

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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BRIEFING ON NFPA 805 FIRE PROTECTION

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THURSDAY

JUNE 19, 2014

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ROCKVILLE, MARYLAND

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The briefing on NFPA 805 Fire Protection was held at the Nuclear Regulatory Commission, Commissioners' Conference Room, 1st Floor, One White Flint North, 11555 Rockville Pike, at 9:00 a.m., Allison M. Macfarlane, Chairman, presiding.

PRESENT:

ALLISON M. MACFARLANE, Chairman

KRISTINE L. SVINICKI, Commissioner

GEORGE APOSTOLAKIS, Commissioner

WILLIAM D. MAGWOOD, IV, Commissioner

WILLIAM C. OSTENDORFF, Commissioner

## EXTERNAL PANEL:

PAUL HARDEN, Senior Vice President, Fleet  
Engineering, FirstEnergy

JOELLE DeJOSEPH, Senior Fire Protection  
Engineer, Duke Energy

JAMES CHAPMAN, Director, Safety and Risk,  
Sciencetech Curtiss Wright

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

## NRC STAFF PANEL:

MARK SATORIUS, Executive Director for  
Operations

JOSEPH GIITTER, Director, Division of Risk  
Assessment, NRR

ALEX KLEIN, Chief, NRR, Fire Protection  
Branch

HOSSEIN HAMZEHEE, Chief, NRR, Probabilistic  
Risk Assessment Licensing Branch

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

(9:07 a.m.)

CHAIRMAN MACFARLANE: Okay. Good morning. Sorry we are a little late. It's my fault. I was touring Congressman Van Hollen around our Small Business Group this morning.

I'd like to welcome everybody to this morning's meeting on the status of operating nuclear power plants that are transitioning to a risk-informed performance-based fire protection licensing basis. That was a mouthful.

This transition is performed in accordance with the National Fire Protection Association Standard 805, and hereto forth will be referred to as NFPA 805, a blessed acronym in today's meeting, along with NRC.

So we are going to provide -- or this meeting will provide a status of the plants that are submitting license amendment requests to transition to NFPA 805. Our briefing will also include a discussion of the technical issues involved in fire probabilistic risk assessment. The first panel is an external panel, which includes Mr. Paul Harden from FirstEnergy, Ms. Joelle DeJoseph from Duke Energy, Mr. Jim Chapman from Scientech Curtiss Wright, and Mr. David Lochbaum from the Union of Concerned Scientists. We will have a short break after the first panel, and then we will turn to our staff panel, who will provide a status of license amendment reviews and a discussion of the progress in addressing technical issues encountered during the NRC reviews.

Before we begin, let me turn to my fellow

Commissioners to see if anybody has a comment.

COMMISSIONER OSTENDORFF: I do. Thank you, Chairman. I think this is the last public meeting in which our dear friend and colleague, George Apostolakis, will be with us. And it's a sad day for all of us on the Commission. Commissioner Apostolakis has added tremendous value to this agency and to nuclear safety, not just in the United States but worldwide. I personally have benefited tremendously from learning from George, as I think we all have. In the finest sense of the Commission, we have all learned from each other.

And, George, I just want to tell you that you have left behind a tremendous legacy, or leaving behind a tremendous legacy. We will have a chance I know to say good-bye before you actually depart, but this is the last public meeting. And I just want to go on record for saying I consider you a dear friend and colleague, and I'm grateful for knowing you and grateful for your service.

Thank you.

COMMISSIONER APOSTOLAKIS: Thank you very much.

COMMISSIONER SVINICKI: Well, I will join in what will be one of I'm sure many tributes to our colleague. And I want to say here, here, but I also want to acknowledge something very significant, which was Commissioner Dr. Apostolakis' long service, not only as a member of the Advisory Committee on Reactor Safeguards, but the Chairmanship of that group as well, and just the body of his work and contributions over that time need to be added to his

significant contributions as a Commissioner.

COMMISSIONER MAGWOOD: I was planning not to say anything because I know how George embarrasses easily. But since Commissioner Ostendorff has started the ball rolling, let me chime in. I agree with everything that Commissioner Ostendorff said, and he said it very well, so thank you for starting this.

I think I can only say that I can't imagine anyone that epitomizes what one expects to see from an NRC Commissioner more than George Apostolakis. I think you are not only probably one of the finest Commissioners that has ever served, you are one of the finest people I have ever met, and it has been an honor and a privilege to serve with you. So thank you.

COMMISSIONER APOSTOLAKIS: Thank you. Now you have to say something.

CHAIRMAN MACFARLANE: I know. I have to say something. I was trying to save you from this, George, but I didn't -- I didn't succeed.

(Laughter)

Well, you know, we will all terribly miss George, and all our discussions. And I, of course, will miss Professor Apostolakis. It has always been a pleasure to have a fellow academic sitting right next to me. We share similar world views, and I think during these Commission meetings we have had a similar approach. And so it will be a great loss, but we will have an opportunity, multiple opportunities I believe, to go over that in great detail. So I won't belabor the point now. But if you would like to say anything, George.

COMMISSIONER APOSTOLAKIS: Well, thank you very much. I really appreciated working with you, and I enjoyed it. I knew about the Commission and how it functions before I joined, but I'll tell you, the members really think independently. We have one-on-one meetings where we exchange views, maybe sometimes trying to change the other guy's views, but it's always in a very friendly way, and I really appreciated that. And I'm sad to go, but I will go. Thank you.

CHAIRMAN MACFARLANE: Okay. Well, on that note, I will -- we will turn things over. I know George is very interested in this particular topic, and so we will look to you for your wisdom during the question and answer session.

So, first, we will start with Mr. Paul Harden, who is Senior Vice President, Fleet Engineering, at FirstEnergy.

MR. HARDEN: Well, good morning and thank you. I'm here this morning to talk about some of the industry perspectives on NFPA 805. And before I start, I think it's important just to highlight briefly some of the anticipated benefits from 805 when we started, because that puts in perspective some of the feedback from the industry. It was viewed as an effective method to address fire safety and the compliance issues based upon risk significance.

And when we set out on this journey, we thought it to be a cost effective alternative to deterministic resolution for non-compliances. It was also thought to further promote risk-informed approaches by focusing on issues that are most risk-significant.

So in my presentation today I'm going to touch a little bit on the history, because that puts in perspective where we are today, some of the current things that we believe are going very well in the process, some of the current hard spots that we are still working through as an industry with the staff, some of the future concerns that the industry has, and then a conclusion.

So if we go to the first slide. For the historic experiences, when we first got into this, we dealt with a lot of unpredictability of expectations, cost and schedule challenges that resulted in it taking a lot longer than any of us thought it would and costing more than we thought it would, resource challenges on both the staff's part and the industry's part with a lot of rework due to research, changing expectations, changes in direction, and a lot of planning challenges trying to line out and lay out the schedule for getting all of these through, and, on the utility side, for being sure that we had a good view on the decisions that were going to come out of the model, so that we didn't have to wait for approval to start working on the modifications that were going to result in safety benefit.

And some of the unpredictability and uncertainty certainly clouded some of that view early on. So that sets the backdrop.

If we go to the next slide, I want to highlight where we are today with what's going well. There has been a tremendous amount of progress. There is still work to be done, and I'll highlight that. But there has been a tremendous amount of progress. We believe there is an improved understanding within the industry and the

NRC. There is much greater openness today than where we were in previous years to reviewing the process and seeking common ground to make things better.

And some of the examples I have there -- lessons learned meeting in October of last year, very productive meeting between the industry and the NRC. Research and Electric Power Research Institute, EPRI, have a renewed working relationship on a number of areas that didn't start out as well, but we believe that's in the right direction now.

Some of the changes, like the plans for audit schedule changes that are currently in the works, we believe that to be of great benefit, as well as better focused requests for additional information. We believe that to be a big improvement from where we were some time ago.

And the fire PRA and NFPA 805 frequently asked question process improvements, we have now established a forum to work issues, work out issues that has been effective. So we think that's a big improvement. And one that I would highlight, probably most important from many of our perspectives, leadership engagement on both the industry side and the NRC side we believe is making a difference, that high level of leadership engagement. It has been required to make some of the process changes and ensure that the process moves forward with consistency.

If we go back to when we started 805, the Fukushima event I believe distracted a lot of management attention units on both the NRC side as well as the staff side. And so that made probably

some of the early things in the process a bit rocky, but that's behind us. The management attention has improved significantly on both sides, and we believe that to be a benefit, and I will highlight later. We want to see that continue, because we believe that to be key to continuing to ensure this is an efficient and effective process to get the benefits that we need to get into our plants from a safety perspective.

If we go to the next slide, I want to highlight some of the industry concerns. And although there are concerns, some of these are areas -- and I'll highlight those -- that the staff is currently working with us on, one being that the fire PRA risks are overstated, that they don't necessarily in all cases comport with operating experience. Some estimate that the risks, even after all of the modifications are incorporated in the plants that are moving through this and doing modifications, can be overestimated by a factor of three.

And the concern with that is really not whether there is conservatism; it is making sure that the risk insights aren't skewed. The risk insights need to be pure to make sure that the decisionmaking is going into the right place when we decide to do safety improvements or modifications to our facilities.

Much higher costs, and even on the operating and maintenance side, not just on the capital investment side, compared to Appendix R, in some cases without the perceived safety improvement.

This took a lot more to get these applications through than any of us envisioned, cost a lot more, and what some plants are seeing -- and it's different from plant to plant -- is that the ongoing cost when you've

got over 50,000 pages of supporting documentation that are now tied to your licensing basis once it's approved, that takes a lot of resource to maintain configuration, control, and update, much more than many of us had anticipated.

And as I mentioned, the cost of the license amendment request, the safety evaluation development, the compliance modifications, when all combined significantly exceeds what our original estimates were. And in some cases, the cost of getting the application through and approved dwarfs the cost of the safety modifications that we're doing from the risk insights.

And also, the need for site-specific versus generic RAIs to better focus industry and NRC resources. That has been an ongoing work in progress, there has been improvements, but we believe we need to continue with those improvements.

If we can go to the next slide.

I won't dwell on it, but just to briefly highlight the conservatism in the fire PRA and what I meant. Rather than plus signs, I probably should have put multiplication signs in there, because of the way PRA works. Rather than -- if you use a bounding value or a conservative input somewhere in a PRA model, rather than being additive, because of the way core damage frequency is calculated, it is actually multiplicative.

So if you've got higher than industry experience supports, ignition frequencies, that gets multiplied by heat release rates, if you're using bounding or 98th percentile heat release rates. And that's where we get concerned, that it can skew risk insights and

steer our decisionmaking away from, in some cases, potentially safety beneficial modifications.

Next slide.

Some of the current hard spots that we are working with the staff on. We believe there is still significant room for improvement in processes supporting timely state of the knowledge improvements. There are many plants that still have not yet completed this transition, so we think it's important that we continue to revisit and incorporate state of the knowledge improvements and operating experience.

Use of operating experience to update the models. We want these models to be realistic from the standpoint of giving us the right insights to make sure they are steering our investment in the right places. That's not to say that we are not doing safety benefit modifications, as we are, but there is some concern in some cases that some of those insights could be skewed.

And the establishment of a freeze point for PRA. There has been ongoing dialogue with the staff and progress being made, but one of the issues has been a rework in process once an application is submitted for issues that really don't have significant impact on the results versus getting through the review process and then having a condition that those need to be updated before the model can be used after approval.

And then the peer review process for a PRA, we believe it must be trusted. And the majority of the RAIs we have seen are derived from PRA. About two-thirds of them on the PRA itself,

even after a peer review has been done, and they mostly refine results rather than changing outcomes. And we believe the framework set in place by Reg Guide 1.200 provides the framework for demonstrating that adequacy. And the risk-informed Steering Committee actually has a working group working with the NRC on that to make improvements.

Next slide.

Future concerns. Some of the future concerns -- executive disillusionment. We don't want to get there. We want our models to be used for risk insights. But when you look backwards and you see the uncertainty, the time and resource drain, the costs that were a magnitude greater, and in some cases skepticism over the risk insights due to some skewed results, there are some executives who are concerned about moving forward with other risk-informed approaches; in particular, as I have highlighted here, seismic.

All right. There are three plants that are lead plants for seismic that are out there. And in seismic, there is even less certainty and less detail in some of the areas than there was for fire. So we believe we need to make continued progress in a number of these areas, in some of the generic industry concerns with process, before we get too far down the road and have a similar experience in other PRA initiatives.

Last slide, please.

So, in conclusion, what we need to work towards and continue to avoid is an unpredictable process that overstates or distorts any of the risk-informed decisionmaking. As I said, there are

safety benefits. The reactor coolant pump seals, safe shutdown seals for Westinghouse plants, I have a plant that is putting in a new emergency feedwater system.

So there are safety benefits, but we want to make sure that the models are putting the risk insights in the right place. And when allowed to work, the existing processes, such as the peer review process, use of operating experience, can work. We just need a better framework to take credit for those and accept that they are working.

And we think the risk-informed process needs to be an alternative, not another layer on top of any deterministic processes.

That is still an ongoing discussion that the industry has quite often with the staff. And the need for improved alignment with the NRC regarding the PRA policy statement, to increase the incentive for the industry to expand risk-informed approaches, because many of us do believe that when done right the risk-informed approaches do provide great safety benefit to our stations.

And then, finally, continued senior management engagement is key, both on the NRC part and on the industry part, for us to continue to make the forward progress that we need to make.

Thank you.

CHAIRMAN MACFARLANE: Thank you. All right. Next we are going to hear from Ms. Joelle DeJoseph, who is a Senior Fire Protection Engineer at Duke Energy.

MS. DeJOSEPH: Hello. First slide, please.

So I'm just going to quickly go over the Duke Energy

status of our plants. The entire fleet is adopting NFPA 805. Harris and Oconee were pilot plants for 805. Harris effectively implemented their program, and Oconee is still working towards that.

Brunswick submitted their license amendment request, their LAR, in September of 2012, and Robinson, Catawba, and McGuire followed suit in September of 2013.

Most of the -- most of my experience is from the Harris plant, so that's the emphasis of my slides.

Next slide, please.

Transition experience. So it was resource intensive for the LAR prep and the RAI process, and fire PRA was a driving factor relative to cost and schedule. But through the transition process we are teaching the plant to think differently about fire.

So there seems to be a better overall awareness to the fire protection program and the associated equipment, the plants starting to understand the impact of important risk-significant systems being out of service for an extended period of time. The plants are starting to think in fire scenario terms, and what the impact of ignition sources and targets those relationships are having to the fire risk of the plant.

And we are also using the insights gained from the NFPA 805 analysis to better manage outages through our non-power ops analysis. And the plants are understanding that fire is a large contributor to fire risk, and they do happen, so we need to be aware of it.

Next slide, please.

So the implementation experience. We have a more comprehensive and a better understanding of our physical plant. Some examples of that are documentation of cable routings, realistic fire scenarios, versus whole room insights that we were using in deterministic space. And we understand the overall plant response to fire through operations response, through fire brigade response, and through equipment response.

Next slide.

I'm going to talk about some specific safety improvements we made. First one was incipient detection, and the issue at Harris is -- the issue at Harris was that we had fires in cabinets that were affecting important equipment, and so the solution that we had was to install this incipient detection or this very early warning fire detection system, and then have the appropriate operator response should an alert and alarm come into one of these cabinets. And that's -- we have had a couple of examples of these systems working well.

Next slide?

Another safety improvement is three-hour cable. And so the issue that we had at Harris was there was a small number of important cables in the cable tray, and rather than wrapping the entire cable tray in fire wrap, we were able to reroute those cables and get them out of harm's way and ensure that they were installed in a way that would meet the three-hour credit.

Next slide, please?

Another safety improvement was the alternative seal

injection system for the reactor coolant pump seals. And what this did is it installed an independent, automatically actuated backup fluid flow to the RCP seals. It was a standalone system requiring only minimal interface with existing plant components.

Next slide, please.

Other safety improvements. So we were able to address multiple spurious operations using a performance-based approach. And by using a performance-based approach, when we disposition these operations we were able to effectively use our resources on issues that really affected safety. And this goes back to being able to use a performance-based approach versus deterministic.

And we also were able to reduce the number of manual actions required by an operator during a fire event. And why that's important is because you don't want to place undue burdens on the operators during a fire event, and that will reduce the chance for human error during a critical time and allow the operators to focus on what they need to focus on.

Next slide, please.

So program maintenance. So we have a more informed maintenance for the fire protection program, and we do that through a number of different processes. And the first one is the fire protection program change process. It's a risk-informed process to review changes to the plant. We use our insights when reviewing plant mods.

Transient combustibles. So we all have a transient

combustible program, but it now includes the transient fire scenario insights, and so we are smarter.

The abnormal operating procedures are more representative of a plant's response to a fire. The operator actions are more closely aligned with potentially impacted equipment, less potentially unnecessary operator manual actions.

Compensatory measures. We have a calculation now that was developed to provide a basis for risk-informed compensatory measures for inoperable fire protection equipment.

And NFPA monitoring, 805 monitoring. So the purpose of the monitoring program is to ensure that the assumptions made in the fire PRA remain valid. At Duke, we use an expert panel. It is very similar to maintenance rule. But the 805 monitoring program is to ensure that the assumptions we made are -- that the plant reflects the assumptions made in the analysis.

Next slide, please.

Mutual fire protection insight. So this slide is kind of talking about the applications that can be used at non-805 plants that we gained from transitioning to 805. And one of them is the plant change process. So it goes back to thinking about the fire scenario and using the insights that we gained from that. So thinking about an ignition source and how it is going to affect the plant, what target it's going to hit, what other equipment it's going to hit. You don't need a fire PRA to use those insights to make better plant mod.

And then the other is the transient combustible control program. So just having control of standoff distances from plants,

from plant equipment, so that you're not putting any undue risk to plant equipment by placing a transient, you know, next to a piece of equipment.

Next slide, please.

So challenges moving forward. So as Paul said, you know, we want to make sure that we have a consistent program implementation throughout the industry. And we really want to make people understand that NFPA 805 is risk-informed, not risk-based, and that there is a continual improvement to the processes that we're involved in, the FAQ process, as Paul had mentioned.

We have a memorandum of understanding between the NRC and EPRI, working through issues. We have industry benchmarking and lessons learned, and then sharing of lessons learned from the NRC inspection process. We are now starting to have 805 focused inspections, and so, what can we learn from each other and the NRC to have that process run more smoothly.

And then lastly, you know, the conservatism in the fire PRA need to be further refined, and we are working towards that. But with seismic and flooding following, when adding all of those results together, the impact of the total plant risk needs to be understood.

That's it.

CHAIRMAN MACFARLANE: All right. We will now move on to Mr. James Chapman, Director of Safety and Risk at Scientech Curtiss Wright.

MR. CHAPMAN: Good morning. My presentation

outline -- it's the first slide -- includes the following items: the conceptual challenge, the practical challenges, what I view to be the positive outcomes, and then the negative outcomes, a path forward, which I believe has already been initiated, and then conclusions.

So next slide, please.

From my perspective, the conceptual challenges are really straightforward. NFPA 805 was developed by experts. They expected implementation of NFPA 805 to be easy. They thought that implementation would prove, with minimal effort, that the decisions they had reached over the course of 30 years were robust. That has not been the case. It has been extremely difficult to implement.

Second is the methods simply weren't piloted. They were only partially piloted. So there was a lot of work -- good work done in NUREG-6850/the EPRI report, but it was never fully piloted. And when you put the pieces together, they just don't connect well.

The same is true of the NFPA 805 pilots. There were two pilots, but both units made significant design modifications in order to achieve a reasonable calculated risk level. So they were not objective, in my opinion, pilots.

The third, as has been stated, almost half the fleet started to transition. Incredible resource strain. Was that a good decision? Was that a bad decision? It's irrelevant; it's what happened.

The other is it's a major licensing basis change. It is not a little change to in-service inspection or to a technical specification, allowed outage time. It's a major licensing basis

change, and the ability of the licensee to have a self-approval process.

So the stakes are much, much higher. I think much higher than anybody realized when we started this.

The other is that fire risk, although small, is not insignificant. When you look at in-service inspection, you can adjust it and the risk remains insignificant. When you look at allowed outage times, you can adjust them and you see extremely small changes. Fire risk is small, but it's not insignificant. So those are the conceptual challenges.

Now, the practical challenges -- next slide, please -- is based on all of the work I have done and my -- and other colleagues have done on average were over predicting fire risk by a factor of five or 10, not necessarily at each and every plant, but on average, when you compare it to operating experience. And I have two references at the end, one an NEI document, and then an ACRS letter. And more recent work that is not yet published confirms that, and it has to do with the methods.

The other is, in order to get results that are meaningful at some level of confidence, you have to analyze over a thousand fire damage states, or on that order. That is equivalent, for the PRA folks, of a thousand initiating events that could start an accident sequence. So it's an extremely detailed work. And, again, as has been mentioned, the level of effort is extremely high.

Next, please.

There are positive outcomes, and just as a reference my team has been involved at this point in nine NFPA 805 projects.

So we have extensive background. There is clearly an improved understanding of fire risk and the contributors on a relative basis. We are looking at scenarios rather than just burning up a whole room, trying to better understand what is contributing.

Is there uncertainty in that? Yes, as Paul mentioned.

Sometimes the results make engineering sense, and sometimes they simply do not.

And I'll continue. As Joelle indicated, improved communications between traditional engineering and PRA members. I refer to some members of my team as being PRA nerds, and that is complimentary. That is with respect. They love what they do. They are excellent at it.

And the same can be said of the traditional safe shutdown engineers. Their goal was to find a safe shutdown path. The goal of PRA is to understand how many you have and to identify more if they exist, because more is better.

Clearly, there has been the identification of beneficial changes, to reduce risk and improve defense-in-depth and safety margins. And one -- I think a key feature of 805, independent of the frustration and what it might mean in the future, is we have taken a risk-informed defense-in-depth approach. We use the risk insights and challenge how much defense-in-depth we have, and look at ways we can improve it.

And here is really important with respect to the title of this presentation, which is issues associated with fire PRA -- the identification of research and development needs to improve realism,

so that we have the results more realistic, so we can support better decisionmaking in the future.

Next, please.

Negatives you've heard. I'll state them very quickly. Costs, frustration, and reduced confidence. Too complex. We need to get through that as an industry. There is absolutely no question in my mind, on average, there is an unrealistic characterization of risk. One can challenge whether or not the resources that have been invested in 805 could be -- could have been used more efficiently. I will not speculate, but I think it's a subject that's worthy of discussion.

And here is something that's important to me. I'm not sure, other than the fire PRA insights and how they were used to inform decision and used, as part of continued configuration management -- I'm not sure any of the other parts of 805 have had any safety benefit, or, if they have, it has been minimal. I think it's a question that should be asked and answered. That's my expectation.

Next, please.

So the path forward, which is started, is clearly, as always, develop lessons learned and implement. That's healthy; it needs to happen. Make sure we continue to conduct the research and development appropriate to achieve realism and to effectively characterize uncertainty, because that's important.

The key topic in terms of technical is the relationship between three elements, and there could be more, but these are the three -- the fire frequency is overstated, the fire size and development is overstated, when you put those two together. And then that

impacts the credit one can take for detection and suppression. This simply does not comport with operating experience.

When we did our work roughly three years ago, we estimated the methods were a factor of five to 10 conservative, on average. Recent work suggests that it's more closer to a factor of 10.

And, in conclusion, attempting to stay on my 10 minutes, again, this is redundant, but I, as well as other senior members of the industry, believe the results are conservative overall. We believe in conservatism in making decisions, but we want that conservative decision to be based on the most realistic information available and an understanding of the uncertainties associated with that information.

And clearly, in order to have an even more effective risk-informed environment within the industry, which I fully endorse, we've got to find a way to reduce the cost. I was talking to a long-time colleague. I think that a fire PRA conducted to support NFPA 805 on average -- and I don't have all the statistics -- is 30- to 50,000 hours, staff hours, of highly qualified people. That's an incredible amount of effort.

When I first made my first bid to support an NFPA 805 license amendment request, a fire PRA was an option, because the traditional fire protection engineers thought they would disposition almost all of the variances from deterministic requirements simply with fire model, and that proved not to be the case.

So thank you for your time.

CHAIRMAN MACFARLANE: Thank you. Now we

are going to hear from David Lochbaum, who is the Director of the Nuclear Safety Project at the Union of Concerned Scientists.

MR. LOCHBAUM: Good morning. Thank you for soliciting our views on this topic.

Slide 2, please.

I will focus on three issues today, the slow pace of resolving known fire protection deficiencies, the fact that risk is elevated in the meantime, and that chronic non-compliances with the regulations adopted via a public rulemaking process makes a mockery of that process and violates the NRC's contract with the public.

Slide 3, please.

Our first concern involves the glacial pace of resolving known fire safety problems that appears to be slowing down. The time between licensees expressing their desire to meet fire safety regulations and their applications to do so is lengthening. The time taken by the NRC staff in reviewing and approving the applications is also increasing. Often, pilot efforts take longer than subsequent efforts. Apparently not in this case.

Harris demonstrated that it need only take slightly over five years from letter of intent to issuance of the NFPA 805 license amendment, and Harris was not a simple, easy plant. Many modifications and much analysis were required. There is no justifiable excuse for subsequent reactors taking longer and longer and longer.

Harris also demonstrated that no more homework and no more IOUs are warranted. Either enough is known already to

perform the risk-informed fire analyses or too little was known to issue the license amendments for Harris and the other plants. Pick one; you can't have it both ways. You either know or you don't know.

Next slide, please.

Only half of the NFPA 805 license amendments scheduled to be issued this past year were actually issued.

Slide 5, please.

Appendix R, Section 3(g)(2), was perfectly clear about requirements, three-hour rated fire reps or one-hour rating with fire detection and suppression capability or 20-foot separation with no intervening combustibles.

Yet it took the NRC more than a decade to discover that dozens of reactors violated these crisp, clean requirements. By comparison, NFPA 805 is voodoo fire safety. Can NRC inspectors truly verify compliance in a more timely manner?

To be fair, there is encouraging evidence. As noted in my backup slides, the NRC identified fire safety regulations at Harris using the new NFPA 805 inspection procedures.

Slide 6, please.

A second concern is that the delays have risk implications. Fire has the potential for doing what the tsunami waters did at Fukushima -- disabling primary safety systems, their backups, and the backups to the backups. The Browns Ferry fire taught us this lesson decades ago, and Fukushima only reminded us about it.

Slide 7, please.

The fire risk equals the risk from all other initiating

sequences combined, and that is assuming reactors actually comply with fire safety regulations. Non-compliance increases this already high risk. The public remains at undue elevated risk until compliance is achieved.

Next slide, please.

To put some numbers on the risk from violating fire safety regulations, the NRC staff reported that NFPA 805 implementation would reduce the core damage frequency at Oconee by  $5.0 \text{ E to the minus } 5$  per reactor year.

Next slide, please.

I don't have the risk numbers for non-compliances at Browns Ferry because Appendix W from its NFPA 805 transition report was curiously withheld from the public. But this long list of modifications strongly suggests that the risk is considerably more than a smidgeon or two.

The NRC staff, in its presentation, will term NFPA 805 a positive step. I agree, but its value is only achieved after that step is taken.

Next slide, please.

This is a slide from TVA's presentation within the recent past. TVA actually submitted its license amendment request on March 27th, 2013, two days ahead of its target, and slightly more than 38 years after its disastrous fire. I wonder what a weak commitment to fire safety would look like, if this reflects a strong commitment.

Next slide, please.

A third concern is that the NRC has broken its contract with the public. There is much effort currently underway about the cumulative effects of regulation. But what about the cumulative effects from non-regulation? The NRC would not even think about imposing more severe requirements than embodied in its regulations. It must not sink to tolerating nuclear outlaws. The NRC should enforce its regulations; no more and no less.

Next slide, please.

Dozens of reactors have been operating for decades out of compliance with fire safety regulations. By tolerating the intolerable, the NRC is letting the public down and literally gambling with their lives. If a fire destroyed one of the out-of-compliance nuclear reactors, would the NRC have a good answer to the question, why did you allow the reactor to operate so long despite the known risk? I can't think of a good, honest answer.

Next slide, please.

Instead, the NRC is using open-ended compensatory measures in lieu of compliance with the federal regulations adopted via public rulemaking process. In so, the NRC is denying the public its legal right to contest what is allowed and how long it is allowable.

Next slide, please.

With only six exceptions, the nearly four dozen reactors transitioning to NFPA 805 have a zero percent chance of complying with federal safety regulations at this time. As more and more years pass, those licensees and the NRC have less and less justification for exposing the public to this undue risk.

Next slide, please.

It has been nearly a decade since NFPA 805 regulations became effective, and only six reactors in the country comply with them. I challenge the nuclear industry and the NRC to take fire safety more seriously by having all reactors in compliance with either Appendix R or NFPA 805 by July 16th, 2019, five years from now. Put up or shut down.

Thank you.

CHAIRMAN MACFARLANE: Thank you very much.

Okay. Now we are going to go to questions. Let me start off with this question of conservatism, which you three have talked about, and you all have claimed that the fire PRA results are overly conservative. So I'd like to hear from you three, and then I'd like to hear from Mr. Lochbaum his views on this, too, being the only person sort of on the outside of this.

So why are you confident that these -- and give me some specific examples -- why these results are overly conservative.

MR. HARDEN: Sure. I'll start with an example, real example from one of my stations. So take batteries. And if you follow the guidance in NUREG-6850, you know, for the fire probability and the binning, and it goes along with it, for one of my stations it comes out that it's 100 times more likely that a battery will catch fire than fail to perform its function. And does operating experience support that? And we think not. And that's not just operating experience in nuclear plants. Batteries are used all over the world in many applications.

If you look at the types of batteries we have in our plants, we don't think it supports that it is 100 times more likely to catch fire than to fail to operate. Pumps is another one -- that same plant. It's as likely that a pump will catch fire as it won't start and perform its function for an hour. And it's 31 times more likely that the pump will catch fire than it will fail to run after an hour of operation.

And, again, if you look at operating experience -- and we have a lot of experience -- we don't see that, and we don't believe operating experience supports those kind of numbers of fire versus failure probabilities.

CHAIRMAN MACFARLANE: Okay. Ms. DeJoseph?

MS. DeJOSEPH: One example of conservatisms in the fire PRA analysis is -- that I'll talk about are the heat release rate used for electrical cabinets. Right now, the guidance gives us typically two fire sizes to use. And like Paul was saying before, it is compounded because you are multiplying that by an ignition frequency that is conservative, and you are multiplying it by a severity factor that is conservative.

And so instead of it being -- instead of having one part of that equation being conservative, you have three parts of the equation that are conservative. The good news is is that we're working through those specific conservatisms right now with the MOU between EPRI and NRC Research, and we are looking at that specifically because we know that electrical cabinets on a whole have a big impact to the fire risk at the plant.

And so as we go through and do more testing and have more fire events in the database to look at, we are able to refine our numbers and get a more realistic number that can match operating experience and give us -- take some of the conservatisms out.

CHAIRMAN MACFARLANE: Mr. Chapman.

MR. CHAPMAN: My first reference on Slide 9 -- it's in the public document room -- documents an assessment of the results being developed using the prevailing 6850 practices to operating experience. We looked at the accident sequence precursor results. It was done by two different teams, my team and a team from ERIN Engineering.

And in both cases we found that the results being produced by the current methods that are being used resulted in precursor results, like conditional core damage probability, that was -- the frequency of which accumulated was a factor of five or 10 higher than based on operating experience.

So it's -- in my mind, as I stated, and as Paul and as Joelle stated, it is driven by higher fire frequencies that can -- that are challenging fires than exist or occur, and then the severity of those fires, and heat release rate is one indication, one indicator of severity. So it just doesn't comport with operating experience at all.

CHAIRMAN MACFARLANE: Mr. Lochbaum.

MR. LOCHBAUM: I guess my view on that would be -- my understanding is that NFPA 805 is a voluntary rule. And if it costs \$100 to do all the homework and pay for all the modifications,

then it must cost \$101 or more to do the compliance with Appendix R. So the whining about how difficult it is and how complex it is and how costly it is tells me that it costs even more to achieve compliance with Appendix R. Otherwise, these savvy business people wouldn't be opting for NFPA 805. So it's your choice; you've got to live with it.

CHAIRMAN MACFARLANE: Well, I am wondering why, if this is so difficult and so complex, and it's taking so much longer, and, you know, you pointed out that at the beginning people thought this was going to be easy. I don't really understand why anybody would have had that going in.

MR. LOCHBAUM: For the record, I wasn't in that camp.

CHAIRMAN MACFARLANE: It seems like it's a complex, very complex system to model. Fire is not terribly predictable. So I don't understand why you all went in thinking this was going to be straightforward, and now we find that it isn't, and, yes, you don't have a lot of operating experience to benchmark on. So you probably don't really understand what conservative is or isn't, I would think, if you don't have actual data.

So why are you all doing this?

MR. HARDEN: Well, I'll start. The original staff estimates for what this was going to cost -- and I'm going by memory -- I believe it was on the order of \$2-1/2 million. At the end of the day, when I look backwards and see that I've spent \$30 million before I did any modifications, I can definitively tell you, if I would have known up front it was going to cost \$30 million, I would not have done this.

CHAIRMAN MACFARLANE: Okay. And, you know, it's your business decision, but maybe when you get to like \$6- or \$8 million, you'd have a rethink. I don't know.

Do you want to jump in on this?

MS. DeJOSEPH: I'm just a senior fire protection engineer. I don't get to make those kinds of decisions.

(Laughter)

But, so it probably wouldn't be prudent for me to answer that one.

MR. CHAPMAN: And I don't represent a licensee, so

--

CHAIRMAN MACFARLANE: That's fine. But I'm just wondering why you all started going down this path. I mean, is Mr. Lochbaum right that this is easier than getting -- coming into compliance with Appendix R?

MR. CHAPMAN: I can't address that. I can share with you what I have already stated. Extremely experienced people that were involved in writing NFPA 805 thought this would be straightforward, and it simply turned out not to be.

Now, I'm not whining. I'm just sharing the situation with you, so --

MR. HARDEN: I would also add, one, I believe in PRA. I absolutely believe in PRA. My fleet has invested heavily in PRA. And so if done right, and if the numbers are aligned with operating experience, and they are realistic on the inputs, you can apply conservatism on your thresholds on the output and ensure that

you don't skew the risk insights. When done right, those risk insights are real, and they are extremely valuable.

CHAIRMAN MACFARLANE: I can see that. But, so is your -- are you positing, then, that it's all the NRC's fault?

MR. HARDEN: No. I think the expectations up front weren't clear on all parts, the industry and the NRC. And I believe the pilot process did not work out all the issues that needed to be worked out prior to the rest of the plants filing through. You know, if you look backwards in the history, I think that's why we find ourselves where we are today is the pilots were intended to work out all the bugs, so that the rest of us really understood what it took to get through this process. And we find ourselves today still doing a lot of ongoing research and still changing a lot of expectations for what is needed in those models.

CHAIRMAN MACFARLANE: Well, okay. Let me come to you, Ms. DeJoseph, about Oconee. I know you said your experience is with Harris, but, you know, maybe you can answer a question about Oconee, because the NRC issued a violation last year because the commitment to complete the installation of a protected service water modification by the end of 2012 wasn't met. I'd like to know where you guys are on that.

MS. DeJOSEPH: I don't have direct experience with Oconee. I can tell you that I have read the order received by the NRC, and there were six or seven milestones associated with that order. The first three milestones have been completed. Everything else is on track or scheduled to be completed prior to those dates in

that order.

CHAIRMAN MACFARLANE: Okay. Did you want to add anything briefly?

MR. NOLAN: No, Madam Chairman. I'm Chris Nolan. I'm the Director of Regulatory Affairs for Duke Energy. If you have questions on PSW, we're happy to answer them. Joelle answered the first three milestones are completed. Milestone 3 was completed last Friday, so we're on schedule, we're on track, we're implementing the milestones well ahead of the order requirements.

CHAIRMAN MACFARLANE: Okay. In my last 30 seconds, Mr. Lochbaum, what is the source of all of this delay?

MR. LOCHBAUM: I think it was because the NRC didn't establish a deadline that the -- to hold the industry accountable to. It is open-ended. As long as it needs to take, it's -- I forget whose law that is, but when you have an open-ended deadline and you allow delay after delay, excuse after excuse, it's easy to generate excuses rather than it is to apply the resources to get the homework done and make the modifications complete. So I think the NRC's tolerance of the agency's foot-dragging has protracted the foot-dragging.

CHAIRMAN MACFARLANE: Okay. All right. Thank you, all.

Commissioner Svinicki.

COMMISSIONER SVINICKI: Well, thank you, and welcome to each of you. Appreciate your presentations.

Ms. DeJoseph, you had an interesting -- on your last

slide, you had a comment that -- or a goal or maybe a challenge moving forward is consistent program implementation throughout the industry. So I was listening closely between your presentation and Mr. Chapman and Mr. Harden, and I don't know if it was a difference in emphasis or substance, but I drew a conclusion that maybe Duke on whole had a different experience in terms of NFPA 805 transition and fire PRA implementation.

And so if that's an accurate conclusion to draw, that you fundamentally had a different experience with it that was -- perhaps did not encounter some of the challenges that were encountered by others, can you provide me one or maybe two specific examples of how Duke's approach was different and you had perhaps avoided some of the challenges in implementation that the other participants here spoke of?

MS. DeJOSEPH: Yeah. I don't think I would say that we had a -- we had the same challenges. But speaking through the Harris experience, you know, we are past that. We are implemented now, and we are moving forward. So it's -- so the emphasis is more on the safety improvements and how the program is running. That is what is at the forefront of our thinking.

So you needed some examples of maybe the differences, approaches, and maybe why the experiences were different.

COMMISSIONER SVINICKI: Well, I think you have addressed it a little bit, because I -- I acknowledged up front, I don't know whether it was just a different emphasis in your presentation on

-- you know, and it's human nature to say, you know, what were the benefits moving through this process, and I appreciate that you have made that part of this dialogue here because we need to hear about the challenges.

But if there is really positive outgrowths, it was important that someone, you know, provide that into the record. So I think what you're saying is it isn't like you had some great strategies for avoiding the challenges that others encountered, but, you know, you are past it now, and so you wanted to present some of the positive outgrowths of the experience.

MS. DeJOSEPH: Yeah. That and I think there were some really good NFPA 805 leadership, and there was -- at least on the legacy Progress side, so before we merged with Duke Energy, there was a rather large fleet group that was helping the site and sites manage the licensee amendment request, and all of the work that went into it.

And so there were always -- it was always -- all of the decisions were always coming back to that same group of people. So there was a consistency in management and decisionmaking, and so you didn't have --

COMMISSIONER SVINICKI: You didn't have, like, ad hoc approaches to issue resolution for each. And I -- actually, I appreciate you mentioning that, because one of the reasons I'm asking you is that Duke now is such a large fleet operator that if Duke were not to support some of the -- NEI on behalf of the industry has been very, very strongly critical of NFPA 805 and, you know, so much

so as to say fire PRAs are not consistent with operating experience. They obscure the insights that can be gleaned. The consequences, the benefits of NFPA 805 programs, have been elusive, and so what I'm trying to understand is Duke is such a significant presence in this, you know, do they not support these industry-wide concerns? And I think, if that is the case, that's very valuable for the Commission, to understand that if Duke departs from the industry-wide position that these things have been challenges.

So I'm just trying to clarify that a little bit, and it sounds like you're saying, though, that at the end of the day there were challenges, but there were positive outcomes as well.

MS. DeJOSEPH: Yeah. I mean, we worked through them and we made it work, and we all at Duke believe that we have a better fire protection program under NFPA 805. I mean, we learned a lot, and we believe in it. And is there more work to be done? Yes. Can things be better? Yes. That's the case with everything. But we've had a positive experience with it.

COMMISSIONER SVINICKI: Okay. Thank you for that. Appreciate your insights and observations today.

Mr. Chapman, I'm curious that as you reflect back on some of the challenges, if we could start over, which of course we can't -- and that's not realistic -- are there some things that you think should have been essential precursors or done on the front end before there was a wide-scale engagement on fire PRA and NFPA 805? What was lacking on the front end that would have provided greater preparedness for this initiative?

MR. CHAPMAN: Effective piloting of the methods, which did not occur. We would have learned, if there was a full, complete pilot, in my opinion, the results would not comport with operating experience.

Second is I don't believe, even though they are excellent efforts, that the Oconee and Harris pilots were typical pilots. And, again, they completed a successful LAR by committing to major plant modifications, with major safety benefits, which is good. But that was not the expected outcome of implementing NFPA 805, which means either we didn't pick the right plants or we should have had another plant that perhaps would have a different outcome, because not all plants are identifying extensive modifications. It depends on the plant.

And as the PRA professionals in the room know, and anyone else -- this is very obvious -- all risk is plant- and site-specific. A hundred of our plants in the U.S. are not identical. That's just the way it is. So the expectation is you would get different results. So piloting, in my opinion, is the key.

COMMISSIONER SVINICKI: Would your answer be the same if one were about to embark on a large-scale similar effort but for plant PRAs? I know NRC has had significant efforts underway for some years now on Level 3 PRAs, you know, not just for fire but plant-wide. So would you give the same answer if we were about to embark on an industry-wide, more significant PRA or plant-wide PRA effort? Would piloting be key, or some -- maybe taking a couple of plants and really developing it, similar thought process?

MR. CHAPMAN: Yes, similar. I believe fully in piloting.

COMMISSIONER SVINICKI: Okay. Thank you.

And, Mr. Harden, I'm not a PRA expert, but I think your duties require you to be involved beyond just fire PRA. If fire PRA had this kind of challenges and difficulties, is it safe for me to assume, as a non-practitioner, that plant PRAs would encounter similar issues if we were to embark on, you know, a fleet-wide upgrading of plant PRAs? And what could we do in advance to make it go smoother if one were going to embark on that?

MR. HARDEN: Yes. I do believe that plant PRAs -- it would run the risk of the same challenges, if not piloted -- as Mr. Chapman spoke, if not piloted right and thought through from the front end. That's why I mentioned seismic as an example.

My fleet is one of the leads on seismic PRA. And as we look at it, we view that as having even more uncertainty and more need to rely upon the industry experts and the consensus methods to determine -- because the expertise, just the amount of expertise in the world is much, much smaller than even for fire.

We think as we go forward in these much more emphasis needs to be placed on the pilot and flushing out those expectations up front, because a lot of the cost was due to rework. It wasn't due to just the cost to build a fire model. It's just we -- that many plants were building the models, building their LARs to one expectation. As those expectations changed, we had to go back, start all over again, and redo it. That's what really drove up the cost

at the end of the day for the license amendment applications.

COMMISSIONER SVINICKI: And since I have about a minute left, I'll fill it with my own story. As I was listening to Chairman Macfarlane ask you about, you know, why did people think it was easy, or why did people embark on it, it reminded me of very early in my time at NRC there was a lot of focus on digital I&C, and we did some piloting of digital projects at some plants.

And the Commission held a meeting, and, honestly, I don't remember who the presenters were and where the pilots were conducted, because there is a lot that has occurred in the intervening years, and it makes me forget specifics. But I do remember one of the participants talking about the experience that his plant had on their project, and he indicated that midway through he felt it was a little bit like you thought you could swim the English Channel, and that midway through you wish you had never started, but you know that you -- you don't have the energy to turn around. All you can do is keep swimming, you know, all the way across the thing.

So it was very colorful testimony, and it, obviously, lodged in my mind. So I was thinking of that, and I think we all have things that we have halfway through go, "I'm not sure this was the best idea." But sometimes you just have to continue, because you don't really have a lot of alternatives.

So with that, Chairman, thank you very much.

CHAIRMAN MACFARLANE: Okay. Commissioner Apostolakis.

COMMISSIONER APOSTOLAKIS: Thank you.

Thank you all for your presentations.

I became aware -- well, I had heard rumors, but I became aware of the frustrations of both the industry and the NRC staff regarding NFPA 805 at the American Nuclear Society meeting of last September, I think.

One of the things that surprised me was the extraordinary costs for preparing the license amendment request. I heard figures like 17 million, 21 million, without, as you pointed out, spending a single dollar on the plant itself. And I suspect part of that cost was due to the fact that some licensees had to retrace the routing of the cables. But I still don't think that that justifies numbers like 17 million.

And another thought that is released is we are doing all of these PRAs to make good decisions. So maybe -- I don't know. You have been in the field fighting this battle. Are we being too detailed? Are we looking at details that really don't matter when it comes to decisionmaking?

And those details and the questions from the NRC staff, and so on, add to the cost without really contributing to decisionmaking? Do you have any thought about that? Because I don't know that Appendix R gets into such detail.

MS. DeJOSEPH: No. It's my experience that Appendix R doesn't. So from a fire perspective, you have a fire in that room, and everything burns up and you lose everything.

COMMISSIONER APOSTOLAKIS: Which is conservative as well.

MS. DeJOSEPH: Which is conservative.

COMMISSIONER APOSTOLAKIS: Yes.

MS. DeJOSEPH: And then, when you're in a performance-based space, you are looking at the specific fire scenario. So what is burning? How big is that fire? What is it affecting? What plant equipment is it affecting?

And so I'm not sure that you can do a performance-based approach without being detailed, right? Because you are starting down that path, and you need to understand everything that is being affected in order to make a decision.

So if you're not detailed, you're kind of in this gray space between the two.

COMMISSIONER APOSTOLAKIS: And I appreciate that point, but there is detail in detail, right? So, anyway, any other comments?

MR. HARDEN: Yes. I guess I would also add that in that detail lies the true risk insights, right? As I said, when done right, I believe in these models, because in that detail you can find that a room has more importance than you might have thought previously.

So spending the time and energy to get that level of detail I don't think was something that we should not have done. I think a lot of the costs, where you hear a lot of the feedback from the industry, has been, you know, the rework, the changing expectations, the things that would have been avoided had we had pilots that really flushed out all the bugs at the end of the day.

That's why we're working so hard with the staff on,

like, a freeze point, so that we are not constantly updating our application, because when it's supported by 50,000 pages of supporting documentation, every time you have to update it you're touching many, many thousands of those 50,000 pages of documentation. And that's where a lot of the -- a lot of the cost and the resource goes on both sides.

COMMISSIONER APOSTOLAKIS: Well, I am very pleased to hear you say that it's worth looking into the details. I mean, I like that. This is good.

Now, there is something you said, Mr. Harden, that perplexed me a little bit. I don't know how you can be perplexed a little bit, but I was perplexed. You said that the data -- you gave examples -- do not comport -- I mean, not the data, the frequencies that are being used do not comport with the actual data.

Now, when Dr. Siu and I were first developing the fire PRA models, we collected some data with some distributions. Then, a few years later, EPRI developed a database. A few years later, there was another database. And we reached the year of 2014, and we are still talking about the frequencies not being realistic. I just can't understand that. Why is that so? Even on the ACRS, I expressed frustration -- I think it was 14, 15 years ago -- when somebody came and said, "And we are developing a database." So how many times do we have to develop a database so that you will not be frustrated, you know, 31 times more than -- it escapes me. Silence. Okay.

MR. HARDEN: I'm not sure I have a good response

or an answer to that one, because it has been frustrating.

COMMISSIONER APOSTOLAKIS: I has been. I mean, you know, data upon data upon data, basis, I mean, I realize it keeps some people gainfully employed, but --

MR. CHAPMAN: And it continues, sir.

COMMISSIONER APOSTOLAKIS: And what?

MR. CHAPMAN: And the database development continues. And, as you know, the biggest challenge is interpreting the information, because most of the "fire events" that have occurred were not documented under the assumption that they would be used for safety analysis for PRA. They were documented for other purposes, be it insurance or whatever other requirements there are.

So I'm told -- and this is not my area of expertise -- it's not so much necessarily the frequencies that are being used, but they are assumed to be challenging fires. That's the key.

COMMISSIONER APOSTOLAKIS: Well, first of all, Mr. Harden presented examples of the actual frequencies, so that's why my source of frustration was.

Now, when it comes to the size of the fire and all of that, we use models, physical models, and so on. But there the uncertainties are such that maybe you want to be conservative. Again, I realize that PRAs are supposed to be realistic, but, you know, some conservatism -- anyway, this really perplexes me. I mean, the issue of data, and I don't know how many years in the future we will have to be doing this.

The incipient detection systems -- I think it was you,

Ms. DeJoseph, who mentioned them. I've heard things about them, that the industry is frustrated because the staff doesn't give you enough credit for those. The staff tells me, "Well, we don't really have the hard evidence that would justify higher credit." So where are we on that? I mean, that sounds like a good idea, to have a means of detecting incipient fires.

MS. DeJOSEPH: Right. So where Duke stands with incipient, Harris submitted doing a modification to install incipient in those important cabinets, and we got some PRA credit. And Brunswick and Robinson followed suit. And Harris, because it has an installed system with committed operator response procedures, we had been helping -- well, we were interviewed I guess by NRC Research in developing a NUREG for incipient.

And so what they are doing is they have done some testing of actual incipient systems or very early warning fire detection systems. There is an HRA component. There is a human reliability -- human response -- I always get that one confused, the HRA component. So how is the plant -- how is the operator responding?

And then, with those two -- with those two components, what kind of PRA credit can be given? And I know that they are working on that right now. And so from an operating standpoint, we have seen the benefit of incipient. We have had a couple of events at Harris where incipient has performed as expected, and the plant response by operators was as expected. And we have seen some benefits to installing that system from a fire protection programmatic standpoint.

COMMISSIONER APOSTOLAKIS: Thank you.

David, I have also been bothered by the delays in not just fire protection, but there are other issues, important issues, in the regulatory arena where it seems to be taking years to do anything. And in response to the Chairman's question, you said maybe the NRC should have set a deadline.

Well, I wonder how effective that would be. Clearly, it took some time for people to realize that complying with Appendix R was not feasible for some plants. Then, it took another number of years to advance the state of the art so that it could be used. But the NRC is saying, "Thou shall do it by December 31st of 1990" or something like that, I don't know whether that would resolve the problem.

MR. LOCHBAUM: Well, if the protected service water at Oconee is an example, you know, drawing a deadline was not effective. The licensee blew right through that deadline and still hasn't met it.

But I think if you established harder goals as you do for license renewal and other applications that are not set in stone, but are targets that both the industry and the NRC staff worked towards, if more firm goals had been established for NFPA 805, they might not have been met, but I think that would have allowed the resources to be allocated to better achieve those goals.

The other complement -- I talked to Mr. Harden before -- that is, when goals aren't met, neither the NRC staff nor the industry do a really good job of communicating the reason for those delays.

And in that vacuum, it allows us to make up the motives for why the deadlines were missed, and it's very seldom charitable.

So if you communicated why deadlines weren't met -- I learned some very valuable information today that explains some of the delays. Maybe not justified it, but explained them. But I think there is a communication component missing from this process as well.

COMMISSIONER APOSTOLAKIS: Okay. One last comment. Mr. Harden, you said twice that you believe in PRA, and, Ms. DeJoseph, you said it once. I wish you don't use the word -- you didn't use the word "believe." This is not religion. Okay? Although some people are declaring themselves as being high priests of PRA, I think that the word "believe" is not appropriate here.

Thank you, Madam Chairman.

CHAIRMAN MACFARLANE: Thank you for that correction.

Commissioner Magwood.

COMMISSIONER MAGWOOD: I always thought that that was because you preferred the term "Crown Prince of PRA" or something along those lines.

(Laughter)

First, excellent panel. Thank all of you for coming and speaking with us today. I may retrace some ground for my colleagues, because I thought that some of the questions were along the same lines that I was thinking. Let me first start with Ms. DeJoseph, because I did visit Harris some time ago and talked to the

staff. And I'm trying to remember, maybe talked with you at that time, can't quite remember -- about the experience of going through the PRA.

And one of the things that stuck with me was that the staff was actually very excited by the exercise, because as -- you put it very well. The plant was learning from this experience and learned not just about the fire PRA but the larger plant itself. And that they were finding safety benefits from the exercise that had nothing to do with fire, and it was a very exciting exercise for them.

In the case of Duke, what was the balance of using internal staffing contractors and going through the exercise? Because it seems to me if the plant is going to learn, the plant and -- you know, with all due respect to the contractor community, the plant won't learn as much if you bring a lot of contractors in to do the work. Can you talk about that a bit?

MS. DeJOSEPH: Yeah. And like I said, coming from legacy Progress, that was my experience up until the merger with Duke. And I think that was -- like I had said before, I think that's one of the reasons why we were successful. We had a core group of in-house at the corporate level helping Harris, helping the Harris engineers transition.

And so we had in-house people making the important decisions, maybe not go doing the analysis, but saying, "This is how we're going to go do the analysis. You go and run the numbers."

And I think the other reason why I think Harris had such a positive experience is they were completely engaged. The fire

protection program manager, the safe shutdown program manager, the system engineer, were all involved daily with the license amendment request process.

And so nothing was, you know, kind of thrown over, you know, the wall and said, "Here you go." It was all very much done together and as a group. And I think that that's -- that was one of the reasons why it worked so well, and that's why I think the Harris plant had such a positive look on it is because they were a part of the process from the beginning.

COMMISSIONER MAGWOOD: Okay. Appreciate that.

Mr. Harden, since you profess your admiration -- I won't use the word "belief" for PRA -- just a couple of questions more generally. Do you maintain PRAs for your plants today? Do you have models for the whole fleet?

MR. HARDEN: Yes. The FirstEnergy Fleet has well-developed PRAs for all of our sites. I mean, similar to what Joelle just said, my corporate PRA group is just under 20 people, and that's all they do is PRA, which is why we are out in the forefront on seismic. We have worked with EPRI to pilot spent fuel pool PRA. So we have invested heavily, because we care about risk-informed decisionmaking. I'll stop saying "believe." Care about risk-informed decisionmaking, in that it does give you insights and you do get information out of these models, when done right, that you may not otherwise get on where to make your investments in the plant.

COMMISSIONER MAGWOOD: So you think there is

real safety benefit to having a model like that.

MR. HARDEN: Absolutely.

COMMISSIONER MAGWOOD: Okay. One thing I -- and Commissioner Apostolakis and I have talked about this a bit in interacting with people in the industry -- while I know that plants like yours have these models, they are also doing the NFPA 805 fire PRA. What is the crosswalk between those? How -- do they eventually come together in some fashion? Or do they stay stovepipe? How do you manage that?

MR. HARDEN: Actually, they are very well intertwined, because to do NFPA 805 you not only need PRA expertise, but you need fire protection expertise as well. And if you look at -- I can't speak to every fleet, but at least how my fleet has set it up, we have got members of our corporate PRA group. They don't all sit in the corporate office. Some of them have permanent desks at sites.

They work on a day-to-day basis hand in hand with the fire protection folks, very similar to what Joelle just mentioned her experience was. And that is how you get the value out of it, because the entire station, all of the staff, grow and learn what this tool is about while it is being developed. So that when it comes time to use it and implement it, the breadth of knowledge is much greater. Otherwise, that hurdle for implementation would be a much higher hurdle to get over. So it's a day-to-day working relationship.

COMMISSIONER MAGWOOD: So as you go through these various exercises -- fire protection, seismic -- it really

just adds to the overall understanding of the plant as a whole, not as separate stovepipes.

MR. HARDEN: Absolutely.

COMMISSIONER MAGWOOD: Okay. Well, I appreciate understanding that. Let me get your perspective on something else, and I will try to keep Ms. DeJoseph out of trouble here. But, you know, David Lochbaum's presentation -- I don't think he said it when he was going through it -- is fire when not ready.

And I'll ask him what he meant by that, but I -- let me interpret what I think that meant when I saw that. It made me think when I first saw that that we launched a process; it just wasn't cooked. And when I listen to this panel, I kind of hear that from almost all of you, except for Ms. DeJoseph. Keeps you out of trouble.

Is that really the core of this? Is this a process that just simply wasn't ready to be launched and it just was premature in terms of its maturity of our understanding of the issues, how to go forward with this? Just get your opinion on that.

MR. HARDEN: I guess my -- my opinion would be not necessarily that it was premature when we launched it. I think we all went into it with a misunderstanding of what it was going to take, both the staff and the industry. Had that been thought through, I think the state of the art of the knowledge, you know, could have been ready to support it and have a much more efficient, I'll call it, outcome. But I believe we all went into it thinking things were more well developed than they really were, which is why the -- you know, my opinion, why the pilots ended up not being true pilots and working out

all the bugs.

COMMISSIONER MAGWOOD: So if the models that you are now developing -- if you knew they were going to be as detailed as they are, I heard you say that if you knew how difficult this process would have been you might not have launched it in the first place, but think about the product. If the models were as detailed as they are, would you have considered that to be a worthwhile exercise up front?

MR. HARDEN: Absolutely. If it was a matter of knowing exactly today's expectations back then and what it would take to meet it, we would have still done it, and it wouldn't have cost nearly as much. As I mentioned, at least for us, a lot of the cost was all the rework along the way, not necessarily the end point, if you had known how to get to that end point in the beginning.

COMMISSIONER MAGWOOD: Okay. That's a very important insight. Appreciate that.

What did "fire when not ready" mean?

MR. LOCHBAUM: Well, you derived a much deeper meaning than I had, so I'd be foolish to say that it wasn't that. But I meant having a fire when the plant wasn't ready -- wasn't adequately protected, but that's much shallower, so I'll stick with yours.

COMMISSIONER MAGWOOD: You can have it.

MR. LOCHBAUM: Thank you.

COMMISSIONER MAGWOOD: You know, you raised -- you know, one of the things about this whole process, which is very important -- and we've said this, the Commission has said this

on multiple occasions -- that the plants are safe while this process goes forward. So, yes, it may take a while. It may take -- there may be lots of fits and starts, but the plants meet current regulations.

Part of your thesis is, well, maybe not. And let me ask a couple of questions, because you raise some interesting issues. And one had to do with manual actions, and you -- I don't think you raised it in your presentation, but a lot of the UCS information that we have looked at speak to this.

And you have indicated that it is your view that in some cases plants are using unapproved manual actions that would not be allowed by their site-specific exemptions. Can you give -- sort of elaborate on that a little bit?

MR. LOCHBAUM: Well, the only numbers I have are when the Harris plant was going through it. It was -- if I recall the numbers correctly, it had 300 manual actions that it was using for the Appendix R fire protection measurement. And the process to get -- turn those from unapproved manual actions to approved manual actions would have been costly and involved, which, as I understand the process, led the company to choose NFPA 805 as a more efficient way of getting to compliance with the regulations.

I don't have numbers on the -- elsewhere, but that -- I don't think anybody was -- had numerically the same number as Harris, but there were quite a few in that same category.

COMMISSIONER MAGWOOD: Okay. I didn't understand that, but I know what you're talking about now. Thank you for talking to us about that.

One -- well, maybe not. Again, thank you.

Thank you, Chairman.

CHAIRMAN MACFARLANE: Okay. Commissioner Ostendorff.

COMMISSIONER OSTENDORFF: Thank you, Chairman.

Thank you all for your presentations. This has been a very substantive session this morning, and I really appreciated my colleagues' questions. I think those have all been very insightful, and I want to maybe make a couple of comments and then ask a few questions.

I picked up on the same tone as Commissioner Svinicki on, you know, hearing a different experience perhaps from Duke than we are hearing from the gentlemen to your left and your right. And I have -- you know, I'm not going to ask you a question on that, but I agree that there has been a very, you know -- if one is trying to walk away from this presentation and get some feel for where the industry is, I can't do that.

I'm not saying I should be able to do that, but I see a very negative tone from, you know, FirstEnergy on a lot of this that I didn't hear from Duke, who has maybe had more experience with it. So I'd just comment on that.

I had a chance also -- you know, as Commissioner Magwood mentioned, I was down at Harris in March of this year and spent most of my visit focused on fire protection, had a detailed walk around of the incipient fire detection system. And the impression I

walked away with from Bill Pitesa and company there for that visit, the chief nuclear officer for Duke, was that the fleet has learned a lot from this process of going through 805, and the ability of that plant and the operators to respond to fire has been improved, not insignificantly, as a result of this process.

So I guess I'm pushing back on Mr. Chapman and Mr. Harden from that standpoint, because that -- your comments don't match, and not just the Duke visit but other discussions I've had with industry. So I just -- you know, I guess the question is, am I misinterpreting your comment? Comments?

MR. HARDEN: I'll go first. I guess maybe slightly. I wouldn't say that, you know, we -- we don't want to be where we're at. At the end of the day, when we are done with this whole process -- because we are making forward progress working with the staff in a lot of areas.

I believe we will eventually have models that I believe in, that I trust -- better word than "believe" -- that I trust. I think we'll get there. I think the frustration you hear and -- or plants that are still in progress that are -- that have undergone all of this rework along the way are very frustrated because it shouldn't have had to be this difficult in the first place. We should have been able to get here much more efficiently, much more effectively, and for a much lower cost and effort than we did at the end of the day.

When we're all done, you know, is the industry going to continue to work with the staff? And there's research being done at EPRI. I know Joelle takes part in some of that. Will we make this

all better? Absolutely, I believe we will. But there is a lot of work yet to be done to get to where most of us believe we need to be at the end of the day.

COMMISSIONER OSTENDORFF: I'll come back for a question in a minute. Let's let Mr. Chapman speak, and then I want to come back to you with something.

MR. CHAPMAN: Well, I do not represent a licensee as you know.

COMMISSIONER OSTENDORFF: I understand.

MR. CHAPMAN: And --

COMMISSIONER OSTENDORFF: But you made some pretty strong statements.

MR. CHAPMAN: I mentioned strong statements on safety improvements and strong statements on cost and frustration, yes. And that has been, in my opinion, the general industry experience. I can't speak to Duke. I can speak to, again, the benefits have been, in my opinion, at many plants significant safety improvements.

COMMISSIONER OSTENDORFF: Okay. Thank you. I appreciate that clarification.

I would comment, before I forget -- the Harris experience. I know that your -- Duke and our staff are still working together on the credit for incipient fire detection system, and there is some testing, and I had -- after my visit down there, I went back and had a briefing with our staff on this topic. Commissioner Apostolakis and I have talked about this topic as well.

I would just encourage industry to move forward in that area. I know that in the submarine force we had a significant modification made to the electrical switchboards back in the late '80s and early '90s to install an arc fault detector system to detect arcing and sparking in a distribution switchboard to provide tripping of breakers, anticipating electrical fire. And it was installed in all of the 688 class submarines and is viewed as a significant enhancement. There is an analog here to what your incipient fire detection system is -- a slightly different application, but the same concept.

I'm going to go back to Mr. Harden here for a minute. I appreciate the examples you gave of the conservatisms and the -- I wrote down the 31 times factor. I think I wrote it down correctly, that 31 times more likely to have a fire in a pump than to have the pump fail to operate over a period of time. Is that, in essence --

MR. HARDEN: Yeah. It was 31 times more likely for it to catch fire than for it to fail operation greater than one hour.

COMMISSIONER OSTENDORFF: Okay. So, and it's always helpful to have examples. So thank you for providing that. What has been your experience in providing that kind of example and other examples back to the NRC staff to look at this concern that both you and Mr. Chapman raised on the overestimate concern?

MR. HARDEN: I think the --

COMMISSIONER OSTENDORFF: And it also get into Commissioner Apostolakis' database on OE.

MR. HARDEN: Yeah. The -- I guess my direct answer would be it has been mixed. And I personally try to steer the

discussion away from the word “conservatism,” because that elicits emotion sometimes. Conservatism generally is a good thing. Generally. If applied right. And the difficulty in these models is, if you stack up I’ll say more bounding values in more than one area, as I had mentioned and as Joelle mentioned, it is multiplicative. So your -- the values get multiplied against one another.

I do believe there is some forward progress being made. Joelle is closer to it than I am, because she participates in some of it. There is work being done between Research and EPRI to work on some of these things going forward. But any given parameter, my personal perspective, a little bit of conservatism in a parameter is not bad. But if you’re not careful and you --

COMMISSIONER OSTENDORFF: Yes. I’m really trying to get into, you know, what kind of dialogue -- and maybe I’ll turn it over -- what kind of dialogue is occurring between industry and our staff on this topic? Because it seems like I’m hearing a common thread from many of you on this one concern.

MS. DeJOSEPH: Well, we have -- we have established a panel, and we are looking at everything that Paul discussed as far as electrical cabinets go. So, you know, you have to look at all of the data, and the data is changing. You know, there is more testing that is being done. The fire events database has been updated. So there is more stuff to look at. And so now that we have gone through the process and created these fire PRAs, and seeing how they have been implemented and how the plant is using the data or the guidance that is provided, we have some insights from that to

better understand how each part of the equation is being used.

And so when you are -- so we're not just going after one part of the equations; we're going after all parts of the equations, because it will have a cumulative effect. And they're all important, and you can't look at one thing without looking at everything else.

COMMISSIONER OSTENDORFF: Yep. I understand. Does anybody else want to comment on that, either Mr. Chapman or Mr. Lochbaum, on that? Okay.

So, Mr. Harden, in your slide you also -- the other takeaway I had was the unpredictable process comment on your conclusion slide, but also significant room for improvement of processes. And maybe I'll ask you all collectively. Do you see, like, that -- and you mentioned freeze point. I think you mentioned freeze point, which I think that's something worth considering, to lock down what the expectations are at any point in time.

Is that the subject of an active dialogue between industry and our NRC staff?

MR. HARDEN: Yes, it is. Both on NFPA 805 specifically, with the Industry Management Committee that meets with the NRC staff on 805, as well as the Risk-Informed Steering Committee, we are trying to address it more broadly at that level, too.

And that's why I emphasized several times in my presentation the continued engagement of NRC senior management, because we have gotten engagement, and I do believe those discussions have been fruitful and have been moving. Some of the frustration is we would all like it to move much quicker than it has and

does. But as far as the level of dialogue and engagement, we believe it has been positive recently, and we want to see it continue to be positive, because we believe that does result in meaningful change.

COMMISSIONER OSTENDORFF: Anything to add there?

MS. DeJOSEPH: No. I would agree with that statement. I mean, all of the experience that I had with dialogue on these kinds of things with the NRC have been open and progressing. And like Paul said, the faster it moves, the better for everybody. But we also can't rush these kinds of things, too. Have to take your time and make good decisions.

COMMISSIONER OSTENDORFF: I'm not going to ask another question, but I am going to make another comment. I want to agree with Commissioner Svinicki's admonition that we undertook this swim across the English Channel, and I think that's a good analogy, that -- that, you know, we are where we are. And we need to move -- you know, be flexible enough to constructively and thoughtfully move forward. If that requires a course correction to do it and get to the end state, then so be it.

But I appreciate Commissioner Svinicki's encouragement in that area, because I think we will all benefit if we continue to work together and get to the -- cross the finish line.

Thank you. Thank you, Chairman.

CHAIRMAN MACFARLANE: Any further questions?  
Commissioner Magwood?

COMMISSIONER MAGWOOD: Just one question.

Maybe Mr. Harden and Mr. Chapman can react to this. Mr. Harden mentioned the -- that maybe there is a lack of faith in the peer review process in looking at these fire PRAs. And that that is a source of where some of the additional conservatism finds its way, actually not so much conservatism but deterministic approaches finds its way into the models.

Can you comment on that a little bit further? Is that something you have been seeing? Maybe you've seen it firsthand.

MR. HARDEN: Well, yeah. And where that comment comes from is the peer review process was well established.

Reg Guide 1.200 provided a pretty good framework, and what we saw as we got into NFPA 805 were a lot of the requests for additional information from the staff were into the details of the PRA, reasking a lot of the things that the peer review had looked at.

And I had it -- as one bullet in my slide, this Risk-Informed Steering Committee that we formed between the industry and the NRC. That is one of the areas that we're having a lot of dialogue on is the framework. If something needs to be changed, for example, in Reg Guide 1.200 as far as the guidance for those peer reviews, let's get it right. Let's not duplicate the work, but let's work to get the process right, so that everyone can trust the process, because for some of these areas -- you know, fire was complicated. Seismic will be more complicated. As I believe I mentioned earlier, the amount of expertise worldwide gets smaller and smaller, and we believe that you have to put some faith in the expertise of those individuals and provide the right guidelines for

them. But once those guidelines are set, as long as the guidelines are followed, have some faith in that process.

COMMISSIONER MAGWOOD: Thank you. Mr. Chapman, did you want to --

MR. CHAPMAN: No addition.

COMMISSIONER MAGWOOD: Okay. All right. Thank you, Chairman.

CHAIRMAN MACFARLANE: Thank you. Commissioner Apostolakis?

COMMISSIONER APOSTOLAKIS: Yes. Just a quick question. Mr. Harden, in your Slide 3, under Leadership Engagement, you say, "Incremental versus transformative progress is being made." Can you elaborate a little bit on this?

MR. HARDEN: Yes. What that bullet really relates to is with NFPA 805 and the Management Committee and the dialogue between the NRC and the industry on 805, we are going and addressing specific examples, which that would be an example of incremental change. We are tackling specific issues.

With the Risk-Informed Steering Committee, we are really trying to get the step back to look at more transformational change on the process, how this worked, how it should be done differently, a better framework for how to address uncertainty, address any concerns there are with the peer review process. Those types of issues are what I refer to as transformational.

COMMISSIONER MAGWOOD: Thank you. Thank you.

CHAIRMAN MACFARLANE: Okay. All set? All right. Well, thank you very much for all your presentations and for the discussion.

We will now take a quick five-minute break before the staff panel.

(Whereupon, the above-entitled matter went off the record at 10:43 a.m. and resumed at 10:53 a.m.)

CHAIRMAN MACFARLANE: All right, I think we're ready to get started with the staff panel now. I'm going to turn it over to our Executive Director for Operations, Mark Satorius.

MR. SATORIUS: Thank you, Chairman and good morning to you and your colleagues.

Before we get started, I thought I'd take a moment on behalf of the staff, Commissioner Apostolakis, we wish you well as you leave the Commission. You're going to be missed. You always have a good perspective and livened up some of our Commission meetings at times and we appreciated that. So, good luck on behalf of the staff, sir.

COMMISSIONER APOSTOLAKIS: Thank you very much, Mark, I appreciate it.

MR. SATORIUS: This morning the staff is here to brief you on the reviews that the staff is performing on the National Fire Protection Association's Standard 805.

I want to start off by saying, and this is important, that all U.S. nuclear power plants are being operated safely under the current fire regulations.

NFP 805 is a risk informed performance based alternative to deterministic fire protection requirements. This approach allows licensees who submit an application for NFPA 805 to leverage risk insights from a plant specific fire probabilistic risk assessment, to identify modifications to reduce fire risks at their plant.

We believe that the safety improvements being made in support of NFPA 805 are among the most significant safety improvements being made by industry and, in many cases, dovetail well with some of the improvements that we're making as a result of the lessons learned from the Fukushima accident.

As you will hear from the staff, progress is being made on completing these reviews. You will also hear the staff's perspective on some of the challenges associated with these reviews as well as steps the staff has taken and continues to take to address those challenges.

Joe Giitter to my left, the Director of the Division of Risk Assessment in the Office of Nuclear Reactor Regulation, which has the primary responsibility for conducting these reviews will now provide an overview of the staff's effort.

Joe?

MR. GIITTER: Thank you, Mark.

I'd first like to start by introducing the two branch chiefs in my division who are responsible for most of the work that's going on with NFPA 805.

To my left is Hossein Hamzehee. He is the Branch Chief of the PRA Licensing Branch and then to Mark's right is Alex

Klein and he is the Chief of the Fire Protection Branch.

I want to start my presentation with an emphasis on safety.

Licensees who have made the decision to transition to NFPA 805, have made or have committed to make significant safety improvements to reduce fire risk.

Examples are the installation of reactor coolant pump seal injection systems like you saw in Joelle DeJoseph's slide or shutdown seals to mitigate the effects of a station blackout that might result from a fire.

Some plants are installing sensitive incipient detection systems which you heard about that can detect fires even before they start.

In some cases, plants are making major modifications such as adding new auxiliary feedwater pumps to ensure that the plant can be safely shut down even if both trains of safety systems, safety related auxiliary feedwater systems are affected by a fire. And you heard Paul Harden talk about one of the modifications at Davis-Besse.

Many of these modifications have been incorporated into post-Fukushima mitigation strategies. Even plants that have decided not to transition to NFPA 805 have made considerable investments to improve fire safety.

For example, industry has indicated that non NFPA 805 plants have made significant investments on modifications to address fire induced circuit failures or what we call MSOs.

So we can say with confidence that the operating reactor fleet has made, and is continuing to make, substantial safety improvements to address the risk from fires. That is the good news.

The reality is that the NFPA 805 reviews have been more complex and resource intensive than we envisioned. I think you heard that from industry and you're hearing it from the staff.

As you can see from the figure on the slide, we are currently at the peak of the review effort as planned by the staggered approach approved by the Commission.

The resource estimates and a schedule for reviewing the non-pilot NFPA 805 applications were based on a premise that the Fire PRA submitted as part of the NFPA 805 application would follow the guidance jointly developed by EPRI and the NRC.

That guidance was validated by two pilot applications and endorsed by the ACRS. However, the Fire PRAs developed by the licensees' contractors have utilized many methods that were never reviewed or approved by the NRC.

While the licensees always have the option of proposing a technically defensible alternative to NRC guidance documents, the magnitude and number of deviations from the guidance have required significant additional resources to resolve and have been the number one driver of schedule delays in the reviews.

The industry and the NRC have been working through the Fire PRA FAQ process and the Risk-Informed Steering Committee which you heard about from the industry earlier to address these deviations. You will hear more about how the staff is addressing this

issue from Hossein.

At the outset of the non-pilot reviews, we were challenged by the Commission to find efficiencies in the reviews. The staff did identify some efficiencies which you will hear more about later this morning. These include efficiencies identified by the leading Six Sigma experts from the Office of the EDO.

However, we are continuing to challenge ourselves to identify and implement further process improvements on the remaining reviews. Towards this end, we have developed a set of metrics to help ensure that we sustain our efforts to continually improve.

My last area of emphasis before I turn it over to Alex is communications.

Consistent with the principles of good regulation, the NRC staff has held numerous public meetings with industry to resolve issues related to NFPA 805 including frequent meetings to address unreviewed methods and monthly NRC NEI management meetings.

As you will hear from Hossein, with the support of industry, we have already resolved many of the unreviewed methods in parallel with the licensing reviews.

In addition, every two months, I hold a phone call with each site Vice President to discuss the status of the NFPA 805 reviews and to highlight any concerns. These communications have proven very beneficial to the NRC and we believe they have been mutually beneficial to the industry as well.

Now Alex is going to discuss the status of the NFPA

805 reviews.

MR. KLEIN: Thank you, Joe. Slide five please?

Good morning. I'd like to begin my portion of the briefing by saying that our overall experience with the review of NFPA 805 license amendment requests show that the transition to NFPA 805 is a positive step to improving plant safety.

Licensees are making plant modifications and have reduced their reliance on operator manual actions as a result of reanalyzing their plants. I'll say a little more about the modifications a little bit later.

You just saw the graphic from Joe that show the staff is in the middle of the peak number of licenses amendment request reviews and that's a big challenge for the staff.

This slide shows that the status and progress made by the staff, and I view this as a success slide despite the challenge of a large number of reviews we currently have underway.

The upper right part of the pie reflects that we've issued six license amendments. However, since this slide was made, we've issued another license amendment with another expected in a few weeks.

Therefore, we've completed seven license amendments including the two pilots.

In fact, the staff issued the last five license amendments over the past nine month time period starting with Duane Arnold in September of 2013 and most recently, Fort Calhoun, in June of 2014.

Based on the status today, we project that we will issue seven more license amendments by the end of calendar year 2014. At a high level, you can see that we project to have half the NFPA 805 license amendment request reviews completed by the end of this calendar year.

I just want to point out something about the left side of the pie. It shows that we have 13 amendments under review after 2014 with two more expected later, one in 2015 and another in 2016.

What the slide doesn't show is that these 13 amendments are under active review today while the technical staff is concurrently completing the safety evaluations projected to be done in 2014.

So each review is on its own unique status. For example, the staff just came back from a week long NFPA 805 site audit at Point Beach. And for the rest of this year, we have an additional five audits scheduled.

We recognize that most of the initial non-pilot reviews have exceeded the two year review metric. In some cases, this was due to circumstances beyond our control such as the identification of the reactor coolant pump shutdown seal reliability issues and the use of previously unreviewed methods by licensees.

However, we continue to apply lessons learned and we've implemented key review process enhancements to gain efficiency and predictability with the reviews. Examples include timing of the audits and setting of goals minimizing the second round request for additional information. The next slide will illustrate some

of this.

Slide six please?

In the fall of 2013, we conducted an internal lessons learned review to assess where we can do things better with respect to the technical reviews.

Aside from circumstances beyond our control that I just mentioned, we learned that the request for additional information had a significant impact on the review schedule.

More precisely, we identified that the second set of request for additional information had the greatest schedule impact.

To address this, we revised our technical review process to conduct the onsite audit later in the time line to allow the earlier development of a draft safety evaluation with a more focused first set of questions meant to support the completion of the evaluation with the goal of reducing or eliminating the second set of questions.

What we are seeing so far with the initial set of reviews is an overall downward trend in the number of second round questions as shown by the graph on the left.

Part of the reason for the reduction in second round questions is attributed to higher quality licensee responses to the first round questions.

I'd now like to talk about the graph on the right side that shows the results of our acceptance reviews.

As you are aware, the staff follows an office procedure to determine at a high level if there is sufficient technical information in scope and depth to allow us to start a detailed technical

review. That's not to say that an application that's acceptable for review will not require additional information to complete that technical review.

We've now completed well over 20 acceptance reviews and have established a clear, predictable and timely process for conducting those acceptance reviews.

The increase in the number of license amendment requests that do not require supplementary information shows that licensees have implemented lessons learned from the first set of submittals in 2011 and they've generally improved the quality and completeness in their later submittals.

In addition, our experience shows that the second or third submittals is generally of higher quality for the fleet submittals.

Next slide please?

On slide seven, I'd like to share some of our observations from our technical reviews broadly divided into the three bullets that are shown on the slide.

With respect to the first bullet, licensees include a matrix as part of their license amendment request submittal package that describes the plant modifications they plan to make as part of their transition to NFPA 805.

Some of the plant modifications resolve longstanding fire protection issues such as fire in the circuit failures or reliance on operator manual actions.

Licensees do this by relocating circuits, adding fuses or installing fire barriers, for example.

In addition, some plants are strengthening administrative controls, for example, by limiting or prohibiting combustible material that may be temporarily located in a given area, things such as packing containers.

Many plants are installing new equipment to allow for the improvements in their post-fire safe shutdown strategies as well as mitigating other risk significant initiators.

The photograph on the slide shows the construction of the new 160,000 gallon condensate storage tank at Ginna. The tank provides a new source of water for the existing aux feedwater pumps and is also part of the plant's Fukushima mitigation strategies.

This tank is part of a plant change that also includes two new diesel generators to provide emergency power to those existing aux feedwater pumps.

We believe these are positive safety improvements being made to the plants and we continue to encourage licensees to make them.

With respect to knowledge, we've observed the licensees are gaining better knowledge of their plant. As part of the NFPA 805 process, licensees reanalyze their plants for fire protection and in that process better understand their plant configuration and fire risks. You heard the same message, I think, from one of the external speakers today.

This helps to increase the awareness of fire risks and the importance of the fire protection program to the plant staff.

As I mentioned previously, we conduct an onsite audit

of each licensee's NFPA 805 submittal. Although licensees rely on contractor support and expertise, we've noticed that licensees are taking a stronger ownership role in their program. This is partially demonstrated by licensee personnel interacting directly with our technical experts during those audits.

In addition, we've observed positive top down culture at some licensee sites as demonstrated by senior licensing management support to put in place qualified and technically capable staff who understand the NFPA 805 program.

They recognize that strong ownership of the NFPA 805 program is essential to the continued success of the program.

There's one other aspect of knowledge and ownership that I'd like to mention.

The transition to an NFPA 805 licensing basis doesn't end when a licensee receives our approval. The licensee still needs to finalize and implement certain actions such as developing or updating procedures.

A good practice that the staff has observed is a readiness self-assessment conducted by the licensee to determine how ready they are to make that transition.

The two assessments we've observed were strongly supported by licensee senior management and by experts from other licensees.

The lessons learned and the knowledge gained with them brought back to their own plants. We also observed that the transition teams established by these two licensees were

multidisciplinary, they were dedicated and they were effective.

We've encouraged other licensees to learn from these self-assessments and we're aware that other licensees are planning similar assessments.

In fact, the NRC staff plans to observe another self-assessment in September. And NRC senior management reinforces this ownership message whenever they visit licensee sites.

Slide eight please.

As you're aware, we continue to have an enforcement discretion policy in place for plants transitioning to NFPA 805. The initial policy was established concurrent with the NFPA 805 rule in 2004. The policy was established to support the transition to NFPA 805 by providing an incentive for licensee transitioning to NFPA 805 to identify and correct issues that would not likely be identified during routine efforts.

The policy further provides conditions for when enforcement discretion for noncompliance is appropriate such as implementation of compensatory measures, the noncompliance was not willful or the finding is not of high safety significance.

The policy has undergone several changes over the years in response to industry feedback and a lessons learned with the pilot plants.

On Joe's slide, he mentioned a staggered license amendment request submittal approach approved by the Commission.

Despite the submittal dates agreed on between the staff and the industry during public meetings in 2011, several licensees

subsequently told us they could not meet their submittal date.

As a result, in 2012, the staff wrote an Information SECY outlining enforcement alternatives should a licensee indicate to us that they need additional time to submit their license amendment request.

One regulatory response outlined in the SECY is issuing a confirmatory order to the licensee that would extend enforcement discretion if the licensee provides adequate justification.

The confirmatory order then sets a new legally binding submittal date for the NFPA 805 license amendment request for that licensee.

In the last two years, the staff received five such requests. Of those, all but one has now submitted their license amendment request and we are now conducting those four technical reviews.

This means that those with the confirmatory orders met the condition of the submittal date in that order.

The remaining request for an enforcement discretion extension is still under evaluation by the staff with a decision planned before the end of June.

Today, licensees transitioning to NFPA 805 continue to receive enforcement discretion provided that they continue to meet the policy. And we continue oversight of the fire protection programs through our regional based reactor oversight process.

In addition, plant safety is being maintained through the use of compensatory measures.

That concludes my presentation. Hossein will now discuss some of the technical challenges with Fire PRAs.

MR. HAMZEHEE: Thanks Alex.

Good morning.

Next slide please.

First I would like to spend a few minutes summarizing some of the technical challenges that are associated with Fire PRA and most of my talk you have already heard from the industry members, but I'll put a different emphasis on them.

The key technical issues have mostly been associated with the use of methods and approaches in fire probabilistic risk assessment portion of the NFPA 805 that have not previously been either reviewed or accepted by the NRC staff.

The NRC and industry, mainly Electric Power Research Institute, EPRI, jointly developed, as you heard this morning, the NUREG/CR-6850 to provide acceptable Fire PRA methods in support of the NFPA 805 license amendment requests.

This report was published in September 2010 and the supplement one of this report provides Fire PRA method enhancements based on the lessons learned from the pilot applications and some of the questions that were raised during the implementation of the Fire PRA.

The results of the NUREG 6850 implementation by the pilots were also presented to the ACRS with the conclusion that "the methods and guidance in NUREG/CR-6850 supplemented by the clarifications and enhancements in supplement one provide a sound

technical basis for the development of Fire PRA models and analyses to support transition of risk informed, licensing framework in accordance with NFPA 805.”

And by the way, the staff plans to meet again with the ACRS in September of this year to summarize some of these technical challenges and issues that have been encountered in the last couple of years.

It should also be pointed out that some licensees have used methods and approaches, as you have heard today, that are different from those described in the NUREG/CR-6850.

And some of the examples of the technical issues are, and again, you've heard some of them this morning, the treatment of incipient fire detection system in Fire PRA and I'll talk about that a little more later during my presentation, the evaluation of main control room abandonment scenarios due to loss of habitability.

We usually have that abandonment scenario for two cases, loss of function and loss of habitability. Most of the challenges have been associated with loss of habitability that would force the operators to leave the control room.

And another example is the evaluation of heat release rate generated by fire in electrical cabinets. And I am going to bring them up a few more times throughout the presentation.

And of course, some of these technical issues have created difficulties for the staff to complete the reviews of this license amendment request in a timely and consistent manner.

The review of the new methods in the license

amendment requests has resulted in additional NRC resources that are needed to complete the safety evaluations. It has also impacted the established review schedule.

The NRC review and acceptance of these new methods in the NFPA LARs on a plant specific basis rather than on a generic basis could also impact the stability of the review process.

Next slide please?

The staff has been working with the industry as you heard this morning to develop new methods and guidance when the current methods and technical bases need improvements.

The NRC Office of Nuclear Regulatory Research has conducted a number of fire tests in support of Fire PRA method enhancements.

Some examples are the testing of electrical cabinets to determine the heat release rate generated by fire, the testing of incipient fire detection system and, again, I'll talk about this a little more later.

And I would also like to mention that so far, the NRC has been leading all these fire test activities.

The NRC Office of Regulatory Research and EPRI are also jointly working under a Memorandum of Understanding on a number of Fire PRA research activities. And some of the examples are to update the industry fire events database and you heard some discussions on this earlier this morning so that they can include more recent fire events. Because as was explained, every few years you may have new data points that you wish to include in the fire

database.

And also the evaluation of the electrical enclosure fire test data that was recently conducted by the Office of Research.

So, the test has been completed and EPRI and Research are working together to evaluate the data and provide information to the industry.

In addition, as Joe mentioned, the NRC established the NFPA 805 Frequently Asked Questions or FAQ program a few years ago to support the identification of the Fire PRA technical challenges and to develop appropriate interim guidance.

Ultimately, these Fire PRA method enhancements and clarifications that have been developed under the FAQ process really integrated into the future revision of the NUREG/CR-6850.

Next slide please?

The NRC staff and industry representatives have been actively participating in the FAQ related meetings and conference calls. As a result of these joint efforts between the NRC and the industry, a large number of these technical issues have been addressed.

Many of the technical issues have also been resolved.

The ones that have been resolved under the FAQ process are treatment of sensitive electronics in Fire PRA, the treatment of self-ignited cable fires and fires that are caused by welding and cutting or hot work which provides additional guidance for a detailed Fire PRA and fire modeling.

And the last example – another example is modeling

of junction box scenarios in Fire PRA which provides the definition of what junction box is and the quantification of risk associated with junction box fire.

In addition, several technical issues are being also evaluated and resolved based on the results of fire testing by the Office of Research and, again, they are electrical cabinet heat release rate and incipient fire detection system.

The NRC staff is currently evaluating, as you heard this morning, the applicability of so-called freeze point concept proposed by the industry to the Fire PRA in support of NFPA 805 license amendment request reviews.

The NRC staff agrees with the concept and belief that the concept is appropriate for Fire PRA, however, we are currently working with the industry to develop scope and implementation guidelines.

The freeze point, or I would like to call it freeze date, concept is a process for finalizing licensing basis Fire PRA information during the staff review of the NFPA 805 amendment request. The finalization of the fire licensing basis information would occur at the proposed freeze date.

And as you heard this morning, because from the start that we get the get the application until we finish the review, we have, on the average, two years and many changes may be identified as a result of the NRC staff's review and some changes that the licensee would identify.

And if every time there is a change identified, you go

back and try to make those changes and you heard how intensive and complicated these Fire PRA analyses are, that would make the process a little unstable. So, defining a freeze date would provide additional stability to the review process.

As you may be aware, a number of licensees have committed in their NFPA 805 license amendment request to install the RCP shutdown seals. The RCP shutdown seals are designed to prevent loss of coolant accidents caused by RCP seal failures.

So, if functioning properly, the RCP shutdown seals will result in plant safety enhancement.

And they also support the efforts that are currently undergoing under the Fukushima mitigation strategies for beyond design basis events.

Currently, the design and performance of these RCP shutdown seals are being reviewed by the NRC staff. The staff is using the freeze point concept to allow licensees to take credit for the installation of these RCP shutdown seals in the NFPA 805 based on the available engineering evaluations supported by adequate test data.

However, the licensees are required to re-evaluate or update the Fire PRAs if the reliability parameters and the assumptions made in their Fire PRA change because of the future test data and engineering evaluations. And that's a very good example of the freeze point concept.

Next slide please?

Again, you heard this morning from the industry

representatives about the Risk-Informed Steering Committee. In early 2014, the NRC formed a Risk-Informed Steering Committee that is chaired by the NRR Office Director. The other members, NRC members, include Deputy Office Directors from the Office of New Reactors, NRR, Office of Research, NSIR and the Regional Administrator from Region I.

The Risk-Informed Steering Committee provides strategic direction to the NRC staff to advance the use of risk-informed decision-making in licensing, oversight, rulemaking and other regulatory areas which is consistent with the Commission's policy statement on PRA.

In addition, the NRC committee interacts with the industry, communicates the staff's activities related to the use of PRA in these areas.

And the industry has also formed its own committee early this year and there have been a number of interactions between the NRC Steering Committee and the industry Steering Committee.

Next please?

Now I would like to talk about incipient fire detection system for a few minutes.

The photograph you see in this slide, shows an incipient detection system that is installed at Browns Ferry. You can see the tubes penetrating each electrical cabinet to sample the air inside the cabinets.

Depending on the application, these systems can be more sensitive than the traditional spot-type heat or smoke detectors.

The NRC staff allows the licensees to take credit in their Fire PRAs for the installation of the incipient fire detection systems. However, the amount of credit should be consistent with the current state of knowledge and operating experience regarding the actual performance which is explained to some degree in the NUREG/CR-6850 and other interim guidance.

As I mentioned earlier, the NRC Office of Nuclear Regulatory Research has just completed the testing of these incipient fire detection systems. The results of this test and the evaluation of the test data are being done currently and it's expected that the results would be published in a report by early 2015 and hopefully that will help the industry with their treatment of them in the Fire PRA.

The results of the incipient fire detection system test will be used to adjust and update the existing guidelines regarding the appropriate credit that should be taken in the Fire PRAs. This would allow the licensees to take more realistic credit for the installation of their detectors in their Fire PRAs that are more consistent with the test results and operating experience.

Next slide please?

And this is just a photograph of a test that was done on the various fire detection systems and the only comment that I want to make here is that it shows that if you have a fire of low energy that would present the fire during the incipient phase of this incipient detection system, because of the low energy, it may not move far enough in the room and usually the test indicated that they move anywhere from four to five feet.

And so it's very critical where you install these detection systems. And if you have them too high or close to the ceiling and have the fire very low, so these detection systems may not be able to detect the fire as expected.

So, these are some of the insights. And that concludes my presentation.

MR. GIITTER: Thank you, Hossein.

As you've heard today, NFPA 805 is not a paperwork exercise although the license amendment requests do involve a lot of paper. NFPA 805 is an investment in safety.

Physical plant modifications such as rerouting cables at Browns Ferry as shown in the picture are being made that make a real impact on risk reduction and this is why we continue to make NFPA 805 a high priority for the staff.

We have emphasized to licensees that the work isn't over when the modifications have been completed. Going forward, it will be critical that licensees take ownership of the program with qualified staff and not let NFPA 805 become relegated to a set of binders on a shelf.

And this is something that I've actually talked to the site VPs about in my initial conversation with them.

You also heard the staff has already implemented a number of process improvements that will help us better align with the principles of good regulation and improve the efficiency of the NFPA 805 reviews moving forward.

We continue to focus on effective communication with

our stakeholders and at all levels of the organization. In that vein, we appreciate the opportunity to meet with the Commission to discuss our progress and challenges with the NFPA 805 reviews.

Although significant progress has been made on the individual technical issues at the working level, we believe the efforts underway collectively by the NRC and the industry Risk-Informed Steering Committees will further remove some of the regulatory uncertainty for future risk-informed applications such as seismic PRA.

At this time, we welcome any questions you may have.

CHAIRMAN MACFARLANE: Okay, great. Thank you, guys. Appreciate the presentations.

So let me go back to my first question from -- to the external panel which was about their claims of excessive conservatisms in the Fire PRAs. And I just want your views on that. Are there excessive conservatisms in the Fire PRAs?

MR. GIITTER: I'll speak to that generally and I'll turn to Hossein and we have the Office of Research here to help us as well.

We believe that there are conservatisms in the Fire PRAs. I think we will admit that. I think, though, our view is that they're not overly conservative and that's an important distinction.

When something's overly conservative, and my definition of it, it means that it's too conservative to make the right decision.

And going back to some of the discussions I've had

with the site Vice Presidents, I've asked them the question, do you believe that the modifications you're making at your plants are the wrong modifications based on erroneous risk insights? And I have yet to have one site Vice President tell me that they think they're making the wrong modifications for safety.

Hossein, did you have anything?

MR. HAMZEHEE: Yes, I agree with what you said. And they are conservative and now how much, I personally don't know how much, but I agree with most of what Joe mentioned.

And as you heard, the reason is we have worked with the industry. We've developed this NUREG/CR-6850 which at the time was the state of knowledge and state of the art.

And, of course, there are areas that any time it will require more research, more time to develop, if the industry did not have the time and resources, they would look at some other maybe more conservative approaches. And there are areas in this guidance that they are conservative.

But anytime you try to eliminate conservatism, you have to make sure that there are engineering evaluations, technical basis, so that it can be reviewed by the staff so that the staff can draw a safety conclusion.

And in some cases as you see, even though the staff may believe that they are conservative, but there aren't enough technical bases or engineering evaluation to support that. And that's really where we are today.

CHAIRMAN MACFARLANE: Okay, thanks. So

back to Mr. Lochbaum's claim about how things are going so slowly and I don't think actually it's a claim, I think it's a fact that we have just been moving really, really glacially on fire protection.

And so I just want to understand from your point of view why you think that is. Is it that we -- should we be holding the industry to firmer deadlines or what's the problem?

MR. KLEIN: I have a different perspective in terms of the progress that we're making in fire protection.

Mr. Lochbaum is correct in term of the timing of, you know, when we issued the Appendix R Rule and the time span that has occurred since then, especially with the Browns Ferry fire.

But I do want to point out that in that time period, the staff has resolved a number of fire protection issues that have been identified as we identify them.

An example, in the 1990's, we had the issue with our fire barrier materials, the Thermo-Lag issue. The staff worked hard and resolved that issue.

In the 2000's time frame, the operator manual actions issue came to the forefront and it came to the forefront because our inspectors began to realize that licensees were beginning to use the operator manual actions in a way that did not meet the rule, the Appendix R Rule.

As a result, we made steps to resolve that issue. We actually went through a rulemaking process but we subsequently withdrew that rule based upon the comments that we received from both the industry and the public.

Of course, at that same time period, we also moved forward with the risk-informed performance-based rulemaking in the late 1990's, early 2000's time period.

We also addressed head on the issue of multiple spurious operations that we talked a little bit about here today.

In my view, we've addressed all of those issues. If you look at a Government Accountability Office report that was published in 2012, I think that one of the general conclusions that was reached in that report is that the staff has made progress in resolving these issues.

So I think we're moving in the right direction, fast enough, that's up to other folks to decide than me.

MR. GIITTER: Yes, I just want to add, too, that in Mr. Lochbaum's presentation he talked about the Browns Ferry fire and the implication was that nothing had been since the Browns Ferry fire and that couldn't be further from the truth.

In terms of the implementation of Appendix R, yes, there were some plants that were built prior to Appendix R and they couldn't have the 20 feet of separation or whatever the deterministic requirement was. But, they had to demonstrate an equivalent level of safety.

And so we believe through Appendix R or through NFPA 805 that plants are safe. I will add, though, that I think with NFPA 805 we are getting some insights that we wouldn't have had from Appendix R and I think you heard that from Paul Harden that there are some really valuable insights from taking a risk perspective that

you wouldn't see taking a strict Appendix R deterministic approach.

CHAIRMAN MACFARLANE: So why have some plants decided to use NFPA 805 but others haven't? Do you have a view on that?

MR. KLEIN: I can respond to that and maybe Joe can add in also.

My personal view is that a lot of these licensees decided to transition to NFPA 805 because they --

As you recall when -- let me back up. When the Appendix R Rule was first issued in 1981, these plants were already designed and built. So the rule was backfit on these plants. It was very difficult for plants to achieve the three hour separation, for example, or the 20 feet.

They determined, I think, later on when the rule came forward in 2004 under a performance-based risk-informed approach that it was more effective for them to transition to NFPA 805 because the new rule gave them that flexibility to address their fire risk in different ways, in more -- in a smarter way, if you will, rather than in a one-size-fits-all kind of approach that Appendix R is.

So they had to have flexibility to do that and I think a lot of licensees did that because, quite frankly, I think it was more effective for them to do it that way as opposed to achieving compliance under Appendix R.

And other licensees did it because or included additional units because they used the fleet-wise approach.

An example is the Constellation fleet. They

transitioned their entire fleet but, as you recall, the Nine Mile Point Unit 2 withdrew their transition to NFPA 805 because they felt that they had adequate separation in the plant, it's a BWR. It was a fairly new design at the time, so they achieved compliance that way.

MR. GIITTER: I agree with what Alex said and I would just add that, you know, it is a business decision and I think certainly plants that have good separation and were designed after the lessons learned from the Browns Ferry fire, it may not be a worthwhile investment for them to do it.

But I will tell you, you know, we have had one plant that has plans to submit an application for NFPA 805 very recently and I can tell you I believe there's other plants out there because we have licensees participating in our calls that aren't on our list of plants that are currently under review.

So there is interest in there but it is a business decision but it's also a safety decision and some of the newer plants, quite frankly, they're designed better against fires, they have better fire protection designs.

CHAIRMAN MACFARLANE: So this makes me think about what other countries experience is with fire protection. Are they in a similar situation? I know a lot of them have newer fleets but those that have older fleets?

MR. KLEIN: Yes, we looked into that question, Chairman, and at a high level, we know of no other country that is utilizing the NFPA 805 approach to the extent that we are here in the United States.

CHAIRMAN MACFARLANE: So what are they doing?

MR. KLEIN: They're using --

CHAIRMAN MACFARLANE: Are they doing something better? Cheaper? Quicker?

MR. KLEIN: I don't know if it's cheaper or quicker, but my understanding is that a lot of the plants currently are, in the international community, are utilizing the deterministic approach. Some are following the Appendix R guidance and some are using a hybrid approach.

MR. GIITTER: One of the interesting things, Canada for example, requires Fire PRAs. The methodology they're using is the same methodology we use for NUREG/CR-6850 and I thought that was interesting.

But France, for example, also requires their plants to do Fire PRAs. So even though they don't have a risk-informed performance-based framework for fire protection, they do -- they are getting risk insights in some cases in some countries.

CHAIRMAN MACFARLANE: Are they having more success with the Fire PRA process than we have?

MR. GIITTER: I can't respond to that.

CHAIRMAN MACFARLANE: I would think it's an interesting question.

MR. HAMZEHEE: I think a lot of the international community follows what we do here in this country but the degree of detail may vary and they haven't been applying for the applications

that we have here. So they may not have seen some of those challenges.

CHAIRMAN MACFARLANE: Okay. Okay, thank you. Commissioner Svinicki?

COMMISSIONER SVINICKI: Thank you all for your presentations and Alex, I particularly appreciate that you took us back to some of the evolution and history on the issues that we have taken head on and addressed.

And it's a much longer narrative than looking at say progress in a year or two years and you're making me reflect on even in my time here what has been kind of the front of mind issue for us at NRC when it comes to fire protection.

I also appreciate that you took us all the way back to 1981 and I won't drag out my amateur lawyering, but if I recall as well is that there was some litigation over Appendix R and there was -- which was upheld that, you know, because the already constructed status of the plants, the Court found, again, this is my amateur lawyering, that in the absence of some sort of process of providing exceptions or some other means of compliance, the Court in effect remanded back to us the ability to have a purely prescriptive rule in place.

And so, you know, I mean I understand that some from the outside say, you know, you've not had a plan and stuck to it, but it's been quite a complicated narrative along the way and I think some of your answers to the questions so far in your presentation you've reminded us that this hasn't been one single thread, it's been a

lot of interwoven threads as we've proceeded.

Joe, I was listening really carefully to your answer in your response to the Chairman's question about levels of conservatism.

We had a Commission meeting, I think, a few weeks ago now on human reliability assessment and one of the things I think that brought front of mind to the Commission because it's not before us every day is this substantial amount of engineering judgment and expert judgment that the staff has to use every single day in this building, all of our technical reviewers are looking at things. And there is some element of applied knowledge that we have to use and so we do have to make judgment calls on a lot of these things.

I think you were asked one of the trickier and more complicated questions of when is something appropriately conservative and when is something too conservative.

I'm not sure though, I'll think more about your answer maybe I'll look at the transcript and re-read it again, though.

I think you said, you know, if you can answer the question that, you know, the right safety calls were made that that would be -- then you can be assured that you weren't too conservative.

I think it's got to be a little more complicated than that because I think that the safest thing you could do is just not operate a plant at all because then you can have absolute certainty that you wouldn't have an accident.

So I think that's why that question of how conservative

is too conservative and what's the appropriate level. I think that's why that's one of the age-old questions here is that it doesn't really yield itself to straightforward metrics of how safe is too safe.

So I imagine as we look to continue to improve this process and have success on these NFPA 805 transitions, I imagine it's a dialogue that is still going to be ongoing as we move forward just because it doesn't lend itself to quick and easy answers.

I did have one specific question and I could have asked this of the previous panel and, Hossein, you might say, you know, it would have been more appropriate to ask them.

But in the tradition of debate societies where they say, okay, now speak for the other side. I would ask you the question, you mentioned the challenges to the staff of the use and invocation of alternate methods and that that certainly adds to the duration of the review.

What do the summitters of the license application, the amendment request, what do they put forward as their motivations or causes or reasons for using these alternate methods? What do they say? Not what effect does it have on us but what are their motivations to do that?

MR. HAMZEHEE: Their motivations -- do you want my opinion or do you want to use the data points so far or what we have heard from the industry members?

COMMISSIONER SVINICKI: What do they put forward and then I don't -- I suppose if I don't know if you're going to offer an opinion on the truthfulness of it or what, but what do they say?

And sure, give me -- how do you react to what they say?

MR. HAMZEHEE: Well we have enough data points so far because as Alex mentioned, there have been a large number of them under review and around five, six of them that we have completed.

What we have heard is that as they are trying to refine the results and complete their Fire PRAs and following some of the existing guidelines, they get into a situation that they believe the guidance is too conservative.

COMMISSIONER SVINICKI: And so we're back to that question again, okay.

MR. HAMZEHEE: Yes. And then conservatism, they believe is sometimes if they walk in a room and they believe there is -- the guidance says you have to assume this ignition frequency for this ignition source and they believe that that is not going to happen and they go talk to some of the technical experts and they all agree that, yes, this is conservative and more focused approach can be used.

Now at that time, they have two options. Either engage the staff and the industry to try to quickly resolve that on a generic basis so that other industry members can benefit from it or what they have done that would cause impact and difficulties for the staff is they go ahead and they do what they think is right based on some evaluations and they put it in the application.

And then it comes to us and now as soon as the staff members see an approach that has not been reviewed and accepted,

they have to make a safety conclusion. And at that time, either they have to reject that approach or they have to devote more time and resources to ensure that they have reasonable assurance that that approach is as good and is reasonably conservative.

So if they take the second approach, then that creates requirement for more resources, more hours to review, ask questions and we get to that point but then we may not be able to complete these reviews in a timely manner.

And as you heard today from the industry members, from Joe and Alex and myself, now because of all these lessons learned, we have also looked forward and see how can we improve these processes?

Well, this FAQ process is an excellent example. It is helping. As a matter of fact, just recently there was an issue that industry was struggling with and they brought it to the table as part of this FAQ and now we're trying to provide some generic evaluation and provide some guidance.

COMMISSIONER SVINICKI: Well and I appreciate that as you provided that specific response, it occurred to me that that's not dissimilar to what we encounter in any kind of licensing actions is people want to come in with some alternate method or frequently they have some other data source or study they want to cite to, then NRR, you know, writ large has to address that and then they have to be able to replicate the same conclusion of whether or not applying that is appropriate in that case.

So whether it be a power uprate or anything else,

that's always available to licensees to cite to or invoke. Some alternate, I think they know that it slows the process down.

I'm glad you're using FAQs. I know that NSIR found those very, very helpful in terms of Part 73 implementation. So again, I think some of the problems are not unique to NFPA 805. Some of the solutions are not unique to NFPA 805.

So, and the only other thing I'm going to say is the Chairman will next recognize a colleague of mine who doesn't like the word believe which you used a number of times so I'm just telling you that before he starts asking questions, a reminder from the first panel.

Thank you, Chairman.

CHAIRMAN MACFARLANE: Okay, before we do that, I cut Eric Leeds off. I know he wanted to jump in on I think my last question.

MR. LEEDS: Thank you, Chairman, Eric Leeds, Director of NRR.

You asked about what do the internationals do? What do our fellow regulators do around the world? And just anecdotal, Mark and I were just over in France and we toured Flamanville and we were with our counterpart, John-Christophe Niel. It was very interesting.

We were in the cable spreading room at this newly designed plant that's supposed to come on line in the next couple of years and I was looking around for the fire detection systems and the suppression systems and I didn't see much. And then I saw the red pipe running through the room.

Well red pipes in nuclear power plants in the United States are fire mains. And so I asked the licensee, the Electricite de France, I said that's a fire main. And he yes. I said so how do you fight fires here in this cable spreading room? Where's your CARDOX system or your Halon system?

He said, no, no, no, we use water. And I said you put water on an electrical fire? He said, oh well, we turn the electricity off first. And I turned to John-Christophe and he shook his head. He was not happy with that answer.

And we went outside and we talked later on during the day and obviously, the regulator is not going to accept that in France. But I started talking to him about things that we were doing with regard to NFPA 805 and incipient fire detection and they don't use that over in France. So he was very, very interested in incipient fire detection. He asked me to send him some information, we exchange information regularly.

So different regulators do different things. I think that we're learning an awful lot here in the United States with NFPA 805 and I'm hoping that going forward, we share that with the rest of the international community over at the IAEA and through the NEA. I think there's a lot of things that other folks can learn from us.

I really do believe that we are on the point of this issue.

CHAIRMAN MACFARLANE: Great. Thanks Eric, that was very helpful.

Okay, Commissioner Apostolakis?

COMMISSIONER APOSTOLAKIS: Thank you.

We heard earlier today from the external panel that Mr. Lochbaum said that the risk from fires roughly equals the risk from all other sequences. But then Mr. Chapman said the risk from fires is small. And then I believe one of the other panelists said that the risk from fires is not insignificant.

Now, in your reviews, can you give us an idea of the range of contributions to core damage frequency from fire? What have you seen so far?

MR. GIITTER: I can tell you that based on what I've seen and I help teach a course up at MIT for the INPO NORM Nuclear Operation Risk Management and there have been presentations there, for example, from different fleets that show, and these weren't NFPA 805 plants, but it showed that fire was a major contributor to core damage frequency, in some cases 50 percent or greater.

Now you can argue how can, you know, is that overly conservative or not, but even if you factor in that it may be conservative by a factor of three, it's still a significant contributor.

COMMISSIONER APOSTOLAKIS: Yes, percentage wise, I mean that's significant input, but in terms of the frequency themselves, can you give us an idea? I mean are we talking about 10 to the minus fives, sixes, fours?

MR. HAMZEHEE: Based on what we have seen for some of the plants, you're talking about low to high one E minus five, you know. So it's significant. However, there may be some conservatism in it but still, the fire risk is real and it is significant.

And what you were quoting was from Jim Chapman that says in his presentation that the risk is small but it's not insignificant and he's absolutely right. The --

COMMISSIONER APOSTOLAKIS: He said it's not insignificant? I didn't remember that.

MR. HAMZEHEE: Yes, that was me.

COMMISSIONER APOSTOLAKIS: Okay, I'm sorry.

MR. HAMZEHEE: And he's right, the risk, depending on how much time you spend and how much of conservatism you get rid of, you may increase or decrease, but at the end of the day, risk due to fire is not insignificant.

COMMISSIONER APOSTOLAKIS: Not significant. It's not insignificant.

Again, the data problem, what Mr. Harden presented, that bothers me. What you have comment from that? I mean 31 times higher all that, it doesn't make sense.

MR. HAMZEHEE: Well again, because the staff has not been involved in doing the actual PRAs, we cannot tell you with high confidence that how conservative they are or they're not and that whether it's a factor of two or a factor of 100 because we don't have the details and we have not done those assessments. So we cannot either agree or disagree.

But based on our knowledge and what we have seen in the existing guidance and the results, we don't believe that some of those factors are realistic factors. But again, it's hard for us without having been involved and done the evaluation to come up with some

numerical criteria for how conservative these results are.

MR. GIITTER: Yes, I would just add, and I'd maybe ask somebody from the Office of Research, I know Nathan's here, he can come down and speak to it better than I can.

But, the data that's being used is not NRC-generated data, it's industry-generated data. So, you know, if there's a concern with the data that's being used, it's an issue that I think industry needs to think about.

And I think Alex said this earlier, the testing that's been done has been done by the NRC and we've been trying to get more involvement from industry to support the testing and we do, I think we are having a better relationship now between the NRC and EPRI to do some of that testing. But it has -- NRC has been carrying a majority of the load on doing the testing. So, you know, that's another way of getting data.

MR. SIU: Nathan Siu, Office of Research. Like Hossein, I can't comment specifically on the factors that we've heard because I haven't reviewed that work.

I think it's fair to say that Research and EPRI are working together to improve the fire database and I would be pretty confident in the numbers generated from the exercise.

However, there is a distinction, as you pointed out, between the occurrence of the fire and the effects of the fire. So saying whether a fire that occurs is large enough to cause subsequent damages, it's a point of modeling and probably a point of controversy.

Some people refer to that as the severity factor issue

which has been around a long time. And fortunately, we don't have many large fires so it's hard to nail down statistically.

COMMISSIONER APOSTOLAKIS: Thank you.

We've heard repeatedly today from the external panel and from you gentlemen that some applications use methods that are not in NUREG 6850 and then you have to review them and, of course, you know pass judgment.

Can you give me an example or two of deviations from the acceptable methods that really created significant delays and the staff had to review them and, you know, there were RAIs between us and the industry?

MR. HAMZEHEE: I think I tried to capture that in my presentation. I think one good example is, as you have heard, how much heat is generated from a fire in the electrical cabinets. And it's obvious became in most of the Fire PRAs, electrical cabinet fire is a significant contributor to the fire risk.

So that's why and rightfully so, the licensee's staff spends a lot of time and resources to get more detail and make sure they do it more accurately and more appropriately.

And there's some guidance in NUREG/CR-6850 that how much heat release rate you can use and some guidance and curves and if they use those, then it may not result in desirable answers so they try to do more realistic and use numbers that are smaller.

And when they do use the numbers that are smaller, then the staff is going to ask questions and what's your basis and why

are you using those?

And because of this situation that you see now as Joe mentioned, the Office of Research is conducting the testing. We're spending a lot of time and resources and hopefully, the results and evaluation of the test data will help us with what is more realistic based on solid engineering results and test data. So this is a very good example.

COMMISSIONER APOSTOLAKIS: So the NUREG report, according to what you said, has some curves that will tell you how big the fire is and so on.

Are these curves based on data? I remember Sandia did a lot of experiments on cabinets some time ago.

So the alternative methods that are being proposed, what do they do? They look at the ignition of a fire and then model how it propagates?

MR. HAMZEHEE: Maybe I should ask someone from the Office of Research if they are here to quickly provide a summary of that --

COMMISSIONER APOSTOLAKIS: Okay, while the guy is coming, the test that the NRC now is performing, are they different from Sandia's test?

MR. HAMZEHEE: I believe so but let me let Mark Salley if he would --

MR. SALLEY: Yes, Mark Salley, Branch Chief for the Office of Research, fire research.

Okay, 6850 was a re-quantification for the fire risk.

And when they put it together, it was published in 2005, it was state of the art. They used the information they had.

As far as the cabinet fires went, the electrical enclosure fires, they relied on earlier data, George, that was done in the 1980s at Sandia.

COMMISSIONER APOSTOLAKIS: I'm not off the Commission yet.

MR. SALLEY: Sorry. But they use --

COMMISSIONER APOSTOLAKIS: Okay, it's all right. I've known Mark for a long time. It's okay.

MR. SALLEY: You beat me in ACRS and you beat me here, too. Okay.

COMMISSIONER APOSTOLAKIS: I couldn't resist.

MR. SALLEY: But the data was always -- the data that was collected from the electrical enclosure fires was always looking at the worst case, okay, how bad could the fire be? So that was the data they had to start with.

When you start building this into the PRA model, you're looking at this data that was the worst case data from the fire. You're now also trying to model it. So where do you model the fire? Do you put it at the top? In the middle? In the bottom?

Again, conservatively, you put it at the top. So this is where this starts adding up. We just ran a series of tests last year with NIST. We ran 125 tests out at CBD, the naval facility and this was to get to the data that not all cabinets go to that worst case. So this is what we're trying to understand.

Under the MOU, we've gotten with EPRI, we've assembled a team and now we're trying to take a look at all of this to come up with a more realistic approach which is what everyone's searching for.

COMMISSIONER APOSTOLAKIS: Thank you very much, Mark.

Chairman.

CHAIRMAN MACFARLANE: Okay, Commissioner Magwood?

COMMISSIONER MAGWOOD: Thank you, Chairman.

As I look at this panel, I couldn't help but think back more than four years ago at one of my first Commission meetings I was struggling trying to remember who the people were on the panel and I think Commissioner Svinicki told me that after you're here awhile you'll start to see them so often, you'll be sick of looking at them or something to that effect. I don't think that was the exact wording but that was the effect of it.

And it's a pleasure to see all of you again because we've had conversations about this subject quite a while.

And as I also think about when we first started, and she did not say sick of seeing you, I'm paraphrasing heavily.

I recall that there was some discussion on the Commission about diverting so many resources to this effort. We talked about it quite a bit and I know there's people from Research and other areas that have been pulled into this effort to make this

happen.

And it's been an awful lot of work and I think that what you've presented today reflects the level of effort that's gone into this and it's really been, considering the difficulties that you've talked about, the industry folks have talked about, it's a success story to a large degree.

While it's been a difficult one, I think you've accomplished quite a bit so there's a lot to be proud of.

That said, you know, I am sensitive to a couple of some of the things that was in David Lochbaum's presentation which doesn't directly affect us and I guess I'll direct this to Mark.

So we have one aspect of David's presentation, which I think should -- I'd like to give you a chance to talk about is the concern that he reflected that there were issues that came out of the review of say Harris where we found that there were manual actions that were perhaps were not entirely what we thought they were. But we found them because we were going through the NFPA 805 exercise.

We have a lot of plants that are not going through NFPA 805. We have a lot of Appendix R plants.

So what's the staff doing to make sure that we aren't missing something in the plants that are not going through this rigorous analysis to make sure that the manual actions and the compensatory actions are all what we think they are?

MR. SATORIUS: Well one thing we do is that within the ROP, there are inspection procedures that we conduct and I don't

know the exact periodicity but we do still inspect those plants to the requirements if they're not transitioning into NFPA 805.

So that's one aspect that we do is we perform those inspections and have been doing those for quite some time and those are also, when we look at those inspection activities and then inspection procedures on a periodic basis to see if we're looking at all the things that we need to be looking at given the feedback that we may have gotten from Harris or other feedback that we get.

So we're looking at those areas that there may be vulnerabilities that we've come to be aware of as a result of plants transitioning. So that's one of the things that we do.

COMMISSIONER MAGWOOD: So we do look at the manual actions in some detail to make sure that they are appropriate and doable in the event of fire. So we have a regular program to do that?

MR. SATORIUS: I'm pretty sure we do. I mean I don't know if I've got it to that level of detail. I might be able to --

MR. KLEIN: I can add to that.

Mark's exactly correct in terms of the ROP and so forth, and the involvement of the inspectors.

During the triennial fire protection inspections, the inspectors will take a vertical slice of the three or four areas in the plant that they've chosen and they will take a look at all of the parts of that fire protection program, including the safe shutdown strategies and so forth and that includes the operator manual actions.

I do want to add a little bit further, I mentioned earlier

a little bit of the history with respect to operator manual actions. We did have a rulemaking in progress some time ago and that was subsequently withdrawn as I mentioned.

During that time period, licensees did go back and reanalyze their plant and there were a set of licensees that came in for exemption requests to the staff because they recognized that they had operator manual actions in place that were not reviewed by the staff. So they were basically unapproved operator manual actions.

We've stepped through that process with the industry. We've reviewed all of those exemption requests and we've dispositioned those exemption requests in accordance with our procedures.

So, you know, in terms of operator manual action, I think it's a two-pronged approach that we used both from the program office and through the ROP.

COMMISSIONER MAGWOOD: Okay, great, appreciate that.

So let me ask you a question, Joe. There were certainly a few themes one can draw from the previous panel but one was this discussion of conservatism which the Chairman mentioned.

But let me drill into one aspect of that and that's the conservatism that comes out of our review of the PRAs. And I'll put it this way, do we not like Reg Guide 1.200, is there something that's being missed through the peer reviews that require us to go back and ask questions about specifics in the models themselves? Is that -- what's gone wrong there?

MR. GIITTER: I'll let Hossein respond to that question in detail, but Reg Guide 1.200 as set up with the concept that you'd have a peer review group that would come in with the right subject matter experts and they'd be able to review the PRA and, you know, typically have a fire modeling person and other experts as well as RPA experts on the panel.

But one of the -- really the process we follow in doing the NFPA 805 reviews is we don't go back and review the entire PRA. We rely on the judgment of the peer review team by and large. But the peer review team, when they look at the PRA will come up with findings and observations.

So when we do our review, it's focused on the findings and observations of the peer review. And we want to make sure we understand how the licensees have dealt with those findings and observations so we just want to make sure that, you know, it's due diligence, that they were dealt with.

And a lot of times what we find is that the peer reviews will identify the unreviewed methods. They may or may not have somebody on the peer review panel that is actually an expert that would be able to make a decision on that particular unreviewed method.

So they'll kick it out and say hey, this is an unreviewed method, it hasn't been -- it's different than the NUREG/CR-6850 and so that's where the problem lies. So it's not that we're not trusting the Reg Guide 1.200 process, it's that the peer review panels themselves are finding the deviations and we have to

pull the thread on how those were dealt with.

Am I saying it --

MR. HAMZEHEE: Yes, you are absolutely right and if I may expand on it.

And by the way, what we're saying is already being worked on as part of the Risk-Informed Steering Committee. As a matter of fact, we have the working group number one that I'm chairing and that is how to enhance Reg Guide 1.200 and other existing guidance documents so that it's clear as to what the expectations are with respect to implementation of Reg Guide 1.200.

So having said that, the problems we have are in two categories. One is, as Joe mentioned, we do focus on the peer review findings. But sometimes, the industry does not do a great job of resolving those findings or documenting the resolution.

So when the staff is doing a detailed review of those findings and we said, well, the reviewer said do X, have you done that? Oh sorry, we didn't or not satisfactorily.

So sometimes that's how we follow Reg Guide 1.200 and that's where we get distracted. So the industry needs to do a better job of documenting and resolving their own peer reviewers comments and the agency can be more focused on some of those and follow Reg Guide 1.200 more closely. So that's one category.

The other category is --

COMMISSIONER MAGWOOD: Let me shift you to something else. I did have -- I appreciate your response.

MR. HAMZEHEE: Oh sure, my pleasure.

COMMISSIONER MAGWOOD: I'll chat with you about what the other one was later. But, just one thing because I wanted to, before I run out of time, follow-up on your discussion about the incipient detectors which was very enlightening in many ways.

But one basic question, these detectors are pretty widely used now in the industry, if not nuclear power plants, certainly other facilities.

I guess I'm surprised that we find ourselves with the necessity to go off and do research projects to see how they work. Why can't we learn from what others have done and apply that? What's the difference -- electrical cabinets are electrical cabinets.

MR. HAMZEHEE: But in my limited experience, most of the experience in the industry is with nonnuclear. It's in the telecommunication. So the challenges --

COMMISSIONER MAGWOOD: Yes, electrical cabinets are electrical cabinets, right?

MR. HAMZEHEE: Well, yes and no because the electrical cabinets, the configuration, the amount of heat they can release, the ignition sources, they vary.

And then the challenges we have is not just with the incipient detection system but how they were installed, where they are installed, how you set the sensitivity of these detectors, and of course, you do all those and then we have to make sure that the main purpose of having something like incipient detection system is that you can detect the fire in its incipient phase before it grows so that the operators have more time to extinguish the fire.

So now if you go and assume that you have a lot of time so that you can take more credit for operator action and then the reality is the test and you realize that's not the case then you are going to have some unrealistic evaluation of the scenario.

So these are the challenges we're having and hopefully with the test data that we have, we can go back and understand exactly the way that the applications are being done at the nuclear plants, how sensitive the incipient detection systems are, what kind of results we get and hopefully we'll take that data, evaluate them and adjust the assumptions in the Fire PRA.

COMMISSIONER MAGWOOD: So from what you're saying, it's less an issue of the science and technology of incipient detection that's really the specific applications that --

MR. HAMZEHEE: Well, not completely but again, I have limited experience in this. If you would like to hear more, if I can ask someone from the Office of Research again, since they're doing the tests, I don't want to step on somebody else's territory. Mark Salley would you or Harry?

MR. BARRETT: This is Harry Barrett, NRR Fire Protection.

I think there's lots of experience with incipient detection systems in the telecom industry but one thing they have not done is tried to quantify what kind of efficiency or how effective they've been.

They've been very effective from a qualitative standpoint and they've actually saved a lot of money by not having

loss of function of, let's say, servers and that type of thing.

But no one has sat down and actually calculated this detector ends up being four times more effective than a spot detector or anything like that which is what we're getting into having to do to quantify it for the PRA.

You know, we did quite a bit of checking with the telecom industry but we were not able to find anywhere where they had quantified it actually from a frequency standpoint or effectiveness standpoint.

COMMISSIONER MAGWOOD: I appreciate that. I may want to follow-up with this but I don't want the Commission starved because I know it's getting after lunch.

CHAIRMAN MACFARLANE: Or freeze.

COMMISSIONER MAGWOOD: Or freeze.

CHAIRMAN MACFARLANE: We're going to have blankets next time.

COMMISSIONER MAGWOOD: I couldn't tell if it was hunger or cold but I knew something was happening here. Thank you very much.

CHAIRMAN MACFARLANE: Commissioner Ostendorff?

COMMISSIONER OSTENDORFF: Thank you, Chairman. Thank you all for the presentations.

And let me just kind of pick up where Commissioner Magwood was, I'm also interested in learning more on incipient fire protection. We had a session in my office on that a while back.

And you know, to the extent that there are other industries that have some experience, I share Commissioner Magwood's concerns that we shouldn't start from a blank sheet of paper if there is reasonable experience that can be relied upon because I agree that you know, even if it's the telecommunications industry, cables are cables like my colleague said.

And I understand there's some nuclear plant specific aspects as well, so I just think there has to be perhaps some thoughtful consideration as to how to consider whatever data already exists elsewhere.

But I'd appreciate the Commission being provided perhaps some information in this area just to kind of keep us apprised because we would not want to see, I think my personal views, helpful technology not incorporated because of getting bogged down in a very long term research project that may not be completely necessary. It's just a personal view.

So thank you, Commissioner Magwood for raising that.

I want to get a high level -- I wanted to comment to Mark and the entire team here that I want to commend the NRC staff for, I think, being very responsive to Commission direction a while back to look at a efficiencies and how you're doing business.

And I know that you're the ones that, in Theodore Roosevelt's words, are the man in the arena, you're fighting the fight on this and I think that you have seriously taken the Commission's direction.

I know you're continuing to work and slog through a lot of things but your efforts are noted.

A couple other comments, Alex and Joe, both of you commented on safety improvement that's resulted so far from 805 and I completely agree with you. And I take some exception to some comments the first panelist members left the impression, maybe not intentionally that it's of questionable value. I think any time in, and I'm going to put aside the cost issue here for a moment.

My thinking creeps into the operator level knowledge, the engineering group's level of knowledge of fire issues of a plant is a good thing and so I appreciate that both of your presentations made that point. I'm in violent agreement.

I wanted to comment, I was at a NextEra plant last week and Joe provided positive feedback in your periodic phone calls for 805, so I just wanted to publically provide that feedback.

Alex, your presentation, I think, acknowledged that the staff is considering this freeze point as a concept, is that correct as far your process?

MR. KLEIN: That was Hossein's discussion certainly, but yes.

COMMISSIONER OSTENDORFF: Yes, so, you know, and Commissioner Svinicki made this point in the Q&A for the first panel, we are where we are.

MR. KLEIN: Yes.

COMMISSIONER OSTENDORFF: We went down a path X number of years ago and if that's conceptually, if a freeze point

makes sense, I encourage you to look at that because I think that sometimes you find yourselves in a multi-year or perhaps a decade or longer endeavor which I think industry has, NRC staff has.

And we need to be willing to take innovative approaches to how to move forward constructively. I think you're doing that. I want to encourage you to continue to do that. Alex, I think this one's yours, I apologize.

There was a comment made in the first panel about on a slide about unpredictable process. Where are we in 2014 in that area? I know that there may have been some hiccups, some detours in prior years but what's your sense as to where we are today as far as clarity of process and expectations with the U.S. nuclear industry?

MR. KLEIN: I think in terms of the process itself, Commissioner, I think the process is very clear. When we go to our audits, we sit down with the licensee. We are very open to them in terms of what the next steps are with our license amendment request review.

Personally, I think some of the difficulty here comes forward in terms of the items associated with the methods. So I want to put that in a different box right now.

But in terms of what the staff is doing to move forward with these license amendment request reviews, I talked about our -- the first step that we do is review the license amendment request for completeness. That's a very open, very predictable process. It's very timely now. I think the staff is processing through that very quickly.

I mentioned how we're making changes to our review process. We've had discussions with the licensees back in October. We brought that forward with them.

So in terms of the process itself, I think that we're doing everything we can at this point and we're learning, we're continuing to learn. We'll make adjustments as we continue to move forward with how we're conducting these reviews to do it more efficiently and as predictable as possible.

COMMISSIONER OSTENDORFF: Okay. I'm mindful of Commissioner Magwood's growling stomach and the Chairman's cold body, so I'm going to very quickly finish here with two comments.

I agree, Joe, that implementation requires a lot of careful thought and we can't just say we're done. And so I think your caution and your slides was appropriate in that area. I know that this is not a simple thing.

And I appreciate also, Hossein, your comments on the FAQ process. I think those are very important.

So I'll stop there. Thank you all, thank you, Chairman.

CHAIRMAN MACFARLANE: Commissioner Svinicki?

COMMISSIONER SVINICKI: Yes, I'm very flattered that my colleagues would either be listening to what I say or purport to remember what I said years ago, but for the record let me say that analogies to drowning in the middle of the English Channel are not my

version of a pep talk for you, okay, so I can do better if asked, to come up with a little bit more encouragement than that.

And I'm sure I don't remember what I said but I'm certain that it was something along the lines of the staff quickly becomes sick of seeing us and we certainly don't blame them. That's what I said.

CHAIRMAN MACFARLANE: Commissioner Apostolakis:

COMMISSIONER APOSTOLAKIS: Well this is my last public meeting with the staff, I'd like to say that in my long association with the NRC, I will complete 19 years in ten days, 15 on the ACRS and four on the Commission.

I have been very impressed by the quality of the work that our staff produces, sometimes under extreme pressure, but I think you guys handle it well. So I would express my appreciation to your contribution to making sure that the nation's nuclear power plants are safe.

Hossein mentioned the RCP seal LOCA which reminded me that the loss of coolant accidents, of course, are the fear here and we don't want to lose coolant and the cornerstone of the regulations is a large LOCA.

But my staff told me the other day that there is another LOCA that I was not aware of and that scared me a little bit until they told me that this is the loss of Commissioner Apostolakis.

CHAIRMAN MACFARLANE: That one could be more frightening, well for us anyway.

Anybody else? Anything additional? Okay. Yes, I know, we can't top that, thank you.

Thank you all very much for your presentations. I think it was a very, very helpful discussion that we had today and thank you again, George, for your service.

We're adjourned.

(Whereupon, the above-entitled matter went off the record at 12:21 p.m.)