UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

MEETING WITH THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

+ + + + +

FRIDAY

MARCH 7, 2014

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

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

COMMISSION MEMBERS:

ALLISON M. MACFARLANE, Chairman

KRISTINE L. SVINICKI, Commissioner

GEORGE APOSTOLAKIS, Commissioner

WILLIAM C. OSTENDORFF, Commissioner

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

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.

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

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

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

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

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

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

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

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

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

Next slide, please.

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

Next slide.

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

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

Next slide.

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

Next slide.

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

Next slide, please.

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

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

Next slide, please.

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

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

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

Next slide.

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

Next slide.

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

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

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

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

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

DR. SCHULTZ: Thank you, John.

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

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

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

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

Next slide, please.

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

Next slide, please.

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

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

Next slide, please.

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

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

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

Next slide, please.

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

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

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

Next slide, please.

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

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

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

Next slide, please.

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

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

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

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

Next slide, please.

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

Next slide, please.

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

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

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

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

Next slide, please.

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

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

Next slide, please.

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

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

We disagree with these assertions and conclusions. We are concerned that they have the potential to inappropriately marginalize and inadvertently prejudge the value of proceeding toward a risk management regulatory framework.

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

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

Next slide.

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

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

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

Thank you.

DR. ARMIJO: Thank you, Steve.

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

Next chart.

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

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

Next chart.

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

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

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

Next chart.

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

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

Next chart.

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

Next chart.

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

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

Next chart.

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

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

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

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

Next chart.

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

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

Next chart.

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

Next chart.

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

Next chart.

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

Next chart.

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

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

Next chart.

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

Next chart.

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

Next chart.

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

Next chart.

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

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

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

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

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

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

Next chart.

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

We also concluded that the cumulative effects of conservatisms and assumptions used in the high estimates and in the sensitivity studies of the regulatory analyses resulted in exaggerated frequencies of fuel damage and exaggerated benefits of expedited transfer.

Thank you.

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

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

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

DR. CORRADINI: Huh?

CHAIRMAN MACFARLANE: I'm just smiling at you.

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

(Laughter.)

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

(Laughter.)

At least the first report. Excuse me.

Let me talk about the hardened vent ISG.

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

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

Next slide.

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

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

Next slide, please.

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

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

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

Next slide, please.

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

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

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

Next slide, please.

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

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

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

Next slide, please.

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

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

Next slide, please.

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

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

Next slide, please.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Thank you very much.

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

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

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

MR. STETKAR: Thank you.

CHAIRMAN MACFARLANE: Great.

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

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

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

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

CHAIRMAN MACFARLANE: Right.

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

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

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

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

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

CHAIRMAN MACFARLANE: Mike has a view.

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

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

DR. ARMIJO: Yes.

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

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

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

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

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

CHAIRMAN MACFARLANE: Yep.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MR. STETKAR: No.

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

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

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

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

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

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

DR. RYAN: That's a good question.

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

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

DR. RYAN: Yes.

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

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

CHAIRMAN MACFARLANE: No, we have not.

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

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

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

CHAIRMAN MACFARLANE: -- look at other countries.

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

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

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

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

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

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

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

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

(Laughter.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Thank you.

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

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

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

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

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

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

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

COMMISSIONER SVINICKI: Okay. Thank you very much.

Thank you, Chairman Macfarlane.

CHAIRMAN MACFARLANE: Commissioner Apostolakis?

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

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

(Laughter.)

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

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

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

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

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

However, there is a large volume of issues that arise that are perfectly evaluated using existing PRA technology and the tools that we have available. And we felt that it's retention of those tools and that framework, which seems to be working quite well for the currently operating reactors, could be extended with minimal effort to extend to new reactors and provide the types of flexibility that the Commission has indicated should be appropriate for the new reactors.

So, for example, in a currently operating plant, if you have a core damage frequency of 10 to the minus four -- pick a number -- the current absolute risk metrics would raise an issue from the green to the white finding if it increased the core damage frequency by one percent. It's 10 to the minus six.

Relative risk metrics, that's a one percent increase. Don't think 10 to the minus six. It's just one percent. Relative risk metrics might say, "Well, I don't raise that level of concern in terms of regulatory optics until I get a factor of 10 increase." Again, forget the absolute magnitude. It's a relative risk. How much -- we certainly don't want to say that a one percent increase in a very, very small number is of concern, but perhaps a factor of 10, perhaps a factor of 50, perhaps not a factor of 1,000.

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

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

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

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

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

MR. STETKAR: Yes.

COMMISSIONER APOSTOLAKIS: Has the Committee reviewed it?

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

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

COMMISSIONER APOSTOLAKIS: Okay.

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

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

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

COMMISSIONER APOSTOLAKIS: Yes, I understand.

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

COMMISSIONER APOSTOLAKIS: Okay. Well, thank you very much.

CHAIRMAN MACFARLANE: Okay. Commissioner Ostendorff.

COMMISSIONER OSTENDORFF: Thank you, Chairman. Thank you all for your presentations. I want to make a comment similar to other colleagues about the role the ACRS work products serve in Commission decision-making. I know that some of the issue that we have briefed -- that are being briefed today because of the delay in this meeting have already been acted upon or are in the process of being acted upon by the Commission.

So I'm not going to really ask questions in those areas, but I'll tell you that I know that all of my colleagues and myself greatly value the work of the ACRS and seeing your perspectives and your take on various issues. And I know that Mark Satorius -- so I am going to ask Mark to pay attention to this one -- that I think it's healthy that, you know, the ACRS may disagree with the staff. I see how you challenge the staff, and I see how you signed a letter back out defending the staff's position or maybe agreeing with some of the ACRS perspectives.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

COMMISSIONER OSTENDORFF: Okay.

MR. RAY: -- concerns us.

COMMISSIONER OSTENDORFF: Okay. Thank you. Appreciate that.

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

DR. ARMIJO: It was fun.

(Laughter.)

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

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

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

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

COMMISSIONER OSTENDORFF: Okay.

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

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

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

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

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

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

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

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

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

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

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

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

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

(Laughter.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DR. RYAN: Okay.

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

DR. RYAN: Sure.

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

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

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

CHAIRMAN MACFARLANE: You would or wouldn't?

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

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

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

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

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

CHAIRMAN MACFARLANE: Okay.

DR. RYAN: Is that helpful? Thank you.

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

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

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