear details on the first few items on  
23 this list in the more detailed discussion.

1                   So if I could skip to Slide Number 5, please. The next  
2 slide? We'll catch up. And the next slide.

3                   What I'd like to do is just highlight some items of  
4 interest from the remaining topics on this list.

5                   During the last however long it has been, seven or  
6 eight months, we have continued our review of the US-APWR design  
7 certification, the associated reference combined license application for  
8 the Comanche Peak site. Shows the topics that we have written  
9 letters on. As of -- as a matter of fact, as of this particular week, we  
10 have completed our review of what I'll call 17-1/2 of the 19 chapters in  
11 both the design certification and the combined license application in  
12 what is Phase 3 of the staff's review. And I'll talk a little bit more about  
13 that in our continuing activities.

14                  One notable item that we did provide a final review  
15 letter on is the topical report for the U.S. advanced pressurized water  
16 reactor advanced accumulator, which is probably the most innovative  
17 passive safety function in that design. So we are finished with our  
18 review of that, which is an important issue.

19                  Next slide, please.

1                   We also achieved within the last two or three months  
2 a milestone in our review of the US-EPR design certification and the  
3 referenced combined license application for the Calvert Cliffs site. In  
4 particular, we finished our review of all of the chapters for the safety  
5 evaluation reports, again, in Phase 3 of the staff's review for those  
6 licensing activities.

7                   Next slide.

8                   In December, we issued our review report on the  
9 Gerald R. Ford class aircraft carrier nuclear propulsion plant design.  
10 And as you're aware, this is an important activity that the ACRS  
11 engages in that is outside of our normal review activities for  
12 commercial nuclear power plant safety and provides an important  
13 input to the Navy.

14                   Continuing on, our accomplishments, we continue to  
15 be actively involved in the Watts Bar operating license application.  
16 We wrote -- completed our reviews of an extended power uprate and  
17 a license amendment request to operate the Monticello nuclear power  
18 plant in the Maximum Extended Load Line Limit Analysis Plus, or so-  
19 called MELLLA+ operating domain.

20                   Next slide.

21                   We have provided input on our annual assessment for  
22 the quality of selected NRC research projects. We wrote another  
23 letter on the draft Commission paper for recommendations for risk-  
24 informing the reactor oversight process for new reactors.

1 Next slide.

2 And we reviewed regulatory guides on emergency  
3 core cooling system testing for both BWRs and PWRs.

4 Next slide, please.

5 As far as our current active engagement, and what  
6 I've tried to list are things that are on our horizon for about the next  
7 six-month period, where we have some reasonable assurance of  
8 engagement, we continue our involvement with the new plant design  
9 certifications, in particular for the EPR and US-APWR, although I have  
10 to admit that there is some question in terms of the intensity and also  
11 the schedule of our involvement on the US-APWR design certification  
12 and COLA reviews because of the announcement of the applicants of  
13 their slowdown in those areas. So we are not quite sure how that is  
14 going to progress.

15 We do continue our involvement in the reference  
16 COLA applications and reviews for the ABWR at South Texas, the  
17 ESBWR at Fermi, and subsequent combined license application for  
18 AP1000 design most notably at the Levy site.

19 Next slide, please.

20 License renewal is an area that was pretty minimal in  
21 terms of our involvement in 2013. We do see a return for some  
22 activity in the license renewal area in 2014. There are a few items on  
23 our schedule, most notably the first two are Callaway and Sequoyah.  
24 Those are coming up in the next few months here.

1                   Related to license renewal, we also have an initial  
2 briefing by the staff scheduled for one of our subcommittees in May  
3 regarding subsequent license renewal, or some of you may know of it  
4 as "life after 60," which those of us who are over 60 hope there is  
5 quite a bit of.

6                   We do have a review of an extended power uprate for  
7 Peach Bottom Units 2 and 3 planned.

8                   Next slide.

9                   We continue to be actively engaged in Fukushima  
10 long-term efforts on station blackout, onsite emergency response  
11 capabilities, filtering strategies, and we do also have active  
12 involvement in the initiatives for risk-informing the regulatory  
13 framework according to the recommendations by the Near-Term Task  
14 Force and the Risk Management Task Force.

15                  Next slide.

16                  And there are a few other items on our list. I won't  
17 highlight all of these. One notable thing is we will start reviewing the  
18 first early site permit application that we have had in several years for  
19 PSE&G. We have a subcommittee meeting scheduled actually March  
20 19th I think it is to start interacting on that topic.



1                   We continue to have interactions on the design-  
2 specific review standard for the small modular reactors in particular.  
3 Right now we are focusing on the mPower design. We have several  
4 meetings scheduled on that topic, depending on how that plays out  
5 over the next few months.

6                   Continue to follow the transition to risk-informed fire  
7 protection programs under NFPA-805. We will be submitting in April  
8 our biennial report on the NRC safety research program. And we  
9 continue to follow very closely the Level 3 PRA project and research,  
10 which is entering an important phase of quite a bit more intense  
11 technical work and modeling activity compared to where they have  
12 been over the last couple of years.

13                   And as a final item, we also continue to follow very  
14 closely the Research staff's work in the development of integrated  
15 human reliability analysis methods.

16                   And that is a rather quick overview of where we have  
17 been and where we are going, as at least we see our schedule over  
18 the next few months. And with that, I'd like to turn the table to Dr.  
19 Schultz.

20                   DR. SCHULTZ: Thank you, John.

21                   Good morning. As Chairman of the ACRS Fukushima  
22 Subcommittee, I am going to discuss the ACRS letter report on the  
23 NRC staff's recommendation for the disposition of Recommendation 1  
24 of the Near-Term Task Force report.

1                   This recommendation suggested that the Commission  
2 initiate action to enhance the current regulatory framework to  
3 encompass beyond design basis events and their oversight. The staff  
4 proposed three improvement activities in response to the  
5 Commission's direction on Recommendation 1, and I am going to  
6 cover the Committee's position on each of these activities.

7                   Our review of the matter incorporated five separate  
8 Subcommittee meetings with the staff and a full Committee meeting  
9 over the last year and a half. This challenging review critically  
10 examined the adequacy of the regulatory framework and what, if any,  
11 changes may be needed to further integrate risk-informed and  
12 deterministic frameworks.

13                   The Committee commends the extensive work  
14 performed by the NRC staff in response to Recommendation 1.

15                   Next slide, please.

1                   As part of Recommendation 1, the Near-Term Task  
2 Force suggested that the Commission initiate these actions through  
3 the following steps. First, to draft a Commission policy statement  
4 articulating a risk-informed defense-in-depth framework, including  
5 extended design basis requirements; initiate rulemaking to implement  
6 a risk-informed defense-in-depth framework consistent with this policy  
7 statement; modify regulatory analysis guidelines to more effectively  
8 implement the defense-in-depth philosophy in balance with current  
9 emphasis on risk-based guidelines; and evaluate insights from the  
10 individual plant examinations and individual plant examinations of  
11 external events, to identify potential generic regulations or plant-  
12 specific regulatory requirements.

13                   Next slide, please.

14                   The Commission, in its staff requirements  
15 memorandum, did not direct the staff to initiate work related to  
16 Recommendation 1 for implementation but directed the staff  
17 specifically to engage promptly with stakeholders to review and  
18 assess recommendations of the Near-Term Task Force in a  
19 comprehensive and holistic manner for the purpose of providing the  
20 Commission with fully informed options and recommendations.

1                   In addition, Recommendation 1 was to be pursued  
2 independently of other NTTF recommendations, and the staff was to  
3 provide the Commission a separate notation vote paper providing  
4 options and a staff recommendation to disposition the  
5 recommendation.

6                   Next slide, please.

7                   On June 14, 2012, the NRC Chairman issued a  
8 tasking memorandum directing the staff to further consider, when  
9 developing options for the disposition of Recommendation 1, the  
10 regulatory framework recommendations for power reactors in the Risk  
11 Management Task Force report, NUREG-2150.

12                   Also, in the SRM for Recommendation 1, the  
13 Commission had encouraged the staff to craft recommendations  
14 which recognized the strength of a performance-based system of  
15 requirements when considering a regulatory approach for events  
16 beyond the design basis.

17                   The anticipated outcome from the risk management  
18 task force working group will be a Commission paper with preliminary  
19 draft policy statement and an integrated plan for potential  
20 implementation of recommendations. And this is due six months after  
21 the Staff Requirements Memorandum from Recommendation 1  
22 notation vote paper.

23                   Next slide, please.

1                   Some may interpret the NTTF Recommendation 1  
2 phrase "to appropriately balance defense-in-depth and risk  
3 considerations" as implication that these concepts are separable and  
4 must be considered in counterpoint fashion. We disagree with that  
5 interpretation. These concepts should not be considered in isolation  
6 or as potentially opposing elements in a regulatory framework design  
7 to assure public health and safety.

8                   Decisions regarding an appropriate level of protection  
9 against a broad variety of threats or hazard must incorporate an  
10 objective and transparent assessment of those hazards and the  
11 effectiveness of feasible protective measures. The decision-making  
12 process should be informed by our current understanding of the risk  
13 from each hazard, our uncertainty about that risk, and considerations  
14 of preventive, mitigative, and defense-in-depth measures that can  
15 reduce risks or compensate for those uncertainties.

16                   And somewhere in this integrated context public  
17 health and safety we believe would be best assured when these  
18 fundamental elements are not evaluated in isolation, but, rather, by a  
19 regulatory approach that examines them in concert. And these  
20 thoughts certainly affect the Committee's review of the activities that  
21 the staff has recommended.

22                   Next slide, please.

1                   In performing their work, the staff initially reviewed  
2 each of the individual recommendation elements within  
3 Recommendation 1, as well as the underlying rationale developed by  
4 the Near Term Task Force. Several candidate initiatives were  
5 winnowed down to three potential activities through public meetings,  
6 white papers derived by the staff, public comments on those white  
7 papers, and interactions with the Japan Lessons Learned Project  
8 Directorate Steering Committee, and with the ACRS.

9                   These activities are Activity 1, to establish a design  
10 extension category of events and associated regulatory requirements;  
11 Activity 2, establish Commission expectations for defense-in-depth;  
12 and Activity 3, clarify the role of the voluntary industry initiatives in the  
13 NRC regulatory process.

14                   The staff has recommended each of these activities  
15 be approved for development on parallel schedules. In our review, we  
16 proposed additional considerations for each activity.

17                   Next slide, please.

18                   Improvement Activity 1 would establish the new  
19 category of design basis extension conditions and would revise  
20 internal policies, guidances, and procedures to ensure that future  
21 design basis extension regulations and orders are written in a  
22 consistent, logical, and complete manner.

1                   The approach would not involve reexamining the  
2 existing regulatory construct for defining design basis accidents and  
3 events, including formally defining or listing the characteristic elements  
4 or risk thresholds for both design basis accidents and for new design  
5 basis extension category events.

6                   Therefore, the ACRS concluded that the staff's  
7 proposed approach will provide limited improvement to the regulatory  
8 structure. The staff has determined that the category of requirements  
9 to define and to address what would be termed "design basis  
10 extension events" already exist. They are beyond the current NRC  
11 criteria for inclusion in the plant safety analysis.

12                   Thus, the staff concludes that it is not necessary for  
13 the NRC to undertake rulemaking to establish such a category, and  
14 we agree with this conclusion.

15                   Next slide, please.

16                   The staff proposes to develop a NUREG design to  
17 specify guidance for design features, documentation, operation,  
18 maintenance, and related outcomes from rulemaking activities.  
19 Improvement Activity 1 is a useful approach for developing this  
20 guidance to assure consistency in the regulatory treatment of issues  
21 assigned to the design basis extension category, and we have,  
22 therefore, concluded that developing such guidance would have merit.

23                   Next slide, please.

1                   In Improvement Activity 2, the staff recommends  
2                   establishing the Commission's expectations for defense-in-depth  
3                   through a Commission policy statement that will develop the definition,  
4                   objectives, and principles of defense-in-depth. Revisions to the  
5                   regulatory analysis guidelines and conforming changes to several  
6                   existing regulatory guides would be part of this improvement activity.

7                   The staff recommended that the new policy and  
8                   promulgation of any associated regulatory requirements be forward-  
9                   looking and apply only the Commission's expectations for defense-in-  
10                  depth to new issues as they arise. However, details of the proposed  
11                  Commission policy statement and its associated implementation  
12                  guidance are yet to be developed.

13                  Our view is that establishing such a Commission  
14                  policy statement is valuable only if there is clear direction to move  
15                  forward with a regulatory framework which includes development and  
16                  quantitative application of a risk-informed performance-based  
17                  defense-in-depth concept.

18                  We do not see that the staff's proposed direction on  
19                  Activity 2 has fully embraced this fundamental concept, and we,  
20                  therefore, conclude that additional Commission direction on the plan  
21                  for risk management regulatory framework is necessary before work in  
22                  this area should proceed.

23                  Next slide, please.



1                   We endorse the staff's recommendation to enhance  
2 monitoring and documentation of future industry initiatives as a  
3 necessary process improvement as recommended in Activity 3. The  
4 staff expects only a modest safety improvement with regard to this,  
5 but we think it's important.

6                   The regulatory inspection requirement should be  
7 designed carefully to optimize valuable inspection resources. The  
8 staff recommends revising policies and procedures to ensure that staff  
9 monitors implementation of future industry initiatives and recommends  
10 evaluation of current status of implementation for those existing  
11 initiatives which are most safety significant to verify their effectiveness  
12 if they are not already monitored under an existing NRC oversight  
13 activity.

14                   Next slide, please.

15                   As a general comment in the course of our review of  
16 the staff's work, the staff suggests that since PRAs reflect known  
17 events and sequences they may have limited added value in the  
18 evaluation and improvement recommendations for design basis  
19 extension events and issues.

20                   The staff evaluation of relative PRA value to costs  
21 from this perspective focuses heavily on deriving costs of plant-  
22 specific PRA development and downplays the short-term and long-  
23 term value of PRA capability in our view.

1                                   We disagree with these assertions and conclusions.

2                                   We are concerned that they have the potential to inappropriately  
3                                   marginalize and inadvertently prejudge the value of proceeding toward  
4                                   a risk management regulatory framework.

5                                   Safety improvements, however they may be identified  
6                                   and implemented, do not diminish the value of plant-specific PRA, and  
7                                   likely assess and identify additional insights and improvement  
8                                   opportunities to further improve performance.

9                                   PRA technology should be used to characterize the  
10                                   value of the performance improvement programs developed within the  
11                                   design basis extension event category, and it also should be a  
12                                   necessary part of implementing the Improvement Activities 1 or 2, and  
13                                   of course necessary for risk management regulatory framework  
14                                   considerations.

15                                   Next slide.

16                                   I would like to close my remarks with outlining just  
17                                   briefly, as John has already indicated, the upcoming agenda items for  
18                                   the Fukushima Subcommittee on these related activities. With regard  
19                                   to the risk management regulatory framework, if you haven't seen  
20                                   already from my remarks, we look forward to reviewing the staff  
21                                   approach and their recommendations to be developed in this  
22                                   important paper.

1                   With regard to station blackout, we are also looking  
2 forward to working with the staff on this program, as they move  
3 forward with their program on mitigating strategies for station blackout.

4                   This concludes my presentation, and I will now turn  
5 the program over to Sam Armijo for the next presentation.

6                   Thank you.

7                   DR. ARMIJO: Thank you, Steve.

8                   Good morning. This morning I will cover the Japan  
9 Lessons Learned Tier 3 issue, expedited transfer of spent fuel to dry  
10 cask storage. In this briefing, I will refer to this topic as the expedited  
11 transfer analysis or sometimes simply as the analysis.

12                  Next chart.

13                  The events at Fukushima following the March 2011  
14 earthquake and tsunami raised early concerns that the spent fuel  
15 pools had suffered significant damage, draining of the coolant, fuel  
16 failures, and uncontained release of radionuclides. This was  
17 particularly of concern when the Unit 4, which had no fuel in the  
18 reactor and all of the fuel was in the pools, when that had an explosion  
19 it was very troubling.

20                  However, we soon learned that the spent fuel pools  
21 hadn't been damaged to any significant extent. None of the pools or  
22 the fuel therein suffered severe damage, but still concerns remained.

23                  Next chart.

1                   The NRC took several actions. In March of 2012, the  
2 Commission issued Orders EA-12-049 and EA-12-051. 049 required  
3 installation of reliable instrumentation to monitor spent fuel pool water  
4 level following a beyond design basis external event; 051 required  
5 strategies and equipment to maintain and restore spent fuel pool  
6 cooling independent of AC power following a beyond design basis  
7 event.

8                   The staff issued the consequence study of a beyond  
9 design basis earthquake effecting the spent fuel pool for a U.S. Mark I  
10 boiling water reactor, commonly known as a spent fuel pool study.  
11 ACRS reviewed this report and work in July of 2013.

12                   Late last year we also reviewed the expedited transfer  
13 analysis in December.

14                   Next chart.

15                   The expedited transfer analysis is conservative,  
16 generic, and addresses all plants in the central and eastern United  
17 States. Plants in the western United States will be addressed upon  
18 completion of the Near-Term Task Force Recommendation 2.1,  
19 seismic reevaluation.

20                   The analysis builds on the plant-specific spent fuel  
21 pool study and its regulatory analysis, prior NRC studies, and other  
22 considerations. The spent fuel pool study was a fine piece of work,  
23 and it provided a sound technical basis for the expedited transfer  
24 analysis.

1 Next chart.

2 The other considerations that the staff -- well,  
3 considerations they considered included domestic and international  
4 operating experiences and practice, demonstrated structural and liner  
5 integrity at the 20 Japanese spent fuel pools following severe seismic  
6 events in Japan -- Kashiwazaki in 2007 and Fukushima in 2011 -- and  
7 took into consideration the orders but did not credit these orders in  
8 their analysis. They also considered inputs from stakeholders and the  
9 public.

10 Next chart.

11 Phase 1 of the analysis uses the NRC's normal  
12 regulatory analysis process as a screening tool to determine whether  
13 a substantial increase in public health and safety will result from  
14 expedited transfer of spent fuel from pools to dry casks and to  
15 determine whether a more detailed analysis is merited.

16 Phase 1 includes both a safety goal screening  
17 analysis and a cost-benefit analysis.

18 Next chart.

19 The expedited transfer analysis grouped plants with  
20 similar features and used conservative inputs and assumptions to  
21 determine whether the NRC safety goals are met with sufficient  
22 margin in the event of a severe spent fuel pool accident. It also  
23 evaluates the costs and benefits of the safety enhancements.

1                   Just as a reminder, the four major groupings that  
2                   were addressed were BWRs with Mark I and Mark II containments.  
3                   These are designs which are very similar to the spent -- to the plants  
4                   at Fukushima where the spent fuel pools are high above grade level.  
5                   There are 31 plants in the U.S. of this type.

6                   Group 2 included pressurized water reactors and  
7                   boiling water reactors with Mark III containments, and these plants  
8                   and pools are at grade level and there are 48 of these plants.

9                   Group 3 was new plants under construction. There  
10                  are four of these. And Group 4 were pressurized water reactors with  
11                  shared pools, and there were 11 of these.

12                  Next chart.

13                  The analysis evaluated two loading alternatives -- the  
14                  current high density loading, which -- a freshly discharged fuel  
15                  assembly surrounded by four low activity assemblies; and the  
16                  alternative is a low density loading which would result from  
17                  transferring all of the fuel with greater than five years' cooling to dry  
18                  cask storage systems by 2019.

19                  The analysis evaluated these alternatives for two  
20                  severe seismic hazards -- 0.7 PGA, which has a frequency of the  
21                  order of one in 60,000 years, and a 1.2g peak ground acceleration,  
22                  which has a frequency of approximately one in 200,000 years.

23                  Next chart.

1                   For each plant group, the staff determined the  
2 frequency and magnitude of initiating seismic events -- the AC power  
3 fragility, liner fragility, which I will talk a little bit more about later,  
4 adequacy of air cooling, fuel heat-up, effectiveness of mitigation,  
5 radionuclide release and dispersion, and health and economic  
6 consequences.

7                   Next chart.

8                   For each design and operational variable in the  
9 analysis, the staff developed a base case, a low estimate, and a high  
10 estimate value. For some variables, the values were known or could  
11 be calculated with reasonable confidence. However, for other  
12 variables, conservative or bounding values were selected by the staff.

13                  Next chart.

14                  The safety goal screening analysis is designed to  
15 determine when a regulatory requirement should not be imposed  
16 generically because the residual risk is already acceptably low. If this  
17 goal is met, further analysis is not required.

18                  Next chart.

19                  The pool loading alternatives were evaluated against  
20 two quantitative health objectives. To meet the prompt fatality  
21 quantitative health objective in the event of a nuclear plant accident,  
22 the risk to an individual within one mile of the plant boundary should  
23 not exceed 0.1 percent of the total prompt fatality risk from all other  
24 causes.

1                                   To meet the latent cancer fatality QHO, the risk  
2                                   should not exceed 0.1 percent of the total latent cancer risk from all  
3                                   causes to the population near the plant.

4                                   Next chart.

5                                   The staff safety goal screening analysis findings for a  
6                                   densely loaded spent fuel pool accident which releases large  
7                                   quantities of radionuclides were as follows. No prompt fatalities are  
8                                   expected. Latent cancer fatality risk is two orders of magnitude lower  
9                                   than the already conservative QHO. Spent fuel accidents are a small  
10                                  contributor to overall risk to public health and safety -- less than one  
11                                  percent of the QHOs. And further reduction in risk from low density  
12                                  loading would have marginal safety benefit.

13                                  Next chart.

14                                  In the cost-benefit analysis, the base case analysis is  
15                                  generally -- used generally conservative assumptions for key  
16                                  parameters and quite often bounding assumptions. Attributes  
17                                  assessed included public health, occupational health, offsite and  
18                                  onsite property damage, industry implementation costs, NRC  
19                                  implementation costs, which were conservatively estimated as zero.  
20                                  The expected values for each cost and benefit is a product of the  
21                                  probability of the cost or benefit occurring and the consequences.

22                                  Next chart.



1                   When all of the costs and benefits were determined,  
2                   the staff found for all of the base cases and all groups of plants that  
3                   the costs of expedited transfer significantly exceeded the benefits.  
4                   For several of the high cases and the sensitivity studies, the benefits  
5                   could exceed cost by large amounts. The staff emphasized that the  
6                   base cases were adequately conservative, and they based their  
7                   conclusions and recommendations on the base case findings.

8                   Next chart.

9                   In the course of our review of both the spent fuel pool  
10                  study and the Tier 3 analysis, ACRS found that the properties -- the  
11                  mechanical properties of the carbon steel were used in the analysis of  
12                  the stainless steel liner fragility. Stainless steel properties are much  
13                  better. They are much more ductile. It's tougher. It would be much  
14                  more difficult to tear or it certainly does not crack in a pool  
15                  environment.

16                  So that indicated that the actual capacity of the liner  
17                  to withstand a seismic loading is higher than used in the analysis. So  
18                  it was a kind of hidden conservatism providing more margin.

19                  Mitigation effectiveness -- there is assumption that  
20                  mitigation would be effective only for low density loadings. That  
21                  assumption in the analysis would reduce the release frequency from a  
22                  low density loading arrangement by a factor of 19 over the high  
23                  density loading.

1                   We found -- we believe that since the operability of  
2 mitigation equipment is not dependent on pool loading density, and  
3 the implementation time is not strongly affected, we felt that  
4 assumption was unjustified.

5                   Our conclusions were that the staff safety goal  
6 screening analysis has adequately evaluated the safety benefits of the  
7 expedited transfer from spent fuel pools to dry cask storage systems,  
8 demonstrated that the NRC safety goal policy and quantitative health  
9 objectives are met with orders of magnitude margin for both the  
10 current high density spent fuel pool loadings and the proposed low  
11 density fuel loadings.

12                   There is insufficient safety benefit to justify expedited  
13 transfer of spent fuel from U.S. pools to dry cask storage systems.

14                   Next chart.

15                   The staff's base case regulatory analysis has  
16 demonstrated that the benefits of expedited transfer are far less than  
17 the costs of implementation. The base cases are adequately  
18 conservative to support the staff's recommendation that more detailed  
19 evaluations of the benefits of expedited transfer need not be pursued.

20                   We also concluded that the cumulative effects of  
21 conservatism and assumptions used in the high estimates and in the  
22 sensitivity studies of the regulatory analyses resulted in exaggerated  
23 frequencies of fuel damage and exaggerated benefits of expedited  
24 transfer.

1 Thank you.

2 I will now turn it over to you, Dr. Corradini.

3 DR. CORRADINI: So the Chairman is looking at me,  
4 so I will catch us up a bit. So we are going to talk about containment  
5 hardened vents and --

6 CHAIRMAN MACFARLANE: I'm just smiling at you,  
7 Mike.

8 DR. CORRADINI: Huh?

9 CHAIRMAN MACFARLANE: I'm just smiling at you.

10 DR. CORRADINI: Oh. No, I meant this Chairman.

11 (Laughter.)

12 We have two here. I report to this one, so --

13 (Laughter.)

14 At least the first report. Excuse me.

15 Let me talk about the hardened vent ISG.

16 So if I could have the first slide, please. Thank you.

17 So, in 2012, Order 12-050 was issued requiring  
18 licensees to install reliable hardened vents capable of removing heat  
19 and lowering pressure within containment. Subsequent to that, that  
20 was rescinded and replaced with a new order, 13-109, which included  
21 additional requirements to ensure that venting functions be available  
22 during severe accident conditions. In particular, those conditions  
23 would be things related to hydrogen issues, hydrogen combustion  
24 potentially within the piping.

1 Next slide.

2 The ISG -- or I should say the new order indicated a  
3 phased approach which was recommended to ensure implementation  
4 with minimal delays. There was a Phase 1, which would focus  
5 primarily on wet well venting systems, and then a Phase 2 which  
6 would look at the dry well venting systems.

7 I would note here -- we will come back to it -- that the  
8 Phase 2 was to be informed by the staff's analysis on filtering  
9 strategies, which would then include a technical basis for the rule that  
10 would be subsequently issued.

11 Next slide, please.

12 The staff's ISG endorsed the industry's guidance,  
13 NEI-1302, and it had particular -- some particular exceptions and  
14 clarifications to assure that all of the Phase 1 objectives were met.

15 I am sure you are all familiar with there were about a  
16 half dozen of these what we will call exceptions and clarifications. For  
17 example, one was on instrumentation. The design features for that  
18 instrumentation would be -- were kind of TBD, to be determined, such  
19 that it could be operated safely both from a mechanical as well as  
20 radiation safety point of view, that combustible gas issues were  
21 addressed, that the venting system could be cycled, turned on,  
22 opened, closed, and then appropriate training. And there were others.

1                   The ISG provides an integrated set of considerations  
2                   and requirements for the design and implementation of a severe  
3                   accident capable wet well venting system.

4                   Next slide, please.

5                   So we had a couple of meetings in September.  
6                   Particularly September 18th of 2013 we had a Subcommittee meeting  
7                   with respect to review and discussion of the ISG. In October, we  
8                   issued our full Committee letter report on the ISG.

9                   I would note that in the discussions the Committee  
10                  still worries about containment accident pressure, and this was  
11                  discussed, and we focused on industry such that they can develop  
12                  detailed venting procedures that don't interfere with containment  
13                  accident pressure credit.

14                  And the only reason I wanted to note that is if you go  
15                  back to the exemptions and clarifications, one of the things that staff  
16                  indicated at this point was anticipatory venting really hasn't been  
17                  thought through carefully, and it has to be done in a careful and  
18                  appropriate manner.

19                  Next slide, please.

20                  A common concern in Phases 1 and 2 was the  
21                  determination of whether a temperature -- or I should say the design  
22                  temperature for the dry well, which was suggested to be 545 F, is the  
23                  appropriate value for the design of the dry well vent and any common  
24                  or shared portions of the vent piping.

1                   We heard from both -- we heard from industry as well  
2                   from staff about that. We had lengthy discussion. As the letter  
3                   indicates, and I will just repeat here -- we want to stick to the letter -- is  
4                   that any value really needs to be confirmed by analysis, and we have  
5                   yet to see that. And so that's what we are looking forward to in future  
6                   discussion.

7                   Also, we had a good bit of discussion on Phase 2  
8                   guidance development and some key issues were discussed.

9                   Next slide, please.

10                  So for conclusions and recommendations relative to  
11                  this, we asked -- we felt the ISG could be issued. It was issued in  
12                  November of '13. We also suggested that staff should better define  
13                  accident scenarios during which dry well venting would be necessary  
14                  or preferred over wet well venting.

15                  We will come back to that again. I know that the -- we  
16                  know that the staff is busy doing this now as part of their filtering  
17                  strategies analyses. And we also come back to our concern about  
18                  combustible gas control. We really feel that additional combustible  
19                  gas control measures should be given higher priority. We can go into  
20                  that further if you'd like, but the Committee had a good bit of  
21                  discussion on that.

22                  Next slide, please.

1                   Venting procedures -- one of our other conclusions is  
2                   that venting procedures must be developed that do not compromise  
3                   long-term cooling which depends on containment accident pressure. I  
4                   have already mentioned the fact that in some of the discussions with  
5                   industry they are looking at anticipatory venting. That is, venting  
6                   below the design pressure of the wet well, and then anticipating that,  
7                   closing it, and doing some sort of appropriate procedures. That has  
8                   got to be thought through carefully, and we look forward to that in the  
9                   future.

10                   We agreed with the staff -- the staff agreed I should  
11                   say with our recommendations for implementing Phase 2  
12                   requirements of the order.

13                   Next slide, please.

14                   And as I had noted, in the EDO's response to us the  
15                   staff indicated they are working on Phase 2 in conjunction with a  
16                   technical basis study for filtering strategies as an associated  
17                   rulemaking. My understanding is recently that that has been delayed  
18                   a bit, so that our last bullet might be a tad old news, and that we have  
19                   planned for some interaction with the staff during the second half of  
20                   '14 and '15. That probably has been delayed a bit into '15. But I think  
21                   it's very important for Phase 2 that we understand clearly what the  
22                   procedures are.

23                   So with that, I will give back some time to the Chair,  
24                   both Chairs, and turn to Mike.

1 DR. RYAN: Thank you very much. I am happy to talk  
2 to you today about the proposed revisions to 10 CFR Part 61. The  
3 Committee recently completed our fourth review of the staff's efforts to  
4 revise Part 61 and to add site-specific performance assessment and  
5 intruder analyses and send our fourth letter report to the Commission  
6 on this subject.

7 Let me begin with a brief review or summary of the  
8 Committee's letter reports, and then I will proceed on with our most  
9 recent letter report and discuss that in some detail.

10 The 570th meeting of the ACRS was in March 2010,  
11 and we issued a letter report during that meeting with one  
12 recommendation -- that the staff should continue to risk-inform Part 61  
13 to include disposal of depleted uranium on site-specific  
14 considerations.

15 At the 585th meeting in September of 2011, four  
16 recommendations were included -- that Part 61 should not be  
17 amended as planned by the staff at that time, and that staff should  
18 develop a risk-informed performance-based low level waste site  
19 assessment methodology using realistic characterizations.

20 The period of performance should not be specified in  
21 the rule. It should be developed on a site-specific basis on the  
22 features, events, and processes specific to the site and waste, and  
23 how to establish this period should be an implementation guidance.



1                   Depleted uranium should be included in a disposal  
2                   scheme, and compliance with the performance objectives, including  
3                   the intruder analysis, should be evaluated on a site-specific basis  
4                   considering the natural features, events, and processes for a period of  
5                   time commensurate with the risk for a specific facility and site for the  
6                   waste that it contains.

7                   At our 606th meeting in July 2003, our letter report  
8                   provided four recommendations. The proposed rule expands the  
9                   regulatory requirement and burden without sufficient justification. Our  
10                  primary concern about the proposed revisions were the requirements  
11                  to demonstrate compliance for 10,000 units, and the protection of the  
12                  inadvertent intruder.

13                  Previous disposed waste should not be subject to  
14                  additional compliance evaluations, and the Committee will hold  
15                  additional meetings to better understand the technical justification for  
16                  those elements of concern just identified.

17                  We embarked on a much wider information-gathering  
18                  activity after that meeting, and the ACRS Radiation Protection and  
19                  Nuclear Materials Subcommittee held additional meetings that were  
20                  identified in our July 2013 letter, and I will summarize those.

1                   On November 19th, we held a Subcommittee meeting  
2                   with representatives from a number of organizations engaged in low  
3                   level waste disposal. These included the U.S. Department of Energy  
4                   represented by Christine Gelles from the Office of Environmental  
5                   Management, Andrew Wallo from the Office of Health, Safety, and  
6                   Security, and Roger Seitz from the Savannah River Laboratory.

7                   These individuals gave us information on the  
8                   background and history of DOE Order 431.5 and the associated  
9                   manual chapters and implementation guidance, technical justification  
10                  for regulatory requirements in the DOE manual on low level waste,  
11                  including the time of compliance, intruder assessments, waste  
12                  acceptance criteria, and review and approval of performance  
13                  assessments and licensing of their disposal facilities.

14                  Robert Boehlecke from the DOE Nevada Field  
15                  Operations Office also discussed how the order and manual  
16                  implemented at the Nevada National Security Site, and Sherri Ross  
17                  from the Department of Energy, Savannah River Laboratory,  
18                  discussed how the order and manual are implemented at the  
19                  Savannah River site.

20                  These were both very informative briefings and  
21                  helped us understand a better strategy for longer lived radionuclides  
22                  which include uranium in particular. So that was very helpful.

1                   On December 3rd, we held a Subcommittee meeting  
2                   with representatives of Agreement States who regulate the disposal  
3                   facilities, and also met with disposal site operators, the Electric Power  
4                   Research Institute, several other low level waste disposal experts, and  
5                   heard from them concerning proposed revisions to Part 61.

6                   Susan Jenkins represented the South Carolina  
7                   Department of Health and Environmental Control, Rusty Lundberg  
8                   from the Utah Department of Environmental Control, Brad Broussard  
9                   from the Texas Commission on Environmental Quality, Earl Fordham  
10                  from the Washington State Department of Health, Scott Kirk from  
11                  Waste Control Specialists and Operating Company, Dan Shrum from  
12                  EnergySolutions in Clive, Utah, and Mike Benjamin from  
13                  EnergySolutions in Barnwell, South Carolina.

14                 Lisa Edwards was helpful from the Electric Power  
15                 Research Institute, and John Greeves from Talisman, a consulting  
16                 company, and John Tauxe from the Mercury and Company, and Arjun  
17                 Makhajani from the IEER. Christine Gelles and Roger Seitz from the  
18                 DOE also returned and provided background information on the  
19                 inventory of depleted uranium being managed at DOE and their plans  
20                 for processing the inventory into a disposable weight form.

1                   Just a brief note, that is mainly UF-6, which needs to  
2 go through a conversion process to a dry solid. But it is a breathtaking  
3 array of tanks of UF-6. It is quite a lot of material. So it was a helpful  
4 benchmark to understand how these larger quantities were being  
5 entered into a disposal strategy.

6                   On January 16, 2014, we held our third Subcommittee  
7 meeting, and our last for the moment. We summarized the two  
8 previous meetings and discussions and heard a presentation from  
9 NRC staff on the history of Part 61 that they were -- that were  
10 proposed in SECY-13-0075, and the reasons the staff recommended  
11 and proposed certain provisions in the proposed rule.

12                   We discussed the possible avenues for  
13 recommendations and our letter report during that meeting.

14                   The next slide provides our recommendations from  
15 our most recent February 19, 2014, letter, to affirm the conclusions  
16 and recommendations in our earlier reports. The compliance period  
17 covering a reasonable foreseeable future should not exceed 1,000  
18 years.

19                   And the waste already disposed in accordance with  
20 current Part 61 requirements should not be subjected to additional  
21 compliance evaluations or new disposal requirements. And that  
22 proposed revisions contain excessive implementation detail. These  
23 details should be given implementation guidance and specifically site-  
24 specific implementation guidance rather than in the rule.

1 Thank you very much.

2 CHAIRMAN MACFARLANE: All right. Did you have  
3 anything else?

4 MR. STETKAR: Nothing, other than to say that  
5 completes our formal presentation, and we will entertain any  
6 questions.

7 CHAIRMAN MACFARLANE: Okay. I think what  
8 we're going to do is take a quick five-minute break. Be back here at  
9 11:00 sharp, and we'll go to questions. Okay?

10 MR. STETKAR: Thank you.

11 CHAIRMAN MACFARLANE: Great.

12 (Whereupon, the proceedings in the foregoing matter  
13 went off the record at 10:53 a.m. and went back on the record at 11:02  
14 a.m.)

15 CHAIRMAN MACFARLANE: So we are going to  
16 resume the question part of this morning's discussion, and I have a  
17 whole bunch of them. So I'll try to go fast, but just keep going.

18 Okay. So let me start with Sam. Okay. So in terms  
19 of the expedited transfer of spent fuel study that you looked at, and  
20 you just reported on, none of the staff's analysis looked at security-  
21 related initiators for problems with the spent fuel pool. So do you  
22 believe, then, what they did was a thorough analysis?

23 DR. ARMIJO: Well, Chairman, we did not review the  
24 security issues as part of our review of this.

1 CHAIRMAN MACFARLANE: Right.

2 DR. ARMIJO: So I would be just winging it on  
3 personal opinion, but -- so I probably shouldn't do that at this time,  
4 because I do have opinions, but they are probably not -- they are not  
5 founded on fact, so I'd rather not go further.

6 CHAIRMAN MACFARLANE: Okay. Well, then, let  
7 me keep going.

8 DR. ARMIJO: If you want, those -- just conceptually, I  
9 just don't like the idea of taking fuel that is well protected within the  
10 building, and if you're satisfied that the safety of the pools is fine, to  
11 take them out into a pad. Granted, these casks are extremely strong,  
12 but they are more accessible. And, yes, I guess accessibility is one.

13 CHAIRMAN MACFARLANE: Well, I think that's  
14 where we need the data, right?

15 DR. ARMIJO: Yes. That's -- that is a weakness of  
16 the dry cask storage. It is accessible. It's out there. People can drive  
17 by it and things like that. That's as far as I'm going.

18 CHAIRMAN MACFARLANE: Mike has a view.

19 DR. CORRADINI: Well, I was just going to simply say  
20 I would reverse it and ask the question. I know the staff has given  
21 briefings to the National Academies Committee on this, and my  
22 question to the staff is, is the end state from that initiator versus a  
23 safety initiator any different? That's the question I would ask.

1                   CHAIRMAN MACFARLANE: And that I think is an  
2 important question to ask. I mean, I think, you know, if you want to do  
3 a thorough analysis, you have to look at all potential initiators.

4                   DR. ARMIJO: Yes.

5                   CHAIRMAN MACFARLANE: So that was my  
6 question. Did you think that that was a thorough analysis?

7                   DR. ARMIJO: Well, we didn't -- as I said, we did not  
8 review that.

9                   CHAIRMAN MACFARLANE: Okay. The staff also  
10 looked at only one expedited transfer option, and that was moving to  
11 what they call low density storage, which is, you know, fewer spent  
12 fuel assemblies in the current racks in five years. Did you guys at the  
13 ACRS consider any other options, you know, moving to low density  
14 racking over a longer period, looking at open frame racks, looking at  
15 different kinds of configurations, looking at discharging immediately  
16 into a one by four or a one by eight?

17                   I was just in South Africa. They discharge into a  
18 special set of racks that are very thick. I don't know, having not been  
19 to France -- these are French plants, but I don't know if the French do  
20 this, you know. Did you look at any of that?

21                   DR. ARMIJO: We didn't go that far. We did -- we did  
22 note in one of our reports that the one by eight loading that is actually  
23 used by the Peach Bottom plant, which was --

24                   CHAIRMAN MACFARLANE: Yep.

1 DR. ARMIJO: -- the basis for the spent fuel pool  
2 study, that that loading had essentially all the favorable characteristics  
3 that you would get from a low density loading. And we commented  
4 that that was something that deserved further attention.

5 CHAIRMAN MACFARLANE: Study, right. Yes. It  
6 seems that that -- it would be worthwhile.

7 DR. ARMIJO: Assuming you had the ability to do  
8 that, it's a step forward. But we didn't go much further than that,  
9 except to encourage people to think about that.

10 CHAIRMAN MACFARLANE: And, you know, you  
11 mentioned the quantitative health objectives, do you think those  
12 quantitative health objectives, which were really developed for the  
13 reactor, are the correct metrics to use to look at a spent fuel pool?  
14 And, you know, this -- do you think that the folks in Fukushima right  
15 now who used to live there but can't live there any longer would think  
16 that quantified health objectives are appropriate measures?

17 DR. ARMIJO: Oh, you know, there may be subtle  
18 issues, but basically a dose is a dose. The spent fuel pool is a very --  
19 what gets released is not nearly as cancer-causing, for want of  
20 something better, than what comes out of a core of -- in a severe  
21 accident. So, you know, it is really dose and exposure. And I think,  
22 you know, I don't -- I personally don't have any problems with that, and  
23 I don't recall anything in our discussions among the members that felt  
24 that that was inappropriate.



1                   CHAIRMAN MACFARLANE: Okay. All right. So let  
2 me turn to a different topic, to Mike Corradini. So I think, you know,  
3 your report, your letter, was very interesting on the venting issue. And  
4 I wonder whether -- you noted in the letter that the staff was over-  
5 relying on venting to address combustible gas issues. So how do you  
6 believe this should be addressed in Phase 2 of the hardened vent  
7 process, dealing with the combustible gas issues?

8                   DR. CORRADINI: Well, I think -- so I have the letter  
9 here. I had this funny feeling this question might come up. I think we  
10 were silent on what the Committee as a whole believes. I think some  
11 of us have various views on what could be considered. What could be  
12 considered are things related to what one might do in the reactor  
13 building for combustible gas control.

14                   I think one of the things that was discussed in the  
15 Committee but didn't come down in a conclusion was we should look  
16 to other peer countries to see what they are doing in terms of  
17 combustible gas control outside of containment, for example.

18                   CHAIRMAN MACFARLANE: I think that is a really  
19 valuable thing to do.

20                   DR. CORRADINI: I think you need to survey before  
21 you make an appropriate decision.

22                   CHAIRMAN MACFARLANE: I wholeheartedly agree  
23 with you. Note we both come from academia.

1                   Another question for you, Mike. So your letter also  
2 identifies the need for venting procedures that don't compromise long-  
3 term cooling. And this goes back to the letter you mentioned also on  
4 Monticello where you noted that the need for accident pressure --  
5 containment accident pressure to support adequate suction pressure  
6 for emergency core cooling pumps and how that could limit the  
7 capability for future venting. I think these issues are sort of combined.

8                   What level of complexity do you guys think is  
9 reasonable for operators who are already taxed by severe accident  
10 conditions? And, you know, given that, wouldn't adding filters make  
11 life a little simpler?

12                  DR. CORRADINI: I will politely not get to that last  
13 one. I am waiting for the filtering strategies analysis, because my  
14 understanding is staff is doing some work with MELCOR on some  
15 other tools to try to understand how the filtering strategy may play out.  
16 But I guess my only comment would be is that we had visited -- now I  
17 can't remember the plant we visited. Was it Peach Bottom? Where  
18 the staff there actually walked through a series of what ifs of what they  
19 would do since they have a small amount of cap credit that they use  
20 for Peach Bottom.

1                   And my impression is that the thinking process -- and,  
2                   again, it is only a thinking process at this point; there is nothing set in  
3                   stone -- is that they essentially would potentially consider anticipatory  
4                   venting as they approach the design pressure, which is -- I can't  
5                   remember the exact number, but it's something on the order of 10 or  
6                   20 psig away from where they need it for cap credit.

7                   So you want to have essentially I'll use the word  
8                   "dead band" between the place where you are using cap credit for  
9                   your ECCS operation of the pumps, so your low pressure pumps,  
10                  versus where you start doing some anticipatory venting.

11                  And the only other thing I'd say is that in the staff -- in  
12                  the staff clarifications and exceptions discussion they make point of  
13                  the fact that they want to think through this, so they make sure that if  
14                  you vent you can actually cycle and close and have some sort of  
15                  operation. But at this point, my sense is it is still a matter of analysis  
16                  and thinking. There is nothing really set in stone.

17                  CHAIRMAN MACFARLANE: Did you want to add  
18                  anything, John?

19                  MR. STETKAR: No.

20                  CHAIRMAN MACFARLANE: Okay. All right. Let me  
21                  just start on to Mike Ryan. I have a bunch of questions, so let me just  
22                  start off with one and we'll get around to it on the second go-around  
23                  here.

1 First of all, let me say I'm very impressed by the  
2 variety of folks that you guys talked with and the outreach that you did  
3 to get a variety of views and perspectives on this issue.

4 So you guys endorsed the 1,000 years as meeting the  
5 reasonably foreseeable future, and so I just want to understand a little  
6 bit more about your thinking on that. So were there specific geologic  
7 processes or societal factors that made 1,000 years a reasonable time  
8 of compliance?

9 DR. RYAN: I think it's a combination of site criteria,  
10 of disposal technology. The uranium half-life, 10 to the ninth years, it  
11 is going to be there no matter what we do with it. So I think the range  
12 of options that people are looking at make 1,000 reasonable.

13 I think if you try and go to the next, you know, order of  
14 magnitude, you then get into processes that are not as nearly  
15 predictable, particularly the natural environment ones. So I think that's  
16 a sensible accommodation. It can't be 100 years. You know, it needs  
17 to take into account the features, events, and processes of a site, and  
18 then you need to bolster the technology to get to that longer period.  
19 So the 1,000-year period was where -- I think the Committee and the  
20 letter we ordered out really is where we landed.

21 CHAIRMAN MACFARLANE: I mean, I completely  
22 understand that thinking. And would you apply this to any kind of  
23 geologic storage?

24 DR. RYAN: That's a good question.

1                   CHAIRMAN MACFARLANE: I would have to think a  
2 little bit more about that, because I don't want to jump and say yes or  
3 no, because I haven't given that as full of a thought as we have to  
4 support our letter today. So I think it's a worthy question.

5                   CHAIRMAN MACFARLANE: Right. This is a place  
6 that a lot of European countries have gotten to in developing what  
7 they call the safety case.

8                   DR. RYAN: Yes.

9                   CHAIRMAN MACFARLANE: Where they do a  
10 quantitative analysis for a shorter period and then a qualitative  
11 analysis for a longer period.

12                  DR. RYAN: And I think that qualitative analysis step  
13 is one that we in the United States have not done.

14                  CHAIRMAN MACFARLANE: No, we have not.

15                  DR. RYAN: So I think I'm kind of hesitating a little bit  
16 because I don't know what framework I would use to apply that or to  
17 develop it, you know, appropriately. So I would be --

18                  CHAIRMAN MACFARLANE: Well, the wheel has  
19 been invented, and we can --

20                  DR. RYAN: We can certainly borrow or adapt --

21                  CHAIRMAN MACFARLANE: -- look at other  
22 countries.

23                  DR. RYAN: -- that kind of thing, if we need to. Sure.

1                   CHAIRMAN MACFARLANE: Okay. All right. I'm  
2 going to back to you later, but I'm going to pass on right now to  
3 Commissioner Svinicki.

4                   COMMISSIONER SVINICKI: Well, welcome, and  
5 thank you all for your presentations, and also thank you to the  
6 members who did not have assigned topics today, but I want to thank  
7 you for not only this work but all of the other letter reports that have  
8 been issued throughout the course of the year, some of which were  
9 not topics for today's meeting.

10                   And while the Chairman might have been smiling at  
11 Dr. Corradini, I was studying Dr. Dana Powers, who although not at  
12 the table is sitting in the first row. And ever since it was revealed to  
13 me -- I always used to think he was taking copious notes, but I have  
14 been made aware that what he is doing -- he is looking very  
15 embarrassed right now -- he is working through equations, and I think  
16 that's amazing. He doesn't need any of those Smartphone apps that  
17 help you keep your mind sharp. I can barely calculate a tip at the  
18 restaurant these days, and as the years go by I can do less and less.  
19 I think that's wonderful.

20                   The reason I am picking on Dana a little bit is that it  
21 has been made known to me that if the Commission approves an  
22 additional term for him he is willing, or has expressed his willingness  
23 to continue on the ACRS.

1                   On a serious note, something that I think provides a  
2                   very unique value of the ACRS letter reports is that you have  
3                   members such as Dr. Powers who have greater institutional history on  
4                   these issues than any member of the Commission sitting on this side  
5                   of the table. And I think that putting issues in some sort of historical  
6                   context, at least, you know, a contemporary context of other issues, is  
7                   very, very helpful in the consideration.

8                   So I want to thank Dr. Powers not only for his service  
9                   on the ACRS, but if you know a little bit about his history he also has  
10                  had the opportunity to study under some of what I would characterize  
11                  as the pioneers of atomic history in the United States. And so he  
12                  brings all of that to the Committee, and he is not alone in that, so I'm  
13                  singling him out. But that is the impressive caliber of the members of  
14                  the ACRS, so I want to thank you all for that.

15                  I'm sorry, Dana. You chatted with me on the break,  
16                  so it turned into quite a storytelling. I'm going to tell one other story  
17                  about Dr. Powers --

18                  (Laughter.)

1                   -- is that after -- it is planned that after this meeting  
2 concludes and the Chairman gavels us to a close that we will take a  
3 photo with our Commission and the members of the ACRS. And I  
4 have a photo of -- from years ago of the Commission with the ACRS --  
5 and members are laughing because they know what this story is -- is  
6 that Dana had found some way to be absent for this photo, and it may  
7 be that he shares the behavioral quirk of many of us that we really  
8 hate being photographed. People don't go into nuclear to have their  
9 picture taken a lot.

10                   So, but not to be outdone, the members of the ACRS,  
11 or maybe it was the staff that support the ACRS, photo shopped him  
12 in. And the reason it sticks in my mind is, first of all, because I have  
13 the photo hanging in my office, because George looks particularly  
14 grim in it. He was a member of the ACRS at the time, and he hated  
15 being in these photos. He barely had the patience for it. But it is one  
16 of the most convincing Photoshop jobs I have ever seen. You really  
17 would not -- if I had not told this story, you would not be able to pick  
18 out who in this photo is photo shopped in.

19                   MR. STETKAR: Yes. The only thing is he's shrinking  
20 as he gets older. If you look at the relative heights in that photo.

21                   DR. RYAN: He's about a foot off the floor in that  
22 picture.



1                   COMMISSIONER SVINICKI: Are they? I didn't  
2 notice that. I didn't think he was standing in the front row. Okay.  
3 Well, then, perhaps I am easily -- easily fooled.

4                   But I did want to talk about a broader topic which I  
5 tend to bring up at these meetings, which is looking not only at the  
6 laundry list of letter reports that have been issued, but I might engage  
7 you, Chairman Stetkar, in a discussion about forecasting of the  
8 Committee's workload.

9                   It may be that if as you complete your review and your  
10 engagement with the NRC staff on a number of new reactor items that  
11 it may be that you would have greater room in your schedule to think  
12 about topics over the horizon or to take some of the broader topics  
13 and look at when the staff might engage the Commission on a topic so  
14 that the timeliness of the arrival of your letter reports with the  
15 Commission could be -- we could maybe have a more finessed way of  
16 looking at that.

17                  And the one that is of mind right now is that before the  
18 Commission now is a staff paper, a voting matter, on subsequent  
19 license renewal. That was listed on one of your slides as something  
20 where you might engage -- and I'm not saying that -- as we move  
21 forward, of course you will continue to engage with the NRC staff.

1                   But I think even in this moment the staff's paper is not  
2 overly complicated, but I would have benefited from having some  
3 perspectives, partly because the ACRS has been so involved in the  
4 nearly 20 years of the 40 to 60 license renewals. And then there is a  
5 tremendous amount of kind of licensing operational experience there,  
6 and you've had a front row seat for that.

7                   So is there something -- and the other topic, the other  
8 reason I am bringing this up is that as we have talked about post-  
9 Fukushima topics, it seems to me that there is some complexity here  
10 which is maybe not historically unique, but it seems to be happening  
11 right now, given that various topics are interrelated.

12                   And it came up with Dr. Corradini talking about  
13 mitigating strategies and filtering strategies and things. You know,  
14 until you can know where the staff is going to end up on one of those,  
15 it is a little hard for you as a Committee to deliberate a letter report  
16 conclusion on a topic.

17                   So can you talk to me about how you're approaching  
18 that right now? Both of those topics.

19                   MR. STETKAR: Yes, I can. And I'm glad you asked  
20 about that. Regarding our workload, we do see, primarily because of  
21 the slowdown in the new reactor area, and we are reaching a relative  
22 maturity in the area of license renewals, some reduction in our  
23 projected workload over the next year or so.

1                   And, quite honestly, over the last five years, as long  
2 as I've been on the Committee, six and a half years now, we have  
3 been very, very, very busy trying to keep pace with the large volume  
4 of material that we have been challenged to review in a reasonably  
5 timely manner.

6                   I think we have been very successful on getting  
7 feedback to the staff where necessary on interim reviews of the new  
8 reactor design certifications and COLA applications. We have tried to  
9 gain -- to remain actively engaged in real time, if I can put it that way,  
10 in the post-Fukushima activities.

11                   It has been difficult to keep abreast of that situation.  
12 And indeed we, among ourselves, in April we are planning to have an  
13 internal meeting to discuss our plans moving forward in specifically the  
14 types of areas that you mentioned. How can the ACRS better inform  
15 the Commission at perhaps a higher level on some of these broader  
16 issues that are now evolving rather than perhaps waiting until we have  
17 formal documents from the staff to provide a review letter?

18                   But that's something in progress. We have not met  
19 internally. We plan to do that -- to have our first internal meeting in  
20 April on that particular subject.

1                   COMMISSIONER SVINICKI: I look forward to  
2 hearing from the Committee on that and having the opportunity to  
3 engage and provide feedback, because I'm of a view that there are  
4 different levels -- certainly, the ACRS can bring very detailed technical  
5 benefit to an issue, but I think that by the time we get to you reviewing  
6 a draft guidance document we are very, very far down the road in  
7 terms of the regulatory option that we have chosen.

8                   So I look forward to that. I hear clearly that you don't  
9 have anything to conclude or to -- anything to suggest or recommend  
10 today. But I think that that's an important topic, and I think if I reflect  
11 historically to ACRS going back to the AEC and what a long history it  
12 has, I think that historically it has had less of a kind of a widget factory,  
13 you know, mode of all of these chapters and design certs and things  
14 like that.

15                   I think it was, you know, also providing higher level  
16 deliberative advice to the -- well, the Atomic Energy Commission and  
17 subsequently the NRC. So thank you for that.

18                   And I had one specific question on the letter report on  
19 the staff's Tier 3 recommendation on expedited transfer. This was the  
20 report dated December 18th. Attached to it were additional comments  
21 by Members Skillman, Armijo, Ballinger, Schultz, and Riccardella, that  
22 made comments along the lines that, you know, the staff's regulatory  
23 analysis assumed NRC cost would be zero, industry cost would not  
24 escalate. These assumptions are not valid.

1                   It talked about the fact -- about assumption of  
2 industrial risk and had some comments to put forward there. My  
3 curiosity had to do with the fact of why were these additional  
4 comments and what were the aspects of this that made this not part of  
5 the letter report? And I didn't know if any of those members providing  
6 these additional views would want to come to the microphone and  
7 speak to that. I have a volunteer.

8                   Thank you.

9                   MR. SKILLMAN: My name is Dick Skillman, and I  
10 authored those comments. A couple of comments -- in my view, the  
11 strongest defense for nuclear safety is a plant that has tight material  
12 condition and operators that know what they're doing and are focused  
13 on what they're doing. They are qualified, they are trained, and they  
14 are staying in the procedures.

15                   If the order were to be given to move the fuel by 2019,  
16 that would require every control room to be in tune with those fuel  
17 movement activities. And my experience is that can be a diversion to  
18 the primary focus of operating that plant and keeping that core safe.

19                   And our experience at TMI, the activities for shipping  
20 were enormous. You have to have licenses to handle the fuel. You  
21 have to have the right equipment, procedures, policies, permissions.  
22 When the transportation vehicles come on your site, you've got to  
23 certify that they are good to leave the site, whether it's a truck or  
24 railroad car. That is a huge set of activities for the site staff.

1                   And, finally, the economics, in my view, are critical.  
2           There may not be enough casks, roadway transportation, logistics,  
3           and maybe even permissions for the fuel to leave TMI. It got blocked  
4           at various state borders. The states did not want fuel to pass through  
5           their boundaries.

6                   And so we touched on some of these issues in the  
7           meeting, and I felt an accountability to identify those issues as added  
8           comments, and several of my colleagues agreed.

9                   COMMISSIONER SVINICKI: Okay. Thank you very  
10          much, and I think that's important context, that they are not dissenting  
11          views, they are additional comments. And please correct me if I'm  
12          wrong. That means merely that these commenters believed that the  
13          letter report itself did not adequately emphasize these points, and they  
14          wanted to add these views.

15                  MR. SKILLMAN: I think that is a correct  
16          characterization.

17                  COMMISSIONER SVINICKI: Okay. Thank you very  
18          much.

19                  Thank you, Chairman Macfarlane.

20                  CHAIRMAN MACFARLANE: Commissioner  
21          Apostolakis?

1                   COMMISSIONER APOSTOLAKIS: Thank you. Well,  
2                   as has already been noted, this is kind of an unusual meeting in the  
3                   sense of the topics that were presented once where the Committee  
4                   has already voted or is in the process of voting.

5                   But Mr. Stetkar gave me an opening by listing other  
6                   things, so now I can ask questions about other things. I notice there is  
7                   a -- as if I needed permission, right?

8                   (Laughter.)

9                   There is an ongoing disagreement between you  
10                  gentlemen and lady and our staff regarding the reactor oversight  
11                  process for new reactors, where you are insisting that the relative risk  
12                  approach has not received the appropriate consideration by the staff.

13                 The staff says that they did table top exercises, and  
14                 they didn't find any need for this approach. Can you summarize -- I  
15                 know you are the principal behind it. Can you summarize the  
16                 disagreement and why you guys think that the relative risk approach is  
17                 reasonable? This is along the lines of Commissioner Svinicki. I  
18                 mean, this would inform my decision.

19                 MR. STETKAR: I can't -- I can't summarize the staff's  
20                 reasons for their position. I can briefly summarize our rationale. And  
21                 the way that we have interpreted what we have seen from the staff is  
22                 a departure from a quantitative, consistent evaluation of the -- a  
23                 method to quantitatively evaluate the significance of events.

1                   We have suggested this relative risk metric. There  
2                   could be other ways to do that, but the staff has run the table top  
3                   exercises and noted that the absolute risk measures that are currently  
4                   applied for the currently operating plants were inadequate to raise  
5                   attention to specific issues that they felt should merit additional  
6                   attention. Therefore, they have proposed -- it has been characterized  
7                   in some cases as qualitative deterministic backstops, qualitative  
8                   assessments, and they have developed a strawman type matrix for  
9                   trying to do things, evaluate things qualitative.

10                   We think that that -- by the way, we agree that a  
11                   measure of qualitative assessment is necessary, because there are  
12                   issues that may arise that cannot be easily quantified in the context of  
13                   current PRA technology. And in particular, I think in our letter we  
14                   highlighted things like passive safety features for new reactors. Those  
15                   are -- there are large uncertainties in the performance of those safety  
16                   features. There are other issues for which there are perhaps large  
17                   uncertainties that a more formal structured qualitative analysis would  
18                   be quite appropriate.





1                   So that is essentially the genesis of our letter, again,  
2                   trying to maintain a system that does provide quantitative risk-  
3                   informed objective and predictable -- it's a format that licensees, as  
4                   well as the staff, understand how to evaluate these events in the  
5                   context of the risk models.

6                   COMMISSIONER APOSTOLAKIS: Well, the  
7                   Committee is not necessarily against the use of qualitative factors. It  
8                   is just that you want to exhaust all possibilities of using quantitative  
9                   techniques before you move on to qualitative.

10                  MR. STETKAR: We strongly espouse the notions of  
11                  Reg Guide 1174, and that is an integrated decision-making process  
12                  that uses, to the best possible benefit, quantitative risk information,  
13                  supplemented, where necessary, by qualitative insights, not using  
14                  qualitative insights as a surrogate, but as a complement to the  
15                  quantitative -- focusing on the quantitative.

16                  COMMISSIONER APOSTOLAKIS: Another topic you  
17                  mentioned is human reliability analysis. The Commission issued an  
18                  SRM in October of 2006 directing the staff to put some order in the  
19                  field of human reliability models. The industry was using three or four.  
20                  We were using our own -- ATHENA, SPAR-H, and so on -- and tried  
21                  to come up with one model that perhaps would include or encompass  
22                  the best features of these models, so everybody would agree to use  
23                  that model.

1                   So unfortunately the Commission briefing of last  
2 Monday was postponed, but this IDEAS model, have you had a  
3 chance to review it?

4                   MR. STETKAR: Yes.

5                   COMMISSIONER APOSTOLAKIS: Has the  
6 Committee reviewed it?

7                   MR. STETKAR: The Committee has not reviewed it.  
8 We have been following so far very closely the evolution of the  
9 fundamental psychological -- there is a very good report that provides  
10 a fundamental psychological basis for -- and underpinning for human  
11 performance and the evolution of the IDEAS model.

12                   We have had -- I've forgotten -- a number of  
13 Subcommittee meetings. It has not come before the Committee. It  
14 will come before the Committee in May I believe, and we plan to write  
15 a letter on it at that time.

16                   COMMISSIONER APOSTOLAKIS: Okay.

17                   MR. STETKAR: But the Committee has not yet  
18 deliberated on the methodology.

19                   COMMISSIONER APOSTOLAKIS: Because I am  
20 really anxious to find out how close we are to that goal of the SRM of  
21 eight years ago.

22                   MR. STETKAR: It is premature to speak for the  
23 Committee at this time --

1 COMMISSIONER APOSTOLAKIS: Yes, I

2 understand.

3 MR. STETKAR: -- because we have not done that,

4 so --

5 COMMISSIONER APOSTOLAKIS: Okay. Well,

6 thank you very much.

7 CHAIRMAN MACFARLANE: Okay. Commissioner

8 Ostendorff.

9 COMMISSIONER OSTENDORFF: Thank you,

10 Chairman. Thank you all for your presentations. I want to make a

11 comment similar to other colleagues about the role the ACRS work

12 products serve in Commission decision-making. I know that some of

13 the issue that we have briefed -- that are being briefed today because

14 of the delay in this meeting have already been acted upon or are in

15 the process of being acted upon by the Commission.

16 So I'm not going to really ask questions in those

17 areas, but I'll tell you that I know that all of my colleagues and myself

18 greatly value the work of the ACRS and seeing your perspectives and

19 your take on various issues. And I know that Mark Satorius -- so I am

20 going to ask Mark to pay attention to this one -- that I think it's healthy

21 that, you know, the ACRS may disagree with the staff. I see how you

22 challenge the staff, and I see how you signed a letter back out

23 defending the staff's position or maybe agreeing with some of the

24 ACRS perspectives.

1 I think this give and take back and forth between the  
2 ACRS and staff is extraordinarily rich and helpful for this agency, and I  
3 think it's very healthy. And so I think when those -- I just -- sometimes  
4 I know that emotions can get involved there, whether it be from the  
5 Committee or the staff, or vice versa, but I just think this is a healthy  
6 way of doing business, and I think that other organizations in the  
7 Federal Government would benefit from the respect of disagreeing  
8 views the way that this organization does. So I wanted to comment on  
9 that.

10 I want to add my agreement with Commission  
11 Svinicki's comments on looking at the longer term picture of the  
12 ACRS. I thought that was a very important point to make and, you  
13 know, broadly to look at that, but also the context of the subsequent  
14 license renewal.

15 Just last week I went to Calvert Cliffs with Amy  
16 Cabbage from my staff, and we looked at Unit 1. They were in an  
17 outage, and the whole purpose of my visit -- I just wanted to look at,  
18 what is the NRC doing? Is the resident inspector, senior resident  
19 inspector, the regional inspectors to come in in an outage and look at  
20 audits, surveillances, there is an in-service inspection, the reactor  
21 vessel head, aka Davis-Besse driven, boric acid leak, checks those  
22 kinds of things. And I didn't know much about what was going on in  
23 an outage as far as the applicability of some of these issues to longer  
24 term aging management.

1                   And so I know that you all are looking at those things,  
2                   but I just -- I found it very helpful to do that, and so I would encourage  
3                   the Committee, where it makes sense and perhaps many of you have  
4                   already done this, but if you haven't I think going to see specifically  
5                   what the licensees are looking at during outages, how they are looking  
6                   at aging issues from a materials degradation standpoint, I saw about  
7                   three or four examples of that.

8                   I didn't observe all of those examples, but I saw where  
9                   their plan for that three-week outage, four-week outage was looking at  
10                  these. So it was very enlightening for me. It was perhaps one of the  
11                  most valuable plant visits I have done as a Commissioner.

12                  Let me shift gears. I was at Watts Bar II earlier this  
13                  year, and the Commission has discussed in various periodics and  
14                  agenda planning that, you know, a few years back when we were  
15                  looking at Vogtle, the AP1000 design certification review, and Vogtle  
16                  and Summer COL mandatory hearings, that those got a lot of visibility  
17                  with the Commission.

1 Watts Bar II has not gotten as much Commission  
2 visibility. It is now. And I know that the ACRS has a plan to look at  
3 Watts Bar II and has been looking at it for some time. But I just  
4 wanted to see, do you have any concerns, John, in your role as  
5 Chairman, about the schedule, the work that the staff is doing on  
6 licensing issues and what you are doing as a Committee? Because  
7 we're expecting to receive that license application here, you know,  
8 sometime in the near future. I'm just curious as to where you stand on  
9 that.

10 MR. STETKAR: All I can say is we're following the  
11 staff's schedule as closely as possible. We are being responsive.  
12 And when the staff -- we have an internal schedule laid out for Watts  
13 Bar review meetings. We, in many cases -- this is one of those types  
14 of licensing issues that we can't take initiatives on particular items.  
15 We have not identified any significant issues to date.

16 COMMISSIONER OSTENDORFF: NRC staff is  
17 keeping you well informed of their milestone --

18 MR. STETKAR: To my perspective, yes. I don't know  
19 whether -- Harold Ray is our Subcommittee Chairman. I don't know if  
20 Harold has anything that he'd like to add. Shaking his head no.

21 COMMISSIONER OSTENDORFF: If you don't have  
22 anything, that's okay.

1 MR. STETKAR: No. We do have -- it's on our  
2 agenda, it's on our radar, and we're following it, you know, as closely  
3 as --

4 COMMISSIONER OSTENDORFF: And I'm not  
5 mentioning it because I have concerns with ACRS, but I just know  
6 overall as a body this organization has, quite frankly, until recent  
7 months has not perhaps paid as much attention to this as has been  
8 the case for prior COLs that this Commission has dealt with.

9 MR. RAY: Well, Commissioner, I would say there is  
10 an SRM, as you know, that guides us in our review. This is a little  
11 exceptional because of the time period between one and two. But  
12 otherwise it's the second unit that we're doing in a plant, and there  
13 isn't anything at this point that --

14 COMMISSIONER OSTENDORFF: Okay.

15 MR. RAY: -- concerns us.

16 COMMISSIONER OSTENDORFF: Okay. Thank  
17 you. Appreciate that.

18 And kind of following Commissioner Apostolakis' lead  
19 about talking about topics that were on your list that were not  
20 necessarily briefed, because I think there are some that have my  
21 interest -- and I look at Charlie Brown over there from his naval  
22 reactors experience. And so I'm just curious -- I know the Gerald Ford  
23 aircraft carrier design -- I know, you know, it's not a commercial  
24 nuclear power plant.



1 DR. ARMIJO: It was fun.

2 (Laughter.)

3 COMMISSIONER OSTENDORFF: I'm glad to hear  
4 you say that.

5 MR. STETKAR: And if we say anything about it in  
6 public, we have to shoot ourselves.

7 COMMISSIONER OSTENDORFF: Well, I  
8 understand we're talking about a very different core, and we are  
9 talking about, you know, issues that are classified. But I'm just curious  
10 at a very high level, unclassified, maybe at a philosophical level, is  
11 there anything that caught the Committee's attention in that as far as  
12 the approach for the design that you thought "ah ha" or "wow"?  
13 Something like that.

14 MR. STETKAR: Dennis is the Chairman of that  
15 Subcommittee.

16 COMMISSIONER OSTENDORFF: Okay.

17 MR. STETKAR: Which has just been dissolved, so  
18 he wants his parting shot.

19 DR. BLEY: We can't talk about any --

20 COMMISSIONER OSTENDORFF: I understand, I'm  
21 talking about at a very high level.

1 DR. BLEY: One thing I will say, and we had heard it  
2 from people like Dana who had been through this before with the  
3 naval designs, whenever we, as a Committee, raised a question or an  
4 issue, the response was overwhelming. I mean, we went up to visit  
5 the lab. We went down to the Navy Yard, and they brought in all their  
6 experts and addressed every issue we raised very thoroughly, and  
7 sometimes they went back and redid work, said, "What? We hadn't  
8 thought about that," and they dug a little deeper. They were very  
9 thorough.

10 If they hit a spot where they're not sure of their  
11 analysis, they will pull out a few million bucks and run the experiment  
12 that it takes to get the data to be able to go forward with the work they  
13 are doing. So it was a pleasure to work with them, and their  
14 thoroughness was impressive.

15 They try to follow our guidance as much as possible,  
16 and they in fact couch their safety analysis in our terms very much.  
17 So I think the overwhelming thing, though, is the way they are able to  
18 respond to issues and address them thoroughly.

19 COMMISSIONER OSTENDORFF: Okay. Well,  
20 thank you. I think that body of work is very important for us. It helps  
21 them out quite a bit, obviously, but I think it helps us, you, be -- you  
22 know, to stay in tune with other ways of looking at things.

1                   I want to make just a comment on Commissioner  
2           Apostolakis' discussion on HRA. The Chairman -- and one of the  
3           great things about the Commission is we all have different  
4           backgrounds, so we have some academics here, we have some Hill  
5           staffers, and we have some DOE employees, we have some operator  
6           experience. So I'm speaking with -- from an operator background.

7                   We had this Commission meeting scheduled earlier  
8           this week. It had to be cancelled because of the weather. I did meet  
9           with two of the outside presenters from Halden and from EPRI, and I  
10          just would -- I want to share with you, because I know you're looking  
11          at this -- what I kind of found absent in their slides and in their  
12          approach -- and I discussed this very candidly with them -- is how are  
13          you looking at this from an operator's standpoint? It was too  
14          academic for me.

15                  And I think there is -- I am not seeing a convergent of  
16          the academic community here with the pragmatic approach of  
17          operators. And so I asked a bunch of questions from an operator's  
18          standpoint. And it was probably unfair of me to ask that, but they  
19          couldn't address them. And, in particular, I look at human error.

1                   A huge thing that submarines train for is being able to  
2 answer a head flank bell quickly, to quick move through the water for  
3 torpedo evasion or other purposes. And so one of the human error  
4 possibilities is the throttleman opens the throttles too quickly, and it's  
5 above -- faster than the reactor operator can shift reactor coolant  
6 pumps to get to higher power to flow SCRAM set point. We won't go  
7 into any numbers here.

8                   But people who are throttlemen, you know, people  
9 that are 21 years of age, a Third Class Petty Officer, they practice this  
10 scores of times in a two-year period. Yet none of the HRA work that I  
11 see really looks at the impact to training or using it even from a  
12 qualitative error standpoint, okay, here is an area that could be the  
13 source of a problem. What is the value of training in that area?

14                   So I just -- I know my time is up. I'm not really asking  
15 a question here, but I am just saying that it's something that I have  
16 seen deficient so far in all of the HRA stuff that I have reviewed. And  
17 Commissioner Apostolakis has encouraged me to keep an open mind,  
18 and I am, but --

19                   (Laughter.)

20                   -- I am just concerned in that area, because I think  
21 that if it doesn't have a fulsome approach to the operator role, then it  
22 is going to be not a very useful product.

1 MR. STETKAR: One quick comment, and I know  
2 Dennis would like to elaborate. I don't know what you were briefed  
3 on, so I don't know exactly what snapshot of the whole process you  
4 have seen. There is quite a bit of, as you've characterized it,  
5 academic underpinning for a lot of the cognitive sciences that are  
6 feeding into the process.

7 They are currently bringing a lot of that material into  
8 the world of practical application of the methodology. So I'm not quite  
9 sure exactly what you saw in that evolution.

10 COMMISSIONER OSTENDORFF: Well, I  
11 understand. All I saw was -- I do not feel personally -- and I'm not --  
12 that the operator role, the effect of training on operators, that all of that  
13 had any appropriate place in their body of work that they are  
14 representing --

15 DR. BLEY: I can comment on that a little bit. I saw  
16 the list of people who were coming to talk with you, and I know they  
17 didn't all make it because of the snow. They didn't have the people  
18 with operations background, but that project and the previous one --  
19 ATHENA -- had a great deal of operator involvement all the way  
20 through it, interactions very closely at the plants.

1                   There were operators from the plants and from the  
2                   NRC staff. There are a number here who participated in the  
3                   development and in the test applications of those issues. And the  
4                   folks at the NRC simulator were heavily involved early on with that  
5                   group as they were beginning their work. So they were able to do  
6                   exercises, show them how things work, and they were able to  
7                   interview and had operators participate.

8                   So there was an effort to have a great deal of  
9                   operations experience embedded in the work as it went along. And I  
10                  have no idea why they didn't bring operators to talk to you.

11                 COMMISSIONER OSTENDORFF: I am not trying to  
12                 pick on people. But I am -- it is more of a caution to ACRS that I think  
13                 the operator piece has got to be fully assessed here in the role of  
14                 training and operational proficiency.

15                 MR. STETKAR: We are well sensitized to that  
16                 because of our own backgrounds. I think that -- and I don't want to  
17                 steal any of the staff's thunder, because you will be briefed on this at  
18                 some time here in the near future. As I said, we haven't, as a  
19                 Committee, fully been briefed on the whole project.

1 I think that when that project develops a methodology  
2 that they -- a methodology and guidance that they feel is ready for let's  
3 call it prime time application, that the piloting of that methodology for  
4 some real-world error-type scenarios is very, very important. And that  
5 type of piloting will bring to bear, you know, the notions that you have  
6 brought up on the effects of training and experience of the crews, crew  
7 interactions, that type of stuff, in the real world.

8 COMMISSIONER OSTENDORFF: Thank you.  
9 Thank you, Chairman. Sorry.

10 CHAIRMAN MACFARLANE: Okay. I'm going to ask  
11 a couple more questions of Mike Ryan, and this is about the 10 CFR  
12 Part 61 analysis that you guys did. So you in your letter expressed  
13 concern about waste that is already buried that might have to meet  
14 new requirements, if you recall. And so one of the questions is, why  
15 wouldn't the total volume of waste at a site be subject to new  
16 standards?

17 And, you know, I can understand there might be  
18 difficulties with this, but if you think to the future and 1,000 years from  
19 now, a dose receptor would not be able to tell the difference, whether  
20 it was the -- you know, the radionuclides they take in were from before  
21 or after the new standard. So --

1 DR. RYAN: I think there's two parts to this. There  
2 are wastes that have been disposed, depleted uranium in particular,  
3 both metal and oxide in packaged form. And by "disposed," I mean  
4 below grade disposal. Sites that have done that have pretty robust  
5 environmental monitoring programs, both on and at the vicinity and at  
6 the far reaches from their site, so they can have an integrated and  
7 long-time profile of how that geohydrologic environment is going to  
8 perform, and, therefore, what the risk might be to the disposed  
9 materials.

10 I think it is reasonable to think about that in a  
11 framework of something like 1,000 years. I don't think much more  
12 than that you can gain a lot of confidence in. So there is that part of it.

13 If, for example, disposal techniques changed and  
14 there was some new activity, then I think you're kind of in the mode of,  
15 well, we've got to look and see and make sure that makes sense. So  
16 that does not in any way say that if something new happened you  
17 couldn't adapt or adopt, you know, whatever seemed appropriate at  
18 the time.



1                   The other part of it is they -- all the low level waste  
2 sites I am aware of have a pretty robust environmental monitoring  
3 program. So that if there is any uranium where it's not supposed to  
4 be, or any other radionuclide for that matter, there are remedial action  
5 plans in place to take care of that, to do something about it, to first  
6 assess it and then implement whatever corrective measure might be  
7 appropriate.

8                   So I think that, coupled with the 1,000-year profile of  
9 time, you can get a pretty good idea, is the uranium in the right place,  
10 behaving in the right way, based on our ongoing monitoring. So have  
11 I addressed your question?

12                  CHAIRMAN MACFARLANE: Yes, sort of. Let me  
13 just go on to a question more on the uranium issue.

14                  DR. RYAN: Okay.

15                  CHAIRMAN MACFARLANE: So, you know, with  
16 uranium the issue is not the uranium itself, it's the daughter products.

17                  DR. RYAN: Sure.

18                  CHAIRMAN MACFARLANE: Right. Over time, those  
19 are the primary dose contributors. So, and you did, as you said, talk  
20 to a whole variety of people, some of whom I'm sure encouraged you  
21 to think about uranium as a -- treat it the same way as transuranic  
22 waste. In other words, put it in some kind of deep repository versus a  
23 shallow one.

1                   Did you do any thinking about that? You know, what  
2                   were your conclusions?

3                   DR. RYAN: Yes. I guess I wouldn't necessarily take  
4                   uranium and put it in the same category as plutonium.

5                   CHAIRMAN MACFARLANE: You would or wouldn't?

6                   DR. RYAN: I would not. And I would not because  
7                   uranium is driven principally by its chemical hazard taken into the  
8                   body. It is driven by its chemical properties, not --

9                   CHAIRMAN MACFARLANE: Well, right now, but  
10                  then -- but in the future the daughter products become an issue.

11                  DR. RYAN: Of course, then if radium comes into  
12                  equilibrium, then radium might be the -- you know, per curie of intake  
13                  a hazard. Exactly right.

14                  But plutonium is a whole different kind of animal, and  
15                  it has a much higher radiotoxicity per unit intake, and that, you know,  
16                  might need different treatment, plus the half-life is 24,000, not 4.1  
17                  billion years. So I think different strategies could come into play there.

18                  I kind of see that as an apples and oranges  
19                  comparison, but it's not an unfair one, because if you look at both of  
20                  those time horizons and these long-lived species in those time  
21                  horizons, you can get some insights as to what might be a good  
22                  strategy based on where you are and what the geohydrology is doing.

23                  CHAIRMAN MACFARLANE: Okay.

24                  DR. RYAN: Is that helpful? Thank you.

1                   CHAIRMAN MACFARLANE: Commissioner Svinicki,  
2 anything additional? No? No. Okay.

3                   All right. Well, then, we will draw this meeting to a  
4 close. It has been a pleasure to meet with the brain trust here this  
5 morning, and we look forward to doing it again soon. But I now  
6 declare this meeting adjourned.

7                   (Whereupon, at 11:53 a.m., the proceedings in the  
8 foregoing matter were adjourned.)

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