UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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BRIEFING ON THE STATUS OF LESSONS LEARNED

FROM THE FUKUSHIMA DAI-ICHI ACCIDENT

(PUBLIC MEETING)

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THURSDAY

JULY 31, 2014

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ROCKVILLE, MARYLAND

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The Commission met in the Commissioners Hearing Room at the Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, at 9:00 a.m., Allison Macfarlane, Chairman, presiding.

COMMISSIONERS PRESENT:

ALLISON M. MACFARLANE, Chairman

KRISTINE L. SVINICKI, Commissioner

WILLIAM D. MAGWOOD, IV, Commissioner

WILLIAM C. OSTENDORFF, Commissioner

EXTERNAL PANEL:

NORMAN P. NEUREITER, National Academies Study

B. JOHN GARRICK, National Academies Study

JIM SCAROLA, Fukushima Response Steering Committee

PETE SENA, FirstEnergy Nuclear Operating Company

JEAN-CHRISTOPHE NIEL, Director General, ASN

JOSEPH G. KLINGER, Illinois Emergency Mgt. Agency

DAVID LOCHBAUM, Union of Concerned Scientists

NRC STAFF PANEL:

MIKE JOHNSON, DEDO

JENNIFER UHLE, NRR

JACK DAVIS, Japan Lessons Learned Division

DAVE SKEEN, Japan Lessons Learned Division

CYNTHIA PEDERSON, Regional Administrator, Region III

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

9:02 a.m.

CHAIRMAN MACFARLANE: Good morning, everybody. All right. So, today's topic for this Commission meeting is the lessons learned from the Fukushima Dai-ichi accident. It's of course an area of great interest to the public, to the industry, to those of us at the NRC and to the international regulatory community as well.

Our last briefing on the status of our response to lessons learned was April 2013, so this is timely. There have been quite a few accomplishments since the last briefing. There's been a lot of progress made on seismic hazard evaluations, reevaluations, flooding hazard reevaluations, response to the mitigating strategies order. I think we're going to hear a little bit about that probably from our industry guests and from our own staff a little later.

But of course while significant progress has been made on a variety of fronts, we have to make sure that we continue our efforts to make sure we achieve the timely goal of implementing the lessons learned as committed to. And there's more lessons learned that we feel we have to look at at the NRC as well. At the same time, as information becomes available we're going to hear from the National Academy, from their report today. We need to thoroughly assess the new information as it comes in and integrate it into our own work as we go forward.

So this morning we've got quite a diverse panel that includes the National Academy of Science, the nuclear industry, the French Nuclear Safety Authority, the Illinois Emergency Management

Agency and the Union of Concerned Scientists. And then after the external panel we're going to take a break and then we'll invite our own staff to come up and talk to them today.

Now before I go on, I want to note a couple of major milestones today, and they all have to do with Commissioner Magwood. Today is Bill's last Commission meeting with us before he goes on to assume the -- to be the Nuclear Energy Agency's Director-General starting in September. And Bill's had, he reminded me, four-and-a-half years of service here at the Commission, but a long, long distinguished career in Government service before the NRC at the DOE. Bill's been a very articulate advocate for nuclear safety and security over the years, and I'm sure he will continue to be so at the NEA.

Bill, I just want to let you know I've really appreciated working with you, learning from you and I look forward to our continued relationship, but in a slightly different way when you go over to Paris. So I just wanted to take this moment to wish you very well and to thank you very much for your service.

And also; as I said, there was more than one event, it's Bill's birthday. So happy birthday.

(Laughter)

CHAIRMAN MACFARLANE: That was well-timed.

Now, maybe some of my other fellow Commissioners want to say something.

COMMISSIONER SVINICKI: Yes, thank you, Chairman.

And, Bill, it's been a real honor to serve here at NRC

with you. And both our personal friendship and our working relationship are a manifestation of that thing that happens in life where people's path cross and re-cross and they keep bidding farewell to each other and then they find a few years later that they're working together again. So I look forward to that next opportunity where our paths are going to cross again, and I'm sure they will.

There is one other very significant milestone today that I thought maybe the Chairman would mention, but I'll give some context as to why I know this. My staff is very observant and they noted a number of months ago that the Federal Energy Regulatory Commission conducted its 1,000th meeting, and therefore FERC issued a press release and had a large celebration before their meeting and really made note of this.

So it caused a member of my staff, Alan, to be very curious about how many meetings NRC had had. So in December he asked the Secretary of the Commission and her staff where were we in a count total. They provided a number, and my staff has been keeping very careful track since December of last year counting the meetings, and they are counting our closed and open sessions. Today, by their count; and I know this is NRC and someone will quibble with this, this is the 5,000th meeting today of the NRC.

CHAIRMAN MACFARLANE: All right. We win.

(Laughter)

COMMISSIONER SVINICKI: So I wish you all the best and thank you for being here for this very -- all these milestones which are very significant.

COMMISSIONER OSTENDORFF: I'd like to, Bill, add my well wishes and thanks for your service to those from Allison and Kristine. It's been a real pleasure. We went through the confirmation process together, sworn in the same day back in April 2010, worked very closely together on a number of issues. I've always highly regarded your work ethic and your approach to things. This Agency is far better off your having served here.

And my only regret is I've been unable to influence you in what I thought was a pretty simple thing. We traveled together -- and this telling some dirt on Bill, but we traveled together the fall of 2011 out to Diablo Canyon and San Onofre, and I was appalled to learn that Bill Magwood does not own a pair of blue jeans.

(Laughter)

COMMISSIONER OSTENDORFF: And I've been working with Patty Bubar and his staff to try to change that over the last X number of years and I've been unsuccessful. And I don't know that going to Paris is going to change that for you.

But Bill is a great colleague and friend. It's been my privilege to work with you and wish you all the best.

COMMISSIONER MAGWOOD: Well, thank all of you for your comments. You're very generous. I've already made the observation that serving on the Commission is a very unique opportunity that other than those who have actually done it, it's impossible to explain what it's like, because it's probably one of the most intensive professional relationships one can ever have. You spend so much time talking with four other people on a continuous

basis and your lives intertwine. You find out about all the things that are going on in your personal lives as you go through these things because you're trying to schedule things and you find out about birthdays and family members' issues and things like that. And so you do get very close and you do become friends.

And I think that our Commission over the last couple of years under Chairman Macfarlane's leadership has shown that we are able to disagree agreeably and that we have done that and that we have advanced the cause of nuclear safety in this country, I think, very significantly. And I've been very proud to be part or that and very proud to work with the three of you and with George Apostolakis and look forward to seeing the great things that you will continue to do after I depart the Commission next month.

Now regarding the blue jeans, it is true that I do not own a pair of blue jeans. In fact, I have never owned a pair of blue jeans since turning perhaps nine.

(Laughter)

COMMISSIONER MAGWOOD: And I can assure you that I will stay consistent in that in the future and will attempt to try to convince you that perhaps your reification of blue jeans may be associated with your misunderstanding about the game of football --

(Laughter)

COMMISSIONER MAGWOOD: -- and your continued completely beyond understanding alliance with the Dallas Cowboys, which one would think by now you would have learned just isn't going to get you anywhere.

(Laughter)

COMMISSIONER MAGWOOD: But all three of you have been excellent colleagues to work with. Commissioner Ostendorff and I joined the Commission together and have worked very closely together on many issues over the years.

And Commissioner Svinicki and I have known each other for a very long time, as she noted, in different capacities, and it's always been interesting to work with Commissioner Svinicki. I think you're probably the hardest working person that I've ever met and I think that people who observe the Commission from the outside probably just have no idea of the kinds of effort that you put into everything that you do, and I just respect that tremendously.

And, Chairman Macfarlane, I just appreciate what you came into a couple of years ago when you joined this Commission. You were a breath of fresh air that we needed. You were a restorative for the whole Agency. And whatever happens in the future, just always know that I think everyone in this Agency appreciates what you brought to it. So thank you.

And thank all of you for coming to my birthday party today.

(Laughter)

COMMISSIONER MAGWOOD: This is the biggest party I've had in quite some time.

(Laughter)

COMMISSIONER MAGWOOD: And people coming from overseas, Dr. Niel coming. So all of you, it's really just too much

and I -- but again, thank all of you and I look forward to your comments today.

CHAIRMAN MACFARLANE: Great. Thank you.

Okay. So we're going to start off with the external panel and we're going to start by hearing from the National Academy of Science. And they get a bit of extra time because they've spent quite a bit of time and hard work doing a thorough analysis of the Fukushima accident and lessons learned from it. So we're going to start off with them, and we're going to be hearing from Dr. Norman Neureiter and Dr. John Garrick, who are the chair and the vice-chair of the panel. So, we'll start with you guys.

DR. NEUREITER: Great. Thanks very much. First of all, Commissioner Magwood, happy birthday, since that's important.

As you know, this report was issued last week. There's been a certain amount of press coverage from it; some of it good, some of it not so good, in my opinion not so accurate, and we will go through the details of it today and hope you give us some questions.

But I wanted to start by thanking the NRC, the staff. They have worked with -- officially you're the sponsors of this report, but your staff has worked with us very well. They supplied the information that we've needed and they've come and met with us and so on. And so it's been a very good and I hope effective -- certainly in my view it was a very effective relationship.

I'm going to run through some background slides and then John will enter in a bit of those, and then we can take questions at the end.

So are you seeing the slides or you're not seeing -- there you are. So the background. It was requested by the Congress, and curiously by -- in a conference report from the Consolidated Appropriations Act of 2012. Officially you at the NRC are the sponsors of it. And we appointed a committee of 21 members, which is a fairly large committee, and we also had 23 reviewers on it. And, yes, that was the work of the Academy of Sciences. I'm with the American Association of the Advancement of Science, but I am a member of the Academy.

Now a very abbreviated statement of the task. And you all know this of course, the causes of the Fukushima accident. Task No. 2 was the reevaluation of the conclusions from previous NAS studies on safety and security of spent nuclear fuel and high-level radioactive waste storage. And we did not have time to take that up. And that will be another report. We'll begin that in another month or so and it will be out sometime, we hope, next year.

The key lessons learned. The first one, Task No. 3, the lessons that can be learned from the accident to improve commercial nuclear plant safety focusing particularly on the security systems and the operations of the plants. And then the next one, lessons focusing particularly on security regulations that relate to plant safety. So this whole report deals with Tasks 1, 3 and 4, and Task No. 2, the fuel security and safety will be taken up in a subsequent report.

Now our objective, it's really intended to be a broad-scope and high-level review of lessons learned from this Fukushima situation to improve the safety and security of U.S. nuclear

plants. And we considered many previously published reports on the Dai-ichi accident. And I know of at least 21 reports that have been written, so there was a lot of review which took place. And I do want to compliment the NRC on the Near-Term Task Force. It took us two years to do this job and it took them just a very short time, two months, and they came out with a fine piece of work. This study also evaluated previously published accident timelines to get a better understanding of key events and unit interactions -- and that's an important issue -- unit interactions at Fukushima.

Now to define our words, findings, things listed as findings are really lessons learned. And then the suggestions for implementing those lessons learned in the U.S. are presented as recommendations. And the recommendations that you'll hear much about later are not prioritized. There's no order in which they should be considered. And the report does not make policy recommendations that involve non-technical value judgments. In other words, we're quite restricted in the Academy. We do not make policy recommendations based on anything but technical -- we don't really make policy recommendations, but we do examine issues and assess them in their technological terms.

Going through the selected findings in brief, the causes of the Fukushima accident, it was initiated by the March 11 earthquake and tsunami. The personnel at the plant responded to the accident with great courage and resilience, and actually their actions likely reduced the severity and the magnitude of off-site radioactive material releases. However, several factors relating to the management,

design and operation of the plant prevented that personnel from achieving greater success and contributed to the overall severity of the accident.

And, John, you had something to add here.

DR. GARRICK: Yes. Before I do, I just want to indicate that it's sort of a reminder of some past history to be here. As a member of the Advisory Committee on Nuclear Waste for 10 years I made many visits to this room and had many exchanges, and all of the exchanges were very beneficial, and I'm sure this one will be in that same category. And I'm pleased to be here.

When we talk about this report, Norm and I, we have to remind ourselves that this is a report that was put together by 21 people. This 21 people included some of the leading people in the country on several of the topics that are involved. So they deserve representation that's beyond what I'm probably capable of providing, but I just want to acknowledge that the report was a result of a lot of effort, not only the 21 committee members, but the 24 reviewers. I've been on lots of such committees and I don't think I've ever been on one where the report was scrubbed in quite the fashion that this one was.

But I want to talk a little bit just a moment here about the causes, because to explain the cause in terms of this slide, you have to realize that the devil is in the details and that -- just want to telegraph a few thoughts that I'll expand on in a little while.

Of course we all know that the -- sort of the overarching cause was the failure to protect critical plant systems from flooding. If you had to mention one word that was the cause, I guess flooding

would be it, unless you get into the administrative side of the issues.

But to break that down a little, there are two or three I just want to mention a little bit, and one is of course the loss of AC and DC power. Of all the risk studies that I have been involved in; and that's been a lot of them, it's pretty clear that we have -- this represents maybe almost a singularity in terms of lessons learned because of the depth that's required to really examine and evaluate the role of losing AC and DC power the way it was done because the industry up until the Fukushima accident had been thinking pretty much in terms of if for a station blackout we may be out of AC power for anywhere from four to eight hours. And we probably -- and it's very unlikely that we'll ever be out of DC power. Well, we all know now that that's not the case. We were almost 72 hours without either for Units 1 and 2, even though Unit 3 had some DC power for some 36 hours.

And we also learned with respect to the DC power issue that the DC circuits control the fail-safe logic associated with the system and that the time constance associated with the fail-safe circuitry of course is much shorter than the time constance associated with the response of mechanical systems and what have you to the signals. And this indicates that if we are going to truly represent the role that power plays and losses of power plays, that we have to dig pretty deep with respect to the issue of the race between DC logic circuits that control the fail-safe logic and the isolation valves and the loss of AC and DC power. This was a rather profound experience that is an opportunity for us to have an impact on with much more rigorous analysis than has generally -- than we were able to see in our review.

The other thing that I just want to mention at this point is the need for information, computers that are on long life batteries under these conditions such that such things as mass and balance, mass and energy balances can be made and that there are ways of getting some approximations of critical thermal dynamic parameters in the reactor pressure vessel and in the containment and in the spent fuel pools. In the case of the reactor pressure vessel, it's absolutely critical that some insights always exist regardless of the availability of resources, of water level, of pressure, and of temperature. And in the case of the containment, certainly pressure and temperature. And in the case of the spent fuel pools, water level and temperature are also absolutely critical. And these are all parameters and performance indicators that can be easily calculated given certain inputs that are always available.

The other thing that I just want to mention here is that this was a situation where they were in a domain of activity that they had never thought would exist, and they just were totally unprepared. And so the role of ad hoc reaction was very evident and the resources dealing with the accidents involved very long duration of periods, unlike anything that had every been considered in the past, anything that had ever been a part of a rigorous risk assessment.

And then there's no doubt about the complications that come from the idea of multi-unit interaction and the kind of event or threat that does physical damage to the site in terms of its accessibility and what have you.

But those are just a few of the things that we got into in

considerable detail and that sort of indeed sets this event apart from just being a flooding event. And I'll come back to that a little later when we get into the issue of what's different about our report.

DR. NEUREITER: Going to the findings in brief, the overarching finding is the following: Nuclear plant licensees and their regulators must actively seek out and act on new information about hazards that have the potential to affect the safety of nuclear plants. We'll say a lot more, but if there's one overarching finding, that's it. When you get new information, when you learn about new potential hazards, you got to get into them and you got to deal with them.

So here are some selected things in brief. On the nuclear plant systems we think that the NRC and the industry should give specific attention to improving the following: First; and you've just heard this from John, DC power for instrumentation and safety system control. Second, the tools for estimating real time plant status during loss of power. Three, decay heat removal and reactor depressurization and containment venting systems and protocols. Four is instrumentation for monitoring critical thermal dynamic parameters and reactors, containments and spent fuel pools. Next, hydrogen monitoring and mitigation. Absolutely critical. And you know there were three explosions, hydrogen explosions at Fukushima. Instrumentation for on-site and off-site radiation and security monitoring. And then finally, communications and real time information systems to support the communication and coordination between control rooms and technical support centers, but also control rooms in the field and also between on-site and off-site support

facilities. And as you all well know, every one of these issues had a part in this Fukushima disaster, and a disaster it truly was.

Okay. With respect to training, the NRC and the nuclear industry should give specific attention to the following: One, staffing levels for emergencies involving multiple reactors at a site that last for extended durations and/or that involve stranded plant conditions. And again, it was a great surprise to the Japanese that not one reactor was affected, but all of them. Next, strengthening and better integrating emergency procedures, extensive damage mitigation guidelines and severe accident management guidelines.

I'm not a nuclear person. Now, I know those are SAMGs. And there's a lot of acronyms in this business.

Anyway, training of operators and plant emergency response organizations. There are a couple aspects to that. On the use of ad hoc responses for bringing reactors to safe shutdown during extreme beyond-design-basis events. And then secondly, to reinforce understanding of nuclear plant system design and operation to enhance operators' capabilities for managing emergency situations. Training, extremely important.

Next is risk assessment, and that is definitely John's specialty, so, John, you'll comment on this.

DR. GARRICK: Yes. And it has had its headaches for being my specialty, to be sure.

But here when we talk about strengthening capabilities and supporting industry and talking about incorporating modern risk concepts, the primary target of this recommendation is a more rigorous

treatment of natural events, including their integration into the basic safety and risk analysis models and making sure that we're asking the right question with respect to the natural events. And that question is: What do those events -- how do they affect the risk of the nuclear power plants? There's a tendency to get into kind of a runaway analysis mode of trying to put so much attention on what is the risk of the natural event? Even though we have maybe developed the analysis to the point where we know how it affects the operation of the plant, there's a tendency to go beyond sometimes what is necessary.

And when we talk about modern risk assessments, we refer to several areas: One is an improvement in the way in which we integrate internal and external events, getting away from kind of the stylized assessment of the natural event and making darn sure that it is in fact only, in mass speak terms, another element in the initiating event vector so that you assure yourself that in fact it is an integral part of the basic model. And also to extend the scenarios to ensure consideration of what we refer to as beyond the design-basis events and more in-depth analysis of the uncertainties.

And why do we want to quantify the uncertainties? The big reason we want to is because it gives us the information we need to know how far we need to go in the depth of the analysis of the external events. So the issue here is one of breadth and depth.

And the issue also is to be sure that when we talk about risk assessment for a specific facility that the boundary conditions are well understood, the limitations are well understood, because there's a tendency for the outside world, if you've done a Level 1 risk assessment

on a plant to interpret that as a full-scope risk assessment. And maybe the practitioners; and I'm certainly one of them, have not been as attentive to that as we need to be. There's very few full-scope risk assessments. There were a number of them done in the 1980s, but since that time the risk assessments have been downsized. And now they're on their way to expanding, thanks a lot to the NRC's programs, to try to reach back into the issue of what should a full-scope risk assessment look like?

So I think I'll stop on that for now.

DR. NEUREITER: After risk assessment, the next was off-site emergency response. And the industry and organizations with emergency management responsibilities should assess their preparedness for severe nuclear accidents associated with off-site regional scale disasters. And secondly, the industry and organizations with emergency management responsibilities should examine and, as needed, revise their emergency response plans, including the balance between protective actions to enable effective responses to those accidents.

The next is nuclear safety culture. We actually had a big discussion; and that's Chapter 7 of the report, on nuclear safety culture, and we really had a lot of discussion on nuclear safety culture. And our conclusion here was, the finding was, the recommendation, the NRC and the industry must maintain and continuously monitor a strong nuclear safety culture in all of their safety-related activities. The leadership of the NRC must maintain the independence of the regulator. And then secondly, the NRC and the industry should

examine opportunities to increase the transparency of and communication about their efforts to assess and improve their nuclear safety cultures.

Now, I'll just say a word about the discussion of nuclear safety culture, and then comparing the U.S. and Japan. I'm sure if you ask the Japanese, they will say, sure, we have a safety culture, but the problem in Japan is it's an intersection of two cultures. They have a Japanese culture and it's just flat different from ours. And the combination of their respect for authority and also their respect for the government is terribly important. And I think one simple example is they'll say, look, Norman, we couldn't tell the people that were doing something to make the plant safer because we told them it was safe. And then if we started doing something to make it safer, they'll say, gee, you have been lying to us. It isn't safe after all. And so we didn't do anything. Now that is a safety culture which doesn't work. And I think that's extremely important. You saw that in the Kurokawa report. He talked about it. He called it a manmade disaster. But clearly to me that's what he was talking about.

You've probably surmised from this comment; and I'm not a nuclear expert by any means, but I did live in Japan for five years, worked for Texas Instruments, and so I do have a lot of experience with the Japanese. And they have a big issue with this. When they do something, they've got a procedure, it's beautifully done and it's precise and so on. And that's why they were so successful in micro-electronics. But when it comes to this whole system, it's a big challenge. And that's why nuclear safety culture is a big issue.

Now many of the findings and so on in this report do reflect those of other organizations including your Near-Term Task Force. However, I think you will find that the NAS report does provide some different perspectives on some issues. And John is going to run through those chapter by chapter.

DR. GARRICK: Okay. Report perspectives. The idea here was to try to give you some perspectives that indicate what's different about our report, and most of it has to do with degree rather than kind of issues, but there are some issues that were definitely examined I think more thoroughly than we've seen in the other reports. We did have one major advantage, and that was that this report came late and we had the benefit of the ANS report, the EPRI report, and the INPO report, and the Japanese reports. And so, one of the things that does make it a little different is that we had a much more diverse information base to consider in answering some questions about things like accident causes.

And as far as the slide on report perspectives and accident causes, it emphasizes the challenges that the plant operators faced in responding to the accident. There's never been anything quite like this. Having to work in the dark, having to work without any indication, any sensors operating, having to work under conditions of severe damage, no guidance, no rules to go by was indeed a challenge never before faced in this business. Yet it did emphasize the important role that operators played in lessening the severity of the accident and operators were a source of resilience and their improved solutions were a strength of keeping the consequences down to where they were.

And as a matter of fact, if you look at the events, there were six reactors and five of the reactors had fuel in them. And the Units 5 and 6 were going through tests, and in one of them the containment was open, one of them was pressurized, not operating. They were in a shutdown mode. But nevertheless, they were under pressure conditions. And the work that they did to salvage those two plants was rather impressive. As you know, all of the diesel generators failed except a diesel generator that was air-cooled and provided power for Unit 6. Well, they were able to cross-tie from Unit 6 to Unit 5. And so they knew how to do the kind of things you need to do in order to steal electric power from available sources.

The experience and the causes of the accident provided some very unusual opportunities, and of course the hydrogen explosions were a game changing event because of the amount of damage they did and the impact it had on providing support services to the plants.

So as far as the issue of plant improvements the accident and this study emphasized the availability, reliability, redundancy and diversity of plant systems and equipment for DC power, for instrumentation and safety system control, tools for estimating real time plant status during loss of power and instrumentation of on-site and off-site radiation and security monitoring.

The issue here was the need for giving greater attention to instrumentation and performance indicators with respect to extreme threats, and of course what this means in many cases is the sorting out of the absolute minimum indicators and systems that you

need to operate under these recovery periods from such an accident and doing everything that can be done to harden those systems to make them available in conditions that are very uncomfortable with respect to accessibility, with respect to lighting, with respect to support of resources.

Training. In Chapter 5 we talk a lot about training. Norm's mentioned it already. So here the report emphasizes training on the use of ad hoc responses for safe shutdown during beyond-design-basis events and more general training to enable more effective response to unanticipated complexities. For example, they do not have a simulator at each of their plants. They do not necessarily train on their simulator against the scenarios of their risk assessments and the opportunities to do that exist. And of course thee plans that they have and that they are initiating are certainly moving in that direction.

And as far as the risk is concerned, here the report emphasizes the need for strengthening capabilities, for identifying and evaluating managing risk from beyond-design-basis events, and better estimating the broad range of off-site environmental, economic and social consequences. The whole idea of what constitutes a full-scope risk assessment has gone through a transition as a result of the Fukushima event, and I think the report highlights that pretty effectively. And that transition is that we can no longer really think of unit risk assessments, only unit risk assessments, because even there we have been limited in the scopes of our risk assessment. We have to think in terms of multi-unit and we have to even go further than that and think in

terms of transitioning from unit-specific risk assessments to site-specific risk assessments.

The report emphasizes the inadequacy of the design-basis accident as a paradigm for preventing core melt accidents and mitigating the consequences. The situation that the scenario-based way of looking at the risk allows you a much broader perspective of what the design-basis maybe ought to be because it attempts to answer the question of not only what can go wrong and what the consequences are, but how likely are they and how likely are they that allows us to importance-rank the contributions.

And then Chapter 6 of our report emphasizes the importance of the scalability of emergency response capabilities to deal with accidents associated with regional disasters and emphasizes the need for assessing the balance of protective sections.

And then of course Chapter 7 emphasizes the importance of a strong nuclear safety culture, an independent regulator and greater transparency and communication. As far as the report is concerned, this issue was probably the one that had as much discussion and diverse set of opinions as any. And we worked very hard to make darn sure that the chapter reflects a variety of differences with respect to the matter of nuclear safety culture.

So did you have anything you wanted to add?

DR. NEUREITER: No, I just wanted to say that that is basically our last slide. But when you read the report, you will see that instead of trying to draw a single conclusion about safety culture -- except this one sentence, assuring the independence of the regulator

and then greater transmission to the public and so on with respect to what one thinks and what one does in setting those up.

But we did talk about particularly various views of various people on the committee; remember, 21 people, and the views that they had on safety culture. And so you will see a number of examples and views reported there in this chapter. It's really quite an interesting chapter to read on the subject of safety culture.

Madam Chairman, that concludes our formal presentation, but let me say one thing: The real success of this report, if you consider its size, I attribute to Kevin Crowley, our staff director.

And, Kevin, thanks so much, but I'd like you to stand up and take a bow. If you'd do that.

He's also here in case either of us doesn't know something, and then Kevin will fill in for us. Anyway, that's it.

CHAIRMAN MACFARLANE: Great. Great. Thank you. Thank you very much.

And thanks, Kevin. We know that you're the great repository of knowledge of all of this stuff. A true expert.

So we'll turn to our next panelist, who is Jim Scarola, the executive director of the U.S. Industry Fukushima Response.

So, Jim, you have 10 minutes.

MR. SCAROLA: Thank you very much. I would like to just start out in thanking you for the invitation. It really is about the leadership that you've set for the whole Commission here as we look back over the last several years of setting a culture that seeks and values the diverse input from the stakeholders, and this certainly being

an opportunity for us to provide that input. And I'd like to thank you for that.

And, Bill, also having had the opportunity to go to the IAEA meeting with you in the past and seeing you display that same leadership in the international forum as well as here of seeking input, we certainly thank you for your service over the years.

Just starting out today just going back in time and talk about some of the accomplishments. But before I do that, I want to really talk about the way in which we went about seeking and getting the lessons from Fukushima, and it started out with a response built on an existing culture of continuous improvement. And when I say continuous, I don't mean that lightly. We are far from done and building a continuous improvement environment is a check and adjust. And as we continue with the implementation of our lessons, there are many opportunities to continue to check and adjust our plans through reviews, through inspections, through drills, through work shops that we have, and through sharing in international work shops we'll continue to strengthen our actions over the years.

Our operational focus has been maintained throughout the evaluation of lessons. And we emphasize that every day to our operating staffs that the most important thing that we do is operating the plant on a day-to-day basis and none of our actions are allowed to or are promoted to displace that focus. Also at the beginning of this we had a lengthy discussion about this event and a tsunami. And we made a commitment to ourselves and as an industry that the differences that exist would not be a barrier for us learning, and there

are many differences. But there are many opportunities for us to learn and we continue today to not look at this as an event that's a tsunami, but look at this as an event that was not predicted. And our actions I believe today display that in our strategies.

And then finally, we recognize that we can overwhelm the industry and our technical resources and experts with lessons, and it's extremely important from a leadership standpoint to prioritize and ensure that we are focused on those things that deliver the greatest improvement to public safety and focus our attention on implementation. And that's where we are today.

The next several slides I back up the clock. So in 2011, just from an overview, it was really focused in on first assistance, understanding the event, and then establishing an infrastructure that we could carry the improvements forward. And I've got several bullets down there. I won't read each of them in the interest of time, but I think that one that is extremely important that we did accomplish early out was the readiness of our on-site portable equipment. We recognized that we needed to take immediate action in 2011. It involved the walkdowns of the power plant in terms of our rigidity and margin for natural events. Some early actions were taken at the time of those walkdowns, but it also was a time for us to validate our portable equipment and its readiness for service. And we did find opportunities there and we acted on those opportunities early out.

Another significant accomplishment in 2011 was the report that put out the timeline of the event, and that report became a pillar for learning not just here in the U.S., but throughout the world.

And INPO certainly is credited with doing a very thorough job in putting out that timeline.

In 2012, we now turned our attention to prioritizing and focusing on how to deliver the early improvements. And right at the top of this is the mitigating strategies, what we had initially started as our FLEX strategy. And this was really about establishing the capability to respond to extreme events. And we began this as an unpredicted event. It was not focused in on a flood. It was not focused in on wind. It was not focused in on seismic. It started out with looking at our engineers and saying how do we deal with something that we did not previously predict?

And the key element of this continues to be it's a diverse set of equipment that is installed. We still have our robust design and our defenses associated with that robust design. But this was about providing yet another set of alternatives. And we have created both on-site and off-site alternatives with that strategy.

Also in '12 we signed out an Industry Response Protocol, and this really formalizes the defense-in-depth that the industry has of ensuring that all organizations throughout the U.S. that are in the generating business with nuclear power are able to support each other. And we have INPO, NEI, EPRI -- all the suppliers and operators are all party to an agreement as to how we would interface and focus that support if ever need be.

In 2013, it has been a year of focus on implementation. And we also began the process of moving our thoughts well beyond the hardware and understanding the behaviors that are necessary, the

command and control that is necessary, the leadership that is necessary to succeed in this extreme event condition. And we start to see things of the importance of relationships. And when I talk about relationships, it's vendor relationships, it is local community relationships, it is government relationships that all need to come to bear and work in unison to mitigate an extreme regional event of which the nuclear plant may be one of many things that are impacted during that event. As we did that, we continued to focus on command and control and the importance of while we have many organizations that will be involved, we cannot lose focus of clarity in command and control.

In '14, it now transitions to the reducing on the variability of implementation. So we took what was very well thought out strategies of how to build the additional safety margin in our power plants and we had maybe several hundred people that were working in this industry in building that plan. We now have several thousand people that are implementing that plan. And it is incumbent on us to make sure that we continue to keep alignment in that plan as we move forward. And there is variability and strategy from site to site, but in terms of execution we are assuring that we all meet a certain level that was intended when those plans were set out. And that's being done by reviews. We see the variability as we do reviews at each of the sites. We provide feedback. We provide actions into our Corrective Action Program and we continue to level that playing field as we move forward.

Also in '14 is our year to bring the regional or now what we're referring to as the National Response Centers into service. And this really has been a tremendous effort united through the industry to

put together additional sets of equipment off-site that can be mobilized and brought to any plant in a short period of time throughout the U.S.

So I'll turn over to the conclusion slide in the interest of time here, and it really is about adding safety margin. And that's what as I look back over the last several years I am proud to be in an industry that has accomplished this task and does not look at this task as finished. This, as I started out, is a continuous improvement. And we will continue to look for opportunities to strengthen our defenses long past the event at Fukushima and long past the lessons at Fukushima.

But as we started out and we did our initial walkdowns, we've recognized that there has been a change in knowledge base in all our organizations. That's extremely important when we think about natural events and the defenses to natural events. And people are aware now of the importance of a conduit seal, the importance of a seal around a doorway. That did not exist previously. It does today and there's programs in place to maintain it. There's also readiness of portable equipment that exists today as a result of programs now being put in place that maintain and test it.

We're adding, as I said earlier, a significant layer of defense with FLEX, fortified the response plans and training for extreme events. And this still has a lot of opportunity in front of it. As we go through the drills we'll discover more training opportunities. We're strengthening the capability of leaders to maintain the clear command and control. And then finally, as I said, the independent reviews are a catalyst for ongoing improvement. And we're committed to do those through both self-assessments and industry initiatives to

review each of the sites. That concludes my comments.

CHAIRMAN MACFARLANE: Great. Thank you.

Next is Pete Sena, who is president and chief nuclear officer of FirstEnergy Nuclear Operating Company.

MR. SENA: Good morning, everybody. Appreciate the opportunity to speak to the Commission.

But again before I start, Commissioner Magwood, I do want to extend my personal well wishes to you. Thank you for your service. All of my interactions with you, you've been extremely professional, deliberate, insightful, thoughtful and your service to the country is duly recognized by the industry. So thank you again and well wishes.

And again, thank you for the opportunity to speak here and go through the FLEX implementation strategy, the successes, the challenges, the lessons learned. And let's start -- back up and let's talk -- what's the fundamental problem statement? And again, it's decay heat. It's that seven percent decay heat that we're trying to manage, right? And when you have a reactor core that's 4,000 thermal megawatts, 7 percent; do the math, that's significant. So how do we manage that decay heat with the loss of off-site power, with the loss of on-site power, right, without the connectivity to the ultimate heat sink. The solution developed needs to be developed regardless of whatever the initiating event is. Maintain the fission product barriers. Maintain the core cooling. Maintain containment integrity. So let's develop a FLEX strategy with this overarching theme in mind.

So we have existing strategies for loss of all AC. Let's

build upon those strategies, so we have an existing strategy, all right, for loss of all AC and procedures developed. On a personal note, when I was licensed, my license exam by the NRC on the simulator was actually a loss of all AC power. So let's build upon that knowledge base, build upon that strategy and take it to the next level for an extended loss of all AC. And again, build upon, as Jim said, the continuous learning culture that we have in the industry and our margin management culture that we have. And I do truly appreciate the comments to the gentleman at the right with respect to the differences in Japanese culture.

So one of the items I'm going to talk about shortly is the reactor coolant pump shutdown seal. That is one of the weak links in a loss of all AC power. The modification that the plants were putting in place was already in the books to install the shutdown seal. This was not a result of the Fukushima actions, but as a result of our looking at weak links and what's the margin improvements we can make at our facilities? And again, I'm going to talk shortly about leveraging the existing leadership capability.

So what's the weak link? Again, if I have to solve decay heat, it's power and water. And I don't want to oversimplify it, but if I don't have the on-site power, I don't have the off-site power, I don't have the connectivity with the ultimate heat sink, I have to bring to bear portable water sources, backup upon backup upon backup. So at the on-site we have the N+1. We have the same standard equipment at the additional neighboring nuclear facilities and finally at the national response facilities. Modifications are underway across the entire

industry. And again, what are we doing here? We're continuing to apply the same philosophy -- defense-in-depth and redundancy.

So the standard connections are under way. Just pictures here of auxiliary feedwater connections, river water connections to heat exchangers, AC power quick connections for 480 volts. These are standard modifications being put across the industry. Why? Because the equipment is standard. Many of you have already visited the National Response Centers. The pictures here at my facilities are the same equipment that we have at the National Response Centers. It's all plug-and-play. Simplicity in deployment and implementation is key.

One of the things that quite frankly has concerned me in the past about the strategies is not to overcomplicate this. So if you build upon the existing strategies -- so how do you deal with a loss of all AC at a PWR? Well, it's a natural circ cooldown. Operators are already trained on natural circ. So now what do I need to bring to bear? What is the additional training? All right. How do we do DC load shedding to extend the life of the battery? That can be done. How do we start this equipment? My concern has been if we overtrain/overcomplicate this response to this beyond-design-basis scenario, we take away valuable operator training time from high-probability/low-consequence events. I've said this to my staff and I've exaggerated it for effect, but do we teach the operators how to drive the fire truck in lieu of basic operator fundamentals?

Now when I look at this equipment, simplicity is the key. So this 480-volt generator, if you have a generator in your home,

it's the same method of operation. So let's simplify it with a hard card, a simple pre-start checklist. What do you need to do to start it? Place the on/off key switch to on, start the green button, confirm speed, voltage and frequency, and close the breaker. So simplicity is the key. Let's not over-complicate this.

So again, the weak link. The RCP seal. Every operator, every engineer in the country will tell you this seal is the weak link. If you can protect this seal when it has no cooling, you can protect the RCS integrity. You protect RCS integrity, you protect containment integrity. Seals are going in. The first seals have been installed across the industry. We are on track for this timeline. The important point I can't over-emphasize, with this seal RCS inventory is maintained. RCS integrity is maintained. Containment integrity is never challenged.

So here's an example: Seven days post-event, assuming no cool down with a zero-leakage seal, put in the calcs and we assume one gpm still leaks out the seal, just for conservativeness, and you're looking at four pounds in a containment system seven days out with a design pressure of forty-two pounds and a yield pressure of a hundred and twenty pounds. You protect the fission product barriers.

So again, everything we're doing here -- the question has been asked multiple times by the Commission, by the staff, by industry, are the plants safe today? The answer that always comes back, yes, they are safe today. So everything we're doing today is about a margin improvement. Rightly so. What are your margins? What are your weak links? Build upon those and improve your

margins.

So if it's a margin dialogue, we can also have a dialogue about what is the industry doing and what's the cost? So for four units you can see the numbers there. Now multiply that by 25. So for margin improvements you're talking about a 3 billion-plus commitment by the industry to improve our safety margins.

But it's not just a financial commitment. It's a leadership commitment. I have here an article from the *Harvard Business Review* that talks about Fukushima Daini and how leadership shaped the outcome. So what the U.S. industry is trying to do is put the leadership up front. Let's shape the outcome of the FLEX strategy to ensure that we can be successful up front.

So on each of every one of these strategies the leadership team is looking at is it successful, is it deployable, can we win it, can we do it? All right. I'm licensed at Beaver Valley. My executives are licensed at all of my facilities. So we are challenging our staff. Is it execution-able, is it doable, is it successful? We critique, we challenge, we drive into the details and we desire to improve.

So bottom line, the U.S. industry is committed to FLEX implementation. And we have through INPO peer-to-peer accountability. Review visits being accomplished. Where are we with respect to each other? Are we holding each other accountable? And if we're not, we hear about it from each other, quite frankly. And the lessons learned as we do these review visits are being communicated across the industry.

So what are the challenges going forward? And again, I think we all understand the staff is under a tight timeline. The industry is under a tight timeline. So again, these are fast-track mods. Fast-track mods do bring forth risk with respect to the engineering, the procurement, the construction. So it does require a significant amount of management attention to be put forth to bear that we get this right, get it right the first time and implement these mods per the scheduled timeline.

And again, with so much management attention there is competition with other activities. Plant reliability modifications. So there's only so much time in the day to do so much work. So as we put forth these mods, if something comes on the table, what also comes off the table? And we have to be very deliberate in that decision making.

And finally, on the Gen 3 shutdown seal, I do appreciate the NRC staff being very vigorous in their review of the vendor that proposed this design. Fifty-nine tests have been done. Ten thousand hours worth of testing has been done. Advanced chemical testing has been done. So the staff fully persecuted and prosecuted the viability of that seal, as did we. And that needed to be done. But again, the proof is going to be in the pudding. So even though it's been tested in the lab, what needs to be done, that seal needs to come out at the first plant that's installed it this coming spring and do a proof testing post-installation.

And with that, again, thank you for your time and I appreciate the opportunity to speak.

CHAIRMAN MACFARLANE: Thank you.

Okay, next we have Dr. Jean-Christophe Niel, who is Director General of the French Nuclear Safety Authority.

Bonjour. Bienvenue.

DR. NIEL: Bonjour. Thank you for giving me the opportunity to present our actions.

So, my name is Jean-Christophe Niel. I am the EDO, in fact, of the French Nuclear Safety Authority.

And so, it is a pleasure, Chair and Commissioners, to have this opportunity to present our action.

Next slide maybe.

CHAIRMAN MACFARLANE: Next slide.

DR. NIEL: Okay, thank you.

So, after the accident at the Fukushima site, I took immediate actions.

First, we organized a campaign of targeted inspections of French nuclear facilities. These inspections were open to stakeholders

Second, we launched a complementary analysis of the safety of nuclear facilities. This analysis complies with the European Stress Test process which followed the European Council conclusions of March 2011. This complementary analysis is applied to about 1250 French nuclear facilities; 58 nuclear power plants; one nuclear power plant is in construction, EPR; fuel cycle facilities with each reactor.

It covers extreme natural events, loss of the ultimate heat sink and loss of electrical power and severe accident management. It is complementary to existing continuous

improvement process of safety through periodic safety review and integration of operating experience feedback.

Next slide, please.

On this slide, you can see that the process was paved by ASN position. I will come back to this. But it was also paved by proposition and justification from EDF, if I stay on nuclear power plants, EDF, which bears the primary responsibility for nuclear safety. IRSN, our technical support organization, and our technical standing groups of experts were also involved in this process.

Next slide, please.

On the 3rd of January, 2012, in a public position, following a first assessment of the nuclear facilities, ASN concluded that there was no need for immediate shutdown of a nuclear facility, but at the same time ASN also concluded that there was a need to increase robustness to withstand extreme situations beyond safety margins as soon as possible.

ASN indicated in this position that main measures were to be implemented. The first one is a so-called hardened safety care, which is a limited number of material and organizational dispositions to guarantee safety functions in extreme situations.

And second is the creation of a Nuclear Rapid Response Force. We call it in a French acronym "FARN," which is an EDF national intervention team able to supply local team staff and materials. It has to be fully operational in 24 hours.

Next slide, please.

Very schematically, regarding increasing hazard

severities, the prevention and limitation of accident and releases rely on design conditions that are justified in the Safety Analysis Report and regularly updated during the Periodic Safety Review. And we have some cliff-edge effects on hardened safety core.

Next slide.

On the 26th of June, 2012, I sent a legally-binding resolution for each site. Each resolution is composed of about 30 requirements, with the objective to:

Reinforce the safety margins beyond design-basis level earthquakes and flooding.

Implement new and robust safety measures rather than performing sophisticated analysis.

And implement the safety improvements as soon as possible, not waiting for the next Periodic Safety Review.

Next slide.

The first requirements of each of these resolutions describes a safety goal of the hardened safety core for the situation considered in the Stress Test that are:

To prevent or mitigate the progress of a core melt accident.

To mitigate large-scale radioactive releases.

And to enable the licensee to perform its emergency management duties.

The system, structure, and components, SSCs, part of the hardened safety core, shall be:

Designed with significant margins in relation to the

requirements currently applicable.

And they will be composed of independent and diversified SSCs. The licensee shall justify the use of undiversified or existing SSCs.

Next slide, please.

So, resolutions identified equipment to be strengthened:

An additional ultimate electricity-generating set for each reactor.

A diverse emergency cool-down water supply for each reactor.

New crisis management premises for each site with greater resistance to hazards and being accessible and habitable at all times and during long-duration emergencies.

Mobile devices and means of communication essential to emergency management.

Technical and environmental instrumentation.

The ASN resolution requires, also, the creation of the so-called Nuclear Rapid Response Force. So, it was proposed by EDF. And the so-called FARN is composed of specialized teams able in less than 24 hours to:

Take over from the personnel of a site affected by an accident.

And to deploy additional emergency response resources.

It should be able to manage simultaneously

intervention on all reactors of a four-reactor site by the end of 2014, this year, and a six-reactor site by the end of 2016. We have one site of this type in France, in the north of France.

More recently, on the 21st of January, 2014, ASN took a new set of resolutions. The resolution sets more detailed safety goals for the hardened safety core. And we call on EDF to:

Prevent core melting when the reactor coolant system is pressurisable by giving priority to cooling by the secondary system.

To guarantee the performance of the containment.

And to allow residual heat removal from the containment without opening the venting system.

This resolution also requested EDF to define the list of SSCs, system, structure, and components, composing the hardened safety core and their qualification requirements.

So, new SSCs should be designed according to industrial standards.

And existing SSCs verified according to industrial standards or verified according to methods allowed during Periodic Safety Reviews.

The resolution also defines seismic hazards to be used for hardened safety core design. Normally, it is based on the return period of 20,000 years.

To set requirements regarding external hazards, other than earthquakes and flooding.

The resolution requests to verify pools structural resistance behavior under hardened safety core situations.

And to prevent dewatering of the fuel assembly in spent-fuel pools.

The resolution requests to ensure dropping of control rods under hardened safety core situations.

And the request to provide independence of hardened safety core I&C and electrical systems from existing ones.

And to define hardened safety core instrumentation.

This slide describes a schedule of implementation of these measures resulting from the Stress Test process in France. Three phases can be identified.

The first phase, from the accident, 2014-2015, covers the definition of the hardened safety core, the implementation of the Nuclear Rapid Response Force, and transitory measures. For example, one diesel generator is added to each reactor. It covers improvement regarding seismic hazards.

The second phase, 2018 to 2020, covers the implementation of the large part of the hardened safety core equipment, mainly the ultimate diesel generator and the ultimate water makeup system, one for each reactor; the bunker emergency crisis center, one for each site. Other equipment will have to be designed to withstand extreme natural hazards beyond design.

The third phase covered remaining modification. That lies, actually, in discussion between EDF and ASN.

Next slide, please.

So, this is a representation which shows the situation today. The objective now on hardened core situation is to cool the

reactors through steam generator as soon as possible. Mobile pumps and provisional diesel generators are installed, and the nuclear rapid response is ready to operate.

This representation shows the final situation with the ultimate heat sink to evacuate power from containment, the ultimate water system and emergency feedwater system to bring water to the reactor, the ultimate diesel generator to prevent station blackout, the emergency crisis center to deal with severe accident, the Nuclear Rapid Response Force is fully operational.

Next slide.

One slide on the interaction with the European level. So, these Stress Tests were performed by ASN in the framework of the European Stress Tests. Benchmark and peer reviews among the European safety authorities were performed.

Following this benchmark and peer reviews, conclusions and recommendations were drawn, both in each country at the national level and at the European level.

In the document provided by the European level, which is shown on this slide, the following conclusions were identified:

The first one, European guidance should develop an assessment of natural hazards and margins, including earthquakes, flooding, and extreme weather conditions.

Important, Periodic Safety Reviews for continuous improvement of safety was underlined. It should comprise re-evaluation of natural hazards at least every 10 years. Periodic Safety Review of the existing reactors should be guided by the

objective of avoiding offsite contamination.

The national regulator should consider implementation of the recognized measure to protect containment integrity for NPPs, not yet equipped; notably, to depressurize the primary containment in order to prevent high-pressure core melt, to prevent hydrogen explosion, and to prevent containment of air pressure.

The last conclusion of these four main conclusions is that there is a need to implement measures to prevent accidents in the case of extreme natural hazards and to limit their consequences.

I would like to come to my conclusion now.

First of all, I think it is very important to recall that the complete experience feedback from the Fukushima accident will take at least 10 years.

Second, Stress Tests were performed in the European framework. The European benchmark will continue, and it is part of the new European Directory of Safety which has been approved quite recently.

Stress Tests lead to strengthen the robustness of NPPs to beyond-design situations, to prevent accidents resulting from unforeseen extreme nuclear hazards and to limit their consequence.

Two main set of measures are defined in France: the hardened safety core and the Nuclear Rapid Force.

And before full implementation of these two main sets of measures, transitory measures are requested.

Thank you for attention.

CHAIRMAN MACFARLANE: Merci.

Okay, next we have Joe Klinger, who is Assistant Director, Division of Nuclear Safety, the Illinois Emergency Management Agency.

MR. KLINGER: Thank you.

Good morning, Chairman, Commissioners. Happy birthday, Commissioner Magwood. A small gift, I have no slides today.

(Laughter.)

It is an honor to serve on this very impressive panel today to discuss the Illinois perspectives on the lessons learned from Fukushima and implementation of safety improvements related to station blackout and mitigating strategies.

In general, I am pleased to report that the Illinois Emergency Management Agency agrees with the methodology to implement the NRC Mitigation Strategies Order. In particular, the external hazards review, including flooding and seismic events, spent-fuel pool makeup and instrumentation, hardened vents at appropriate stations, the station blackout coping mechanisms have and will continue to enhance nuclear safety in Illinois.

We also concur with the industry's response through NEI's guidance for developing, implementing, and maintaining mitigation strategies and how it is being applied to Illinois power plants.

The March 2012 Mitigation Order requires a three-phased approach. Phase one, using installed equipment. Phase two, using portable equipment stored onsite. And phase three, using portable equipment stored onsite augmented with additional equipment and consumables obtained from offsite in Memphis and

Phoenix. And I understand those centers are open now. So, kudos.

For phase one and two, State involvement in Illinois is primarily through our onsite resident inspectors. The IEMA Resident Inspection Program is unique and provides the State a senior-reactor-level qualified inspector at each of the six sites housing the 11 operating reactors.

It also affords the State of Illinois the unique opportunity to have direct involvement in all three phases. This is accomplished through inspections of equipment, procedures and training, and interaction with the onsite NRC inspectors as part of their normal duties.

We are confident our Resident Inspector Program adds value to our NRC partnership and is critical to nuclear safety emergency preparedness in Illinois.

Now Exelon is our utility, of course. I met with IEMA on January 30th, this year, to begin the development of the interfaces necessary to implement FLEX phase three, response using equipment stored at an offsite location.

State and local interfaces and resources would be needed to actually transport the equipment to a site in an emergency. Exelon proposed, and we are incorporating, the following wording to include "FLEX" in the Illinois Plan for Radiological Accidents.

Quote: "As preparation for emergency situations, Exelon will coordinate designated routes with IEMA for the purposes of police escort, snow removal, ice mitigation, debris removal, or any other activities that are designed to provide full access to the designed roads

for purposes of moving emergency equipment to the station, as requested in a severe environmental event."

This is really important because in a major event getting that equipment, you could get it out of Phoenix or Memphis, but getting it to an appropriate staging area and getting it to the site in an expeditious manner is very challenging because usually we are not only dealing with -- or we may not only be dealing with a nuclear event, you may have some other events going on that are going to be competing for those same resources. So, it is very important.

So, as a result of the meeting, the following activities are ongoing in Illinois:

The routes and transportation agreements with various airports, the staging airports, are being created to support the use of equipment stored offsite at either Memphis or Phoenix.

The challenges: these airports have to be or the goal is to be between 25 to 35 miles from the site, based on the communication zone and the medium rotary lift capability to get the equipment eventually onto the site. The goal is to receive equipment at staging 20 hours after activation and at the site within 24 hours. That is pretty ambitious. I mean, it is great, and, hopefully, we will never have to use this, but we really have to plan ahead for this and we have to coordinate.

Exelon is assisting with any IEMA planners in identifying airports that meet the level of support needed to implement FLEX. For example, electrical power, temporary or permanent, space. It takes a lot of space for these vehicles to turn around and to load up

and get the equipment out. Lighting for nighttime ops, things like that.

To assist this effort, IEMA has helped coordinate with the other State agencies, like the Illinois Department of Transportation, the Air Division, and other agencies that are affected.

The challenge: some identified airports are reluctant to sign MOUs. We are working on alternatives.

And also, it is really important for industry to reach out to the states because, when we first met, we looked at some of the airports that they were looking at using, and we go, "Oh, that's great, but we've already planned on using that ourselves." So, we have to coordinate and we need to do it beforehand rather than wait for an emergency. So, it is really important work that is going on right now.

IEMA and Exelon have briefed the 13 counties on FLEX because the counties need to know what is going on. What is FLEX? What is all this? What are the three phases? And include the locals in the planning efforts because local police, local fire, all those are going to be instrumental in getting this equipment there, should we need it for phase three.

IEMA and Exelon have created language in support of FLEX to be added to all IPRA volumes. Those are the site-specific emergency response plans for each of the power stations.

So, a lot of good work. Each plant is on a timeline to have all State, county, and staging area agreements in place, starting with Byron in September of this year, and the last one at Dresden in November of 2015.

In conclusion, we applied the additional NRC

requirements and the nuclear industry initiatives, and we will continue to support and help ensure compliance with these important efforts in Illinois.

And finally, thanks for your continued support and partnership with the states. Commissioner Ostendorff spoke at our CRCPD Annual Meeting in Atlanta. We really appreciate it. And, Chairman and Commissioner Magwood, we look forward to seeing you in Chicago at the Organization of Agreement States in a few weeks.

So, thank you again.

CHAIRMAN MACFARLANE: Excellent. Thank you very much. Okay.

And then, we finally have David Lochbaum, who is the Director of the Nuclear Safety Project at the Union of Concerned Scientists.

David?

MR. LOCHBAUM: Thank you, and good morning. Thank you for soliciting our views on this topic.

Next slide, please.

Overall, we would rate the progress to date as good, although with a fairly large caveat. My remarks today will focus on the Mitigating Strategies Order, but the themes apply more broadly.

Next slide, please.

The station blackout rule assumed that either the offsite power grid or onsite emergency diesel generators would be restored within hours. It provided no protection against power outages lasting longer than the assumed coping durations. A strength in the

Mitigating Strategy Order is that it relies on no subjective duration.

Next slide, please.

But have we solved the problem or just swapped problems? The Mitigating Strategy Order assumes that FLEX will be deployed in time to prevent core damage. UCS is not convinced that the order's assumption is valid.

Next slide, please.

My apologies to Entergy for drafting Pilgrim to illustrate our points. My Pilgrim-specific comments generally apply to all operating reactors.

A potential strength of FLEX is in providing at least N+1 options when N is required for success.

Next slide, please.

This map of the Pilgrim site shows that multiple points are envisioned for connecting FLEX's makeup pumps.

Next slide, please.

But even a dozen connections would be useless because none of the FLEX pumps can provide high-pressure makeup. The reactor pressure must be reduced by non-FLEX methods for FLEX's teeny-tiny pumps to work.

Next slide, please.

Entergy's analysis for Pilgrim also shows that a tornado could disable all of the FLEX equipment. Having more equipment that workers cannot use is not the proper goal here.

Next slide, please.

To guard against a tornado affecting both of the FLEX

storage locations, Entergy positioned them more than a stone's throw apart at the site.

Next slide, please.

The NRC assumed that one, and only one, location would be compromised by extreme weather. Apparently, the tornado that devastated Moore, Oklahoma did not know about this 2400-foot rule when it destroyed larger portions of that city.

Next slide, please.

Entergy claims to have N+3 capabilities in some areas, but N+3 may only equal N, unless extreme weather cooperates by only cluttering-up one tiny area.

Next slide, please.

As the NRC's review of Entergy's plan noted, they only have one debris remover, and it may not be able to free up the N+1, N+2, and N+3 equipment areas in time. The Japanese word for this situation may be Fukushima.

Next slide, please.

Another strength of the Mitigating Strategies Order is that considerably more equipment is now staged onsite. Workers literally have more options to apply.

Next slide, please.

But will that equipment be damaged before that need arises? There are no regulatory requirements to monitor the storage shed heaters or to fix them within some timeframe, if one happens to notice that they are broken. Monitored and tested safety equipment has been disabled by cold weather and other extreme conditions, but

the NRC assumes, for some reason, unmonitored and untested equipment somehow avoids this outcome.

Next slide, please.

Regulatory requirements have workers periodically inspecting the air inlet and outlet ports for dry storage systems to ensure ventilation flow paths are not obstructed. But the NRC assumes that FLEX's unmonitored storage sheds on the same locations are somehow immune to such blockage events.

Next slide, please.

This is the NRC summary of Pilgrim's plan developed in response to the Mitigating Strategies Order. As previously noted, the plan non-conservatively assumes that the reactor pressure is magically lowered to allow the little-bitty FLEX pumps to work.

Next slide, please.

And the plan non-conservatively assumes that plant instrumentation not covered by any of the NRC's post-Fukushima reliability orders somehow continues to work just fine and guides the operators into taking proper and timely mitigating actions.

Next slide, please.

The plan also non-conservatively assumes that the Reactor Core Isolation Cooling System, called RCIC, will only draw water from the suppression pool and provide it to the reactor vessel for core cooling. This water will return to the suppression pool as steam flowing through the relief valves. When RCIC draws water from its normal source, the condensate storage tank, the suppression pool will fill up much faster. But somehow RCIC is magically realigned to its

non-preferred supply source and the very bad outcome of the suppression pool overfilling is conveniently averted. This assumption is non-conservative and non-flexible.

Next slide, please.

The Mitigating Strategies Order would be better if it resulted in pumps that work under both high and low reactor pressure vessel conditions, if these pumps and collateral equipment were stored in locations less susceptible to common-mode losses, if regulatory requirements ensured sufficient monitoring of the equipment while it is in storage, and if the many non-conservative assumptions were eliminated that transform beyond design-basis external events into barely-beyond-design basis external events. Yogi Berra may have had this situation in mind when he said, "It's deja vu all over again."

Two decades ago the NRC mandated hardened containment vents be provided on boiling water reactors. After Fukushima demonstrated that this safety upgrade would not work during the very accident that it was most likely to be needed, the NRC mandated that the old hardened containment vents now be made reliable.

Two years ago the NRC mandated that mitigating strategies be provided for all nuclear power plants. Will it take another disaster before the NRC then mandates that the old mitigating strategies be made reliable? The answer is literally in your hands.

Thank you.

CHAIRMAN MACFARLANE: Thank you.

All right. Thank you all very much.

We will now move on to questions from the Commissioners. And the first one to go is Commissioner Magwood.

COMMISSIONER MAGWOOD: Thank you, Chairman.

And thank all of you for your comments today. Welcome to the 5,000th Commission meeting.

MR. LOCHBAUM: Or does it just like that.

(Laughter.)

COMMISSIONER MAGWOOD: I think Annette has actually sat through all 5,000.

(Laughter.)

MS. VIETTI-COOK: It feels like it.

(Laughter.)

COMMISSIONER MAGWOOD: First, let me begin by thanking Dr. Neureiter and Dr. Garrick for their presence today. This was a very good presentation this morning. We appreciate that you lent your experience and knowledge to this cause.

And I hope we have a chance to talk, Dr. Garrick. I don't think we have ever met, but we have some mutual friends I think we can talk about.

And I also wanted to thank you for your presentation -- I didn't attend the presentation last year at the American Nuclear Society, but you gave a paper on PRA-based risk management history and perspectives, which I read. Commissioner Apostolakis actually sent it to the whole Commission. And I found it very, very informative. So, I just wanted to thank you for that.

To start with the National Academy panel, as I read through the report, I saw that there were some instances where it seemed that the Committee was giving observations and advice to our Japanese colleagues because there were some things that seemed to be more aimed in that direction, and there were some that were clearly more intended for NRC.

And to give you a chance to sort of highlight for us what perhaps you think -- I know what you think the biggest lessons are. You made that clear. But what actions do you think the NRC should take? Are there things that, as you look at this and you see the situation that we have today with the Mitigating Strategies Order coming in place and FLEX being implemented, what is the remaining gap that you think still exists that we should pay most attention to?

DR. GARRICK: Well, of course, we were very careful in what we were asked to do and doing it. And that was to try to garner from the accident and all of the people involved with it, and all the reports that have been written about it, what are the important lessons that we have learned from it.

And I am not going to rank those, but I think that there is no question that the back-end of the issue, namely, the recovery stage, the severe accident management stage is something that in the view of the Committee needs continued and diligent evaluation.

It is not to say that the existing programs, whether it be Emergency Operating Procedures or Severe Accident Management Guidelines or extensive mitigation guidelines, or what, aren't good, because they certainly are. But it is to say that this whole accident was

a tremendous eye opener with respect to something that was thought to be very low probability, very low likelihood. It was not.

And one of the things, I think the message out of the report is that, because of how it happened and because, essentially, all of the serious accidents have been, more or less, in the beyond-design-basis category, that this suggests that more attention be given to those kinds of events, particularly in terms of managing the accidents that are resulting from something severe, as a super-tsunami or a super-earthquake or a super-volcano. And the next one could be a super-geomagnetic disturbance.

And so, I think there is quite a bit of emphasis in our report on those, not necessarily because they are rare events, because we are not sure how rare they are. That is pretty obvious from what happened. But because there needs to be an increasing fundamental understanding of them in terms of how they can happen and how to protect from them.

COMMISSIONER MAGWOOD: Do you think that we will be able to develop probabilistic approaches to incorporating these external events into risk models? Because you seem to indicate that that should be a next step.

DR. GARRICK: Yes, well, we didn't evaluate that specifically, but I think the report alludes to that; that if we are suggesting increasing the emphasis on the beyond-design-basis events, I think we are also saying that we think that that can happen, that that can be done.

I know that the response about rare events is always

that there is not enough data, but the one thing that we have learned from the risk assessment business is that the absence of such events does not mean the absence of information about such events, because, after all, the success state was there, and that has to be a very important element of the evaluation.

And I think that my observation about information and data is that there are two kinds of people in the world with respect to data: one that says that there is never enough data, and the other one that says we never use the data we have. And I think they are both right, and I think we see that.

We saw that in Fukushima. There was information about tsunamis. They were important and relevant in what you might call risk space.

And so, the hope here is that this urges us in this business to look at the unexpected very seriously and, more importantly, as one of our findings says, to account for it in our safety analyses and in our expanding-scoped risk assessments.

COMMISSIONER MAGWOOD: I appreciate that.

DR. NEUREITER: Just a very brief comment. I think this point about safety culture at the end, that this is a continuous process. This never stops. You've got to keep thinking about this and working on it and imagining what might happen, and so on.

That is why I think some of the comments, whether you liked them or not, from USC are important, to listen to those things, because they do think about what might happen.

COMMISSIONER MAGWOOD: I appreciate that,

and I also agree with many of the points the Committee raised about safety culture. I think that the cultural and training issues may actually be more important than some of the hardware issues that we spend a lot of time talking about. And that is something that has not got enough emphasis.

I wanted to sort of shift to an issue. You know, you heard Dr. Garrick talk about the beyond-design-basis events. As we go through the process of understanding how to protect plants against beyond-design-basis events, one of the really inconvenient things about beyond-design-basis events is they start at -- one threshold is within design basis and the other end seems to be somewhere over the horizon.

So, what has been your experience as you have engaged in thinking about this? And how do you protect plants against these events? You know, there's lots of analysis about flooding. For example, where does the flooding stop? How do you get your heads around that?

MR. SCAROLA: I will take a shot at it, and then, let Pete jump in as appropriate.

But this is a point of great debate right now for us in the industry. We have all grown up in a history of clearly-defined design basis. And quite candidly, we are comfortable with that. As engineers, we love to have parameters and we can build to those parameters.

What we have difficulty with is when you take away the parameters and say, "Now build me a design that will encompass all

parameters." And the reality is that that is not practical.

But what is practical is to look at the symptoms that you are concerned with and say, "How do I diagnose those symptoms and, then, how do I have a portfolio of options that the operators, the people that are in control of the event can look at that portfolio and, with the knowledge and training, they can lay out a success path?

So, I don't think you can ignore new information that should be changing and improving your design basis. We are not suggesting that. But it can't stop there. While you will always move on the knowledge that you have, you, then, need to go to the step beyond and say, okay, now what about that that we didn't predict? And that is really the basis of our focus and strategy, is making sure that we have well-trained operators that understand the objective.

And as Pete so clearly stated, it is about core cooling; it is about containment. They understand the objective. They understand how to meet that objective. Now we have to provide them potential additional options of what might survive the initiating event, so that they have options to deliver that strategy.

COMMISSIONER MAGWOOD: Okay. Thank you.

MR. SENA: And if I may, so am I worried about a tsunami coming down the Ohio River or off Lake Erie? No. All right. However, I think it is the right decision that the NRC and the industry has undertaken to let's reexamine our margins. So, what could those external events be? Use new data. Use the latest technology and new tools, and let's see where we stand today. And if the margins are not there, then we need to take action.

Again, I understand your role as a regulator, but also understand my role as an owner/operator of a nuclear facility. It is my plant; it is my people; it is my community.

So, if we see that the margins are not there, this is the right action to take. Again, regardless of the initiating event, can we maintain adequate core cooling, protect efficient product barriers, and what tools are being placed in front of the operators to be successful?

I have no argument with the course of action being taken.

COMMISSIONER MAGWOOD: Okay. Well, thank you very much. Thank you to all of you.

I didn't have a chance to ask questions on this side of the table, but just, again, greetings, Dr. Niel. We appreciate your coming over to visit with us. I am sure my colleagues will have questions for you.

And, Mr. Klinger, always a pleasure. And your comments were really very interesting. I really hope that you are working with others in state government to make sure that this kind of activity is underway.

And while I didn't have a chance to ask David some questions, I thought your presentation was excellent, and I actually agree that there are some really important points you raised. In fact, I am going to raise a couple of them with the staff panel. So, they should be prepared for that.

Thank you.

CHAIRMAN MACFARLANE: Great. Thank you.

Okay, on to Commissioner Ostendorff.

COMMISSIONER OSTENDORFF: Thank you, Chairman.

I thank all the panel members. I think your presentations and perspectives are vitally important to the Commission and the NRC. So, thank you for being here.

I am going to start out with the National Academy's group. I appreciated the explanation of how this report is different. I think you made a key introductory comment there that was important for the Commission to take and to digest a bit, because there are a lot of reports out here on Fukushima from different perspectives. And so, I appreciated that you highlighted why yours provides perhaps a unique perspective.

I also will echo your commendation of Kevin Crowley. I have known Kevin for over a decade, and I have worked with him in prior jobs. And I appreciate Kevin's role in the National Academies and what he does for the country, quite frankly.

I am going to make one comment and, then, maybe a couple of questions.

Dr. Neureiter, I appreciated your commentary on the importance of training. I think, as a nuclear operator under Rickover's Navy for many years, and run hundreds, if not thousands, of drills under dark, wet, hot conditions, I think your training comments are really important. I think industry also has embraced that to a very large extent.

But I think that emphasis on training needs to be said

and refocused and reiterated time and again. So, I appreciate your highlighting that in your introductory comments.

A question I perhaps have for both Dr. Neureiter and Dr. Garrick is, I recognize that your report is different and a different perspective, but how should we at the Commission read your report -- and Commissioner Magwood got a little bit to this in his commentary -- about where do you agree or disagree with the actions taken to date by the NRC? So, I will give you a couple examples of things in your report that I am trying to understand what should we take away from this.

One was that emergency response plans should be revised. And we have embarked upon a rulemaking in this area. We have worked on control room staffing, multi-unit capabilities, upgrades to ERDS systems, those kinds of things.

And then, I would go to a different areas completely where in your overarching comment about nuclear plant licensees must actively seek out and act on new information, in the context we have taken a lot of steps in the seismic hazard analysis. The seismic walkdown says seismic evaluations, different Tier 1, Tier 2, Tier 3 categories for plants.

So, I am just trying to understand, do you make a judgment or come to a conclusion on the adequacy or not of NRC actions to date? Whoever wants to address that, please feel free to.

DR. NEUREITER: I don't think that was really our role. It was not to evaluate either the safety of the nuclear plants or whether you all are doing your job.

But I think we did try to draw some conclusions from this experience, and we hope that laying those out is useful. And that is something that you all have to process and deal with.

This is not quite fair, but, well, first of all, John, you should say something. But, Kevin, if you have something to add to this, please do. We want to give you a chance to say it.

DR. GARRICK: Yes, the one thing that it is very important to understand is that the Committee is not saying that the activities that are going on now, the safety assessments that have been performed, the PRAs that have been performed, the Probabilistic Risk Assessments, the emergency response station blackout, that these are not good rules, good regulations, and good guidance, because they are.

It is really just saying that this is a very important business we are in. We need to continuously search for how we can improve not only our rules and regulations, but the methods by which we use to form the basis for rules and regulations.

And each time we have had an accident there has been kind of a step change in that. The Three Mile Island accident, it was clearly a case of the owners' groups getting together and trying to come up with a better approach to dealing with severe accidents and severe management guidelines.

It was the trigger for moving in the direction of symptom-based procedures, which are critically important and have been very beneficial, just as 9/11 was the trigger for the extensive damage mitigation guides and being able to cope with an environment

that involves the type of things that happened at 9/11. These have all represented very important changes.

I think that one of the things we are trying to say is that the analysis, the investigations, the studies that provide us with a knowledge base with which to make these kind of decisions has considerable opportunity for improvement.

The studies and the PRAs themselves have been very good as far as they have gone, but they don't go far enough. And particularly when the major threat that we are trying to do a better job of preventing is natural events, we have opportunities to better integrate the natural event analysis in with the so-called internal events. It is clear, and I think everybody would agree, that the level of, the depth and rigor of the internal event analysis is much greater than that of the external. And that is catching up. The things that you are doing now are steps, clearly, in that direction.

So, I think the whole idea of what constitutes full-scope analyses has changed as a result of Fukushima. I don't think that questions having to do with the infrastructure in the area impeding the ability to get support sources in terms of people and equipment, we do not give a sufficient amount of attention to that. We do not give a sufficient amount of attention to the interaction between units.

So, there have been studies done in both of those areas, but the ability to do a lot more exists, and we are not talking about just opening a can of worms with respect to analysis. We are talking about being smarter about the kind of analysis we do.

But I think that our message is we need to keep

improving what we have, and here are some areas that seem to be reasonable directions to go.

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

Okay. Let me talk to Mr. Scarola just for a moment. I appreciated the time sequence you laid out year-by-year. What is the hardest thing going forward for industry?

MR. SCAROLA: So, I think, as I look forward, it is that I anticipate that 2015 continues to be an implementation year, but also a leveling year, where we get to review processes down, we get the feedback down to where we narrow the dispersion in a way in which we have implemented in the industry.

By 2016, I would anticipate that we have all the processes in place to maintain the gains and that we have integrated our activities here that have been fast-tracked backed into what I would call a new normal prioritization system, that they get prioritized with the other safety improvement activities that we have ongoing, not just those at Fukushima.

So, that is what I anticipate for the years ahead.

COMMISSIONER OSTENDORFF: Okay. Okay, thank you.

Dr. Niel, I really appreciate your coming here from France. I think the relationship between the ASN and the NRC could not be stronger. It is a very positive relationship.

I know when I have meetings with Mark Satorius, Mike Johnson, Eric Leeds, David Skeen, and so forth, that I think we all

benefit from that relationship.

The big picture -- I am going to run out of time here -- but, from ASN's perspective in the post-Fukushima action arena, what is the biggest difficult or what is the area of greatest difficulty for ASN?

DR. NIEL: I guess there are two kinds of difficulties. We have a strong technical discussion with EDF because all these topics are difficult to fix. When you speak of seismic hazards, you know, many experts with many positions; it is not always easy to find the right way. So, that is the first point.

The second point is to deal with delay of implementation. You know that in France we have one unique operator with 58 operating reactors. And so, there is, from the point of view of the operator, an organization of the implementation of the maneuver.

I think one of the difficult parts of the discussion with EDF, I mentioned, for example, the fact that the ultimate diesel will be installed in 2018. Indeed, it will start before; 2018 will be the installation of the last one, and the first one should be in 2015.

So, I would say this is one of the main difficulties in the discussions.

COMMISSIONER OSTENDORFF: Okay. Thank you.

Thank you all again for being here today.

Thank you, Chairman.

CHAIRMAN MACFARLANE: Thank you.

Yes, thank you all very much. Unfortunately, I am not going to get to all the questions that I have for all of you. I would need probably about an hour or two for that. So, I regret that.

But, anyway, let me try to weave together a number of thoughts that I heard, and, then, ask some questions specifically of the National Academy folks. And then, we will see how far we can get.

So, thinking about David's comments and Pete Senna's comments, I appreciate Pete's focus on, you know, what is the fundamental problem? Heat removal, et cetera. But I am a little concerned that sole focus on backup equipment, you know, may actually prevent you from -- there may be other issues. Let me try to be more fluent here. There may be other issues that prevent you from ever getting to use this equipment.

Flooding. If you have high water -- and I have been to some reactors where, you know, the reactor building can flood pretty high; that is the design basis -- you are not going to ever get to use your backup equipment necessarily.

Or if you have hydrogen buildup, and you guys highlighted hydrogen buildup and a consequent explosion, that could, as we saw in Fukushima, certainly get in the way of you ever using your backup equipment.

Or if you have loss of water from your spent-fuel pool and you have a problem with that, et cetera. So, we can imagine a variety of situations there.

So, that sort of takes me back to your comment about one of your findings and recommendations is that the industry and the

NRC should seek out information about new hazards on a regular basis. And you emphasized timely action. You talk about how, with Fukushima, there was mounting evidence of a tsunami, new tsunami wave height calculations, and that wasn't used.

But the problem is, when do you know to act? Like how do you know when the right time is? So, as a geologist, I am pretty close to this issue. Really, it is not just the tsunami. That is one piece of it. What created the tsunami? The earthquake. Well, seismologists didn't accept that mega-quakes could happen on that subduction zone until the mega-quake occurred off Sumatra in 2004. And it took the seismological community a number of years to get religion on that.

And then, really, everybody is getting onboard, and, all of a sudden, boom, there is a big, you know, there is a 9.0 off the coast of Japan.

Now we could have worked backwards because we did have paleoseismic evidence of large tsunamis from a thousand years ago or 800 years ago, or whatever it was, the Jogan tsunami. Brett will correct me if I'm wrong.

But we only know what we know at the time. And I agree that we have to work towards that. But these things are difficult to predict.

And then, we run into the problem, and I have run into that over and over again, sitting here at the NRC, which is, well, these are very low-probability, but high-consequence events. So, should we really act? Should we really make the investment to make a change?

These are really difficult questions.

DR. NEUREITER: It would have been very helpful even if, let's say, at Fukushima Daiichi they had not built everything so low. It would have been helpful if they had water-tighted those building down below very near the water at 3 meters or something. And had they been, and had you not destroyed the battery system, you would have had DC power and you would have done something.

There is also another thing which appeared that seemed to me to be new, and, remember, this is not my field. So, if I have got it wrong, tell me. But it was that in the isolation condenser. There was a lot of discussion early on Unit 1 and the isolation condenser. But only very late in our study -- and we have been at this for a long time -- only very late did it emerge that there was a logic system which automatically closed the valves when the power went off. And so, they actually --

CHAIRMAN MACFARLANE: Where did you find this information from?

DR. NEUREITER: Where did it come from, Kevin? Joe Shepherd had it. Go ahead.

CHAIRMAN MACFARLANE: Yes, go ahead. That's what it is there for.

MR. CROWLEY: This is Kevin Crowley.

Actually, the Committee discovered it for itself by pouring through the accident investigations that had been done. And then, when the Committee realized that there was an inconsistency in some of the accounts, they started talking to design experts who

understood how these systems were built and how they operated. And it was only through a lot of discussions that they came to that understanding.

CHAIRMAN MACFARLANE: Okay. That is a very important insight I think.

MR. CROWLEY: It is, yes.

CHAIRMAN MACFARLANE: Yes.

DR. GARRICK: I think you ask a very good question. And the whole issue is, how do we structure a set of scenarios that we have confidence in? And then, secondly, how do we relate the supporting evidence to those scenarios in a systematic way?

And that is what the so-called triplet definition of risk is all about. What can go wrong, how likely is it, and what are the consequences?

And that is exactly what we did with respect to the isolation condenser issue. We just kept burrowing-in on what happened there. Why did it work the way it did? The reactor core isolation system and the isolation condenser and the high-pressure injection system are all subject to the same basic failsafe logic. It is the same kind of logic. So, why did in one case, in the case of Unit 2, which was the reactor core isolation, were they able to operate the reactor core isolation cooling system, and in the case of Unit 1 with the isolation condenser they could not?

CHAIRMAN MACFARLANE: Uh-hum.

DR. GARRICK: And the simple answer, on burrowing into the information, is that what happens was, we thought what

happened was that, because they turned the closed valve on the inside of the containment on the Unit 1, and that they did not do that with respect to Unit 2, with respect to the so-called RCIC, that that was the cause.

But, on further examination -- and this is what we're talking about to really answer your kind of question -- it was more fundamental than that. The truth is it depends upon the position of the valves at the time of the incident and it depends upon the timing associated with the loss of power. And you have got to orchestrate those issues in such a way to avoid getting in a position that, when you lose DC power, these valves automatically close. And so, now they are faced with a system that really is a very good system, the isolation condenser, being totally made useless to them because of some fault logic, some fault logic that was based on protecting the core against a break in the line associated with the isolation condenser. So, that is what the logic saw when it was working.

CHAIRMAN MACFARLANE: Okay.

DR. GARRICK: And when the DC went off, it treated it as if there was a pipe break and shut things down.

CHAIRMAN MACFARLANE: All right.

DR. GARRICK: Well, there were differences between the timing and between the position of the valves between the two reactors. And those differences were just enough for the system to work in the case of Unit 2, but not to work in Unit 1.

So, the problem of this business, and to answer the kind of questions you have, just seems to be a matter of -- and this is a

creative part of the risk assessment business -- of structuring a set of scenarios that you have confidence in, that you have reasonably covered the full space that you are interested in. And then, it is a matter of seeking out the evidence that supports those scenarios and quantifying them.

And the uncertainty sciences allow us to do that. You may not like the answer because of the amount of uncertainty involved, but there is no doubt about the fact that you can create the curves that communicate to you what the likelihood is of any event.

CHAIRMAN MACFARLANE: But you and I have had this discussion before.

DR. GARRICK: Yes, we have.

CHAIRMAN MACFARLANE: We only know what we know, and the problem is what we don't know.

DR. GARRICK: Yes.

CHAIRMAN MACFARLANE: Kevin wanted to jump in.

MR. CROWLEY: Yes, let me take --

CHAIRMAN MACFARLANE: Briefly, because I am running out of my time here.

MR. CROWLEY: Sure. Yes, let me take a swat at your question here.

It is very instructive to look at what happened at Fukushima Daiichi versus the Onagawa plant.

CHAIRMAN MACFARLANE: Versus the?

MR. CROWLEY: The Onagawa plant --

CHAIRMAN MACFARLANE: Onagawa, uh-hum.

MR. CROWLEY: -- which is north.

CHAIRMAN MACFARLANE: Uh-hum.

MR. CROWLEY: They were both operating on essentially the same set of information. And yet, the plant at Onagawa made several upgrades to protect it from tsunamis; whereas, the Fukushima Daiichi plant did not, even though there were opportunities to make some fairly simple changes; for example, making ground-level doors water-tight, perhaps raising elevations of pumps, you know, moving some of the diesel generators to higher elevations. None of that was done as far as we could tell.

CHAIRMAN MACFARLANE: Uh-hum. Okay. Okay. Well, I am out of my time. So, I will stop right now.

On to Commissioner Svinicki.

COMMISSIONER SVINICKI: Well, I add my thanks to all of you for your presentations. They were very interesting, and it is very easy to fall victim to wanting to share some commentary and observations, and not leaving time for questions. So, I will attempt to do both here.

I would like to begin by thanking the Committee members of the NAS Study Committee. Although you didn't throw the slide up on the screen, you do have in your background materials, so I think it will be in the record of this meeting, the listing and affiliations of all of the individuals who served on the Committee. I certainly thank them for their service in doing that.

I have noticed, as you very deftly have handled the

questions of my colleagues, that it is a very precise tasking that the Committee had, and there were certain things that they were not tasked to do. So, you have handled responding to that well.

And, Dr. Neureiter, you said, you know, what we have done is laid out a set of information and observations, and we hope that it is useful. And I, having looked at it, conclude that it is very useful. And I say that because of the fact that it comes along, as you noted, at a time after the accident where there has been some other work and study and investigation done. And I think that, as Dr. Niel said, we will, at least for a decade -- I sometimes say two decades or three decades -- we will continue to learn about the exact sequence of events here and the contributors and the causes.

It is also very helpful for me, when I reflect, that the public gets all these expert reports. And sometimes I wonder what do we expect them to take away from this. And something that I believe is very noteworthy is that, from our Near-Term Task Force, which, as you commented, had a very short period of time to look at these issues, to your report being released very recently, at a high level these diverse groups of experts are identifying that the same fundamental issues are the priority and are the areas that we need to keep looking at.

I also observed from the presentations today that at this point in time we are beginning to pivot away from a nearly-exclusive look at hardware and other mechanical issues and fixes. There has been discussion today about nuclear safety culture. I liked the simple statement that was made of nuclear safety culture is a big issue.

(Laughter.)

And I think it was interesting for me to hear what a vibrant discussion there was behind the scenes amongst the Committee members. And you were very diplomatic in talking about your experiences with the Japanese culture and the society there and the nuclear safety culture.

I maybe am not as diplomatic, but I would observe I have had an opportunity as Commission to visit nuclear facilities around the world. And when I return to the United States, I do not return with a new or significant concern that there is deficient nuclear safety culture in the United States.

So, I am trying to be a little bit diplomatic there, but chief among my worries, upon looking at the United States safety culture versus other countries that I think have bigger challenges in that area, but that in no way means that you become complacent about it. So, I appreciate that the Committee had a vibrant discussion about, that it is a focus.

And also, I want to thank those of the panelists who talked about leadership. There was mention of the Harvard Review article that talked about how leadership shaped differing outcomes at Daiichi and Daini.

I want to note I also found the article very interesting and wanted to note that one of the chief authors was a former NRC staffer who was deployed earliest over to the U.S. Embassy in Tokyo and spent a very, very significant deployment over there. And he is one of the authors of that. So, again, it is one piece of a mosaic about this event, but I thought very interesting.

And it is time, three years after the event, to be looking at these issues like leadership, like safety culture, and the very significant -- now that we have put preliminary regulatory responses in place, I think we have time to turn to the very nuanced and complex issues that were obvious contributors here.

So, that will end my commentary period. One of the real benefits of a panel like this is I can ask panelists to react to other panelists' presentations.

So, one of the perspectives shared in the NAS report is on training. And while I second Commissioner Ostendorff's view that training is important, this is another one of these maybe secondary/tertiary issues that now is the appropriate time to be looking at that very closely.

But there is a perspective here about having a greater emphasis for operators and others on ad-hoc responses, on these events that have a lower probability of being encountered during the career of any given operator.

I had the opportunity this summer to address the summer meeting of the Professional Reactor Operators Society here in the United States, and I have engaged with operators in that forum and other fora about concerns that they have expressed that their training regimes could, are not now but could, if the wrong emphasis is placed, have too much time spent and emphasis on events that have lower probability as opposed to evolutions or incidents that they have a much higher likelihood of experiencing as operators.

So, I wanted to ask those representing operators and,

also, Mr. Lochbaum, who has extensive background on these types of issues, how does one strike the right balance there, and not overreact and tilt the training balance too much?

MR. SCAROLA: I will comment to begin with. In 2010, the industry took on an initiative, following some low-level events in the industry here in the U.S., and we recognized at that time that we had become very rule-based-focused in our training programs. And we started to take on a balance of knowledge-based versus rule-based and bring that pendulum back into the middle.

And this is precisely what the focus was. It is that we found that over time that, while we were very well-trained, we were very well-prepared on those things that we could predict. And we had some events, a fire at one of the plants that put us into some unpredictable space, not rehearsed, where we had a verbatim procedure to follow. And we had challenges in that in the operators not taking an optimum path.

So, that caused us to back up at that point in time and start to pull us back into knowledge-based training and put our operators in conditions that were not specifically guided by the procedures, where they had to depend on their knowledge, understanding of systems, understanding of things like DC logic, and what that might mean to the control circuits in terms of losing power in events. And we continue to work on that. I won't say that that is solved.

But this question of threshold and focus of training, as we move now into these extreme events, that balance is very delicate.

But we think and believe that the proper balance is knowledge versus rule. And we may not have rules for every extreme event, and we won't have, but we will have the knowledge, and our desire here with our actions is to provide equipment to execute that knowledge with.

MR. SENA: And if I may add, I think one of the most important aspects of training that we give to our operators today, and then, who are, thus, examined by the NRC, is the overall integrated plant knowledge, the interfaces between the systems, how they work, how they interface, what can be accomplished, what can't be accomplished.

And I just have my own personal example. Back in 1997, within one month of standing watch, there is a transient at the plant I was working at. I was on shift and we did not have a procedure to handle that transient. And that was a deficiency, mind you. We should have had a procedure, but we didn't.

But, based upon my integrated knowledge, my crew's integrated knowledge, we were able to take all the right actions, right? And when you go back and look and say, well, what were the actions taken, well, the procedure was thus developed based upon what we did. That is because of that integrated plant knowledge.

So, there is going to have to be a balance -- and I mentioned that -- as we train for these beyond-design-basis events. Maintaining that overall operational fundamentals, how does a plant operate, respond, and interface with other pieces of equipment and man/machine interface?

And then, just knowing what actions we have to take

regardless of the event. So, how do we not overcomplicate the training that needs to be done? And that is why I mentioned, you know, a simple hard card.

So, do I want to spend all this time training how to start a 120-volt AC generator or do I want to have that overall integrated plant knowledge to be able to respond, regardless of what that initiating event is? It is going to be a fine analysis.

And I was there with you on what the reactor operator said. I hear their concerns.

COMMISSIONER SVINICKI: Thank you.

David, did you want to share?

MR. LOCHBAUM: Yes, just shortly. I agree with those concerns. That is an important concept.

I think one of the things the NRC could do to help the industry's processes is use its generic communications process to more than just things that happened bad yesterday.

The example that comes to mind, I thought the NRC staff did a real good job of looking at the Columbia Shuttle Report and extracting transferrable lessons. If they would have supplemented that with an Information Notice, a Regulatory Issue Summary, the licensees review that for corporation-applicable lessons into their training programs and other programs. It doesn't necessarily mean you have classroom or simulator training time, but it may be in the lessons learned or things that you read.

So, I think the NRC should broaden its general communications to include some of these lessons learned from the

NAS study, from the Columbia Shuttle study. And other things that are hard lessons need to go out to let the licensees determine whether that falls in their triage to incorporate or not. So, I think there is a missed opportunity there.

COMMISSIONER SVINICKI: Okay, thank you.

Thank you, Chairman.

CHAIRMAN MACFARLANE: Okay. I think Commissioner Magwood as an additional question. So do I.

COMMISSIONER MAGWOOD: Just a very quick question for Mr. Klinger, towards the end of my time period, you kind of nodded when I asked about the interaction states have been having with other utilities in preparing for FLEX. Could you give us some insights as to what is going on and what kind of conversation you have had with your State colleagues?

MR. KLINGER: Well, we have reached out to all the 13 rep counties and talked to them. As far as other states, I really haven't reached out to the other states. I can't really address that.

But I know it is a high priority in our State. It seems like a simple thing. We have this big equipment that is coming in, and what could be difficult about that? But there is a lot of coordination.

And we just went through a CAPSTONE-14 exercise where we simulated a 7.7 seismic event on the New Madrid and a 7.2 on the Wabash Valley. And it is just amazing the devastation and stuff that is created in events like that, in a regional catastrophic event, and the challenges, and communication and transportation and power, and things like that.

So, we look at this as another all-hazards-type event, that we would have some specific strategies to get that equipment in there to take the mitigation activities as soon as possible.

So, real challenges, but not insurmountable, as long as we plan ahead, get those plants up-to-date, and then, train and exercise to those plants.

COMMISSIONER MAGWOOD: Okay. Thank you very much. Thank you for highlighting that. It is an important issue.

Thank you, Chairman.

CHAIRMAN MACFARLANE: Great. Thanks.

I have a question for Dr. Niel. I want to understand a little better what the reactors in France have done so far in terms of implementation of lessons learned. And I know you gave us a timeline, but I would like to know if they have taken actions already.

DR. NIEL: Good. So, at the present time there have been actions regarding the seismic situation of plants.

CHAIRMAN MACFARLANE: Uh-hum.

DR. NIEL: But for design, there has been the addition of this, we call them "mini-diesel". They are anticipating the real reinforced diesels that should come between 2015 and 2018.

Regarding pools, there has been reinforcement of the measures on the situation of pools level where temporary transformed declassification.

We were asked to reinforce the existing emergency center on the site, anticipating the bunkerized one which will come in the future, before 2018.

And last, the last big measure is the rapid emergency force, which is located on four sites. In fact, one, you know, French reactors are quite similar, but they can be classified in more or less four families. Okay?

CHAIRMAN MACFARLANE: Uh-hum.

DR. NIEL: And so, there is one team of this Rapid Force on four sites, and they are ready to intervene. Now on all sites to date at least with one reactor and at the end of the year it would be for four reactors, and in 2016, for six reactors, at the same time you have a problem on six reactors. And you have one site like this in France in a place called Gravelines.

So, there are the situations, the modification are already in place. And at the same time, we have discussion and we gave already some authorization to EDF to proceed on some components. For example, the ultimate diesel, EDF has launched the permit, okay, to buy them after we have agreed on the requirements, because this diesel must withstand a high level, they must have a high protection level, much more than the existing one on site. We have already two diesels by reactors. This third one would be upgraded in resistance to external events.

CHAIRMAN MACFARLANE: Uh-hum.

DR. NIEL: Okay?

CHAIRMAN MACFARLANE: Okay.

DR. NIEL: So, it is a broad view.

CHAIRMAN MACFARLANE: Great. Thank you very much.

Commissioner Svinicki?

COMMISSIONER SVINICKI: I seek one clarification also from Dr. Niel. On your slide 9 you describe the Nuclear Rapid Response Force and indicate that, in less than 24 hours, they must be able to -- and this is the language of the slide -- "take over from the personnel of the site affected by an accident".

And I don't know if I misunderstand, but is this to take over the operation of the plant and the response to the events; in other words, to take control from those at the site?

DR. NIEL: I suppose at the same time going to control with a team operating, but also to bring materials, mobile materials, to help, to massage the situation. Twenty-four hours is, indeed, the requirement. In fact, EDF expects to be operational in 12 hours, but it is not our requirements. It is their own organization. Okay? Indeed, it is 24 hours. After, they have been triggered. Okay? There might be an action of the site saying, "We need this force," and then, the requirement is this one.

COMMISSIONER SVINICKI: I think what I am reacting to is the phrase "take over from the personnel of the site". And if I understand that correctly, it would be a key departure from the U.S. We would leave the operator of the site in control of responding to the event, and we would not have an outside group come in and take over the response of the unfolding accident or event.

And so, is this that these individuals will take control and decide what the response actions are from those who are currently managing the event?

DR. NIEL: There are two modes which will be decided in action. One mode is to be ready to help, and the other mode is take the lead. Okay? And it will be a choice during the course of the actions.

Up to now, the objective of all the number of people is about 350 people. It is a point you are looking for carefully because EDF wanted skilled people. So, they are taken from an operating team. Okay? And every day it is --

COMMISSIONER SVINICKI: So, they are knowledgeable of the operation?

DR. NIEL: Yes, and they shoot to replace them. Okay? So, we are looking at this to be sure that the fact we create this Force and take skilled people out of the system doesn't make the system weaker. Okay?

COMMISSIONER SVINICKI: Okay. Thank you.

CHAIRMAN MACFARLANE: Okay, well, I think we have reached the end of our questions right now.

I thank you all again for joining us this morning and for your presentations and the discussion. I think it was very helpful. I will call for a short break while our staff panel get ready. So thank you very much.

(Whereupon, the foregoing matter went off the record at 11:24 a.m. and went back on the record at 11:34 a.m.)

CHAIRMAN MACFARLANE: Okay. So now we are going to hear from the NRC staff. I will turn things over to Mike Johnson, who's the deputy executive director for Reactor and

Preparedness Programs, and the lead on the Fukushima Steering Committee.

MR. JOHNSON: Thank you, Chairman. Good morning, Chairman and Commissioners, and I wanted to start with adding the staff's congratulations, first of all, Commissioner Magwood, for your birthday. I didn't realize. Happy birthday, and we're not going to sing, as we decided. But we also did want to thank you for your service and your leadership at your time on the Commission. So I wanted to just start with that note.

Of course today, we're going to provide an update on the status of the actions taken by the NRC and licensees in response to the accident at Fukushima Daiichi nuclear power plant in March of 2011.

Before I go to my slides, though, I did want to note that there is another noteworthy event today, and it is that today is actually Dave Skeen's last presentation for the Commission, as a member of the Japan Lessons Learned directorate or now division, and a key leader in our response on that activity.

Of course probably Dave, more than anyone else, is the face behind or the face that is recognized when you think about the NRC's response on all things Fukushima. So Dave's going to go on and continue to do great things elsewhere in the agency. But we certainly are going to miss him as a part of our efforts and the leadership role, and this will be the last time hopefully you see him on our panel in these activities.

First slide, please. It's been almost three and half

years since the accident, and I want to just touch on a couple of themes that Chairman, I think you started with, certainly you heard in the first panel, and they are first and foremost that the NRC and licensees have in fact taken real action, and those real actions have resulted in significant safety improvements at the plant.

As members of the first panel indicated, we're well into implementation on many of the Tier 1 activities. I will be providing the staff's perspectives with respect to where we are on those individual activities. We think that's important.

A second theme is of course there is more to do. So it's important. We'll say this a number of times probably that we, throughout our presentation, that we remain focused, in order to make sure that we complete the work that we've started.

The slide that I'm talking to actually has a number of pictures that sort of depict activities that are ongoing in various areas. On the left, there are pictures of mitigating strategies equipment that you've seen, a facility up top, and then at the Industry's response center.

In the center of that picture is a flood door that actually prevents migration of flood water to facility, and then on the right side of that picture is a drawing of a spent fuel pool, level instrumentation. Of course, those activities are ongoing and also at the bottom seismic analysis work that is going on, again all depicting work that is underway and going very well.

Next slide, please. Early in our efforts, as a part of the Steering Committee, we established principles to guide what we did,

our approach to lessons learned as a Steering Committee and as a part of the Japan Lessons Learned Directorate, and we've lived with those as we've gone. They've shaped our activities.

First and foremost, we didn't want to distract NRC or licensees from their focus on operational safety and security. We think that's important. Also, we wanted to make sure that we don't displace other high priority work, recognizing Fukushima enhancements are important, but they're not the only thing that is important.

We also wanted to be disciplined in all of our activities, including screening additional activities, including establishing a sound basis for decisions that we've made and continue to make, and making sure that we do things right the first time. Those principles that we established then that guided us will continue to guide us as we go forward.

Since our last Commission meeting, I had the pleasure of leading a team to go to Japan with Cindy and all of the regional administrators, with the office directors in the Offices of Nuclear Reactor Regulation, Nuclear Security and Incident Response, New Reactors, along with Dave Skeen, along with Scott Flanders, who is in the audience.

It gave us an opportunity to provide -- to obtain insights, firsthand insights regarding what happened, to provide greater context to the work that we are doing. That trip left us with several overarching themes, if you will. First, we do want to make sure that the industry and the NRC continue to prepare for the unexpected. That was discussed on the earlier panel.

We want to ensure that licensees have a deep understanding of their facilities, and certainly that the NRC and that the industry has sufficient technical expertise. Finally, we came back with a redoubled sense of the need to make sure that those things that we implement are maintained and continue to be effective, as they relate to the lessons learned.

So like the principles on the slide, those themes continue to guide us, and we'll carry those going forward. So now I'd like to stop and turn it over to Jennifer. Jennifer will discuss the high level status of the Japan Lessons Learned activities. Jennifer.

MS. UHLE: Thanks, Mike. Good morning. My name's Jennifer Uhle. I'm the deputy director of the Office of Nuclear Reactor Regulation, and as Mike indicated, I'll be providing a high level of the significant progress that we've made, but I'll also talk about some organizational changes that we've made in the Office of Nuclear Reactor Regulation, to improve our operational efficiency.

Before I get into the details of my discussion, though, I'd like to do some introductions for the team at the table. To my far left is Jack Davis. He's the deputy director of the Japan Lessons Learned Division, and he'll be focusing his talk on providing an update to the three orders that we issued back in March 2012.

Dave Skeen, who's the director of the Division of the Japan Lessons Learned Division will then update you on the actions in the area of seismic and flooding, discuss the status of the rulemaking efforts underway, the status of the Tier 2 and 3 activities, and our involvement with our international partners.

Cindy Pederson, to my right, is the regional administrator for Region III, and she will discuss inspection issues and our further plans. So next slide, please. That's Slide 5.

So significant progress has been made. We will continue to work to provide additional safety enhancements at the sites by the end of 2016, although some of our activities are going to extend beyond that time frame, and that's in large part due to the time needed to perform the detailed technical analyses to support the technical basis for our activities, and on the licensee's part the time to perform design and construction work at the site.

So the activities that will extend beyond 2016 include the completion of the flooding and the seismic reevaluation, and completion and implementation of the rulemaking.

So next slide. So to give some specifics here about the progress, the staff has completed 63 interim staff evaluations for the mitigating strategies order, seismic and flooding walkdowns to identify vulnerabilities or deficiencies at the site have been completed.

Any issues identified were put into the licensees' corrective action programs and many of those corrective actions have been implemented. We have completed activities associated with the near-term Task Force Recommendation 1, which was associated with potential changes to the regulatory framework. The staff has completed an assessment of the expedited transfer of spent fuel from wet to dry storage.

As we've made this progress, we've taken opportunities to adjust our approach, to provide in some instances for a

more integrated and earlier implementation of action. So a perfect example of that would be the implementation of the mitigating strategies order.

As many of you are aware, the Near Term Task Force Recommendation 4.2, which the mitigating strategy order was modeled to implement, the Recommendation 4.2 was focused primarily on ensuring that the B.5.b equipment or that equipment mandated under 10 C.F.R. 50.54(hh) was protected against the effects of external events, and also that there's adequate equipment to be able to respond to multi-unit events.

So in implementing the recommendation for the mitigating strategies order, we took the opportunity to add additional requirements, including equipment and strategies needed to protect the plant against extended station blackout. We also implemented major parts of the spent fuel pool makeup and spray capability, which was a Tier 2 activity, so we did that earlier.

We also implemented major parts of the recommendation concerning emergency preparedness training, exercises and equipment, which is also a Tier 2 activity. So including these additional requirements results in more holistic strategies, and has led to additional safety measures being implemented much earlier.

The staff has also looked to capitalize on opportunities to deliver early safety benefits when the activities that we were focused on, we needed time to develop the technical justification to support them. An example would be the expedited transfer, I'm sorry, expedited approach used for the seismic hazard reevaluation work.

We use the word "expedited" too many times, I think.

But nonetheless, in the expedited hazard, expedited approach for the seismic hazard reevaluation, there is going to be -- these activities are going beyond the 2016 time frame. So an expedited approach is being used to augment the robustness of the licensees' sites, to the hazard that's beyond their design basis, while they're completing their activities in the seismic PRAs, that will then define what their new hazard will have to be.

So as -- next slide -- as we reflected back on our progress to date, we did identify a means to enhance our efficiency and effectiveness by standing up a new division, that is the division of the Japanese Lessons Learned. This was done primarily to enhance our ability to accommodate addition work surges that occur. It allows us to have a more flexible structure.

When we do have these additional work surges in specific technical areas, we matrix out to the other organizations in NRC, that is, New Reactors, who's got the lead for the seismic and the flooding reevaluations and walkdowns, and then also to the Office of Research for their technical capabilities dealing with severe accidents.

We've also organized this new division so that we have sufficient management oversight to support the activities, and also to handle all the communication that does occur. That is a big part of what we do, communication to the Commission, to the other offices here internal to the agency, as well as communication to all our external partners.

So we've essentially merged two directorates, the

Mitigating Strategies Directorate and the Lessons Learned Directorate, the Japanese Lessons Learned Directorate, and we've added additional project management resources. The division, again, is staffed to handle the day-to-day workloads, and we will matrix out to the other organizations as we need to.

So next slide. So this slide provides more details. It's a graphical snapshot of the progress that we've made on the orders. We've completed regulatory action on the orders, and licensee actions are well underway as you can see on the slide. Specifically, for the mitigating strategies and the spent fuel pool instrumentation orders, licensees have been obtaining equipment and making any necessary modifications to their facilities.

Relative to the vent order, licensees have submitted their design plans and at NRC we've begun our review. The staff has been and will continue to provide strong oversight of these activities through both our technical reviews and audits that occur at the sites. We have also made progress on initiating these orders into our inspection plans.

Next slide. So as my final slide, this is the progress of the other Tier 1 activities, aside from the orders. Of particular note is that we have completed the seismic and flooding walkdown and the emergency response data system modernization initiative.

We're making good progress on the other activities, such as the reevaluation and seismic and flooding reevaluations, and the combined station blackout mitigating strategies rulemaking.

So my presentation provided just a brief overview.

You don't get a lot of details from my slides. However, the next speakers will get into those gory details, and so as this stage, I'll turn it over to Jack Davis, who will start with some details about the Tier 1 orders.

MR. DAVIS: Thanks Jennifer, and good morning to the Commission. I'll start with the mitigation strategy order, the slide on that one. With regard to mitigation strategies, progress continues on schedule. As you know, we issued interim staff evaluations in February of this year, and that was for all of the sites.

These evaluations give licensees and the public assurance that licensees are on a success path to meeting the order compliance state, if it's implemented as described. That's the -- those are the key words there.

The sites have been procuring equipment. They've been making modifications, and again, these are in line with the integrated schedules that they have and the overall integrated plans, and this is in compliance with Order EA-12-049.

As licensees complete their activities, we continue to review their progress, through both an ongoing e-portal type of audit, as well as an on-site portion of an audit. So that's another key point I think that's important here. It's an ongoing effort. Just because we issued the ISEs in February of this year does not mean that that was the end point. It continues.

Typically, the onsite audits are going to be conducted two to six months prior to the first unit at a site being in compliance, and then with those audits, we will look at the open and confirmatory items

that we've identified as part of the interim staff evaluations and attempt to close those particular things out.

Again, if they've implemented as described, and that the analyses and calculations have come out as we would anticipate. Ultimately, final safety evaluations will be issued after all the units at a site are in compliance. Watts Bar will be the first site that will come into compliance, and their safety evaluation is planned for later this fall.

Then subsequent safety evaluations going forward are scheduled for issuance starting in spring of next year.

Industry has also chosen to establish and maintain two geographically diverse response centers, as you know, for housing the portable emergency equipment to meet Phase III of the order. That part of the order requires that they obtain sufficient offsite resources to sustain core cooling, spent fuel pool cooling and containment integrity indefinitely. Those are the words of the order.

The staff is actively engaged in looking at that regional response center capabilities, to see if it does actually meet Phase III of the order. We've had a public meeting this past May. We've talked to them about expectations about what type of documentation we need and what kind of evidence that we would need, to say that those are actually operational.

Recently, we participated in two proof of concept exercises, where we observed them, look at both a truck transport and an air transport scenario, to see how that went. Our plan is to document our findings, our conclusions in a report that we'll be issuing later on this fall on whether we believe it could actually meet the Phase

III order requirements.

Next slide, please. With regard to the spent fuel pool instrumentation order, initially both this order and the mitigation strategy order were on a parallel but separate path. We've since combined both of those reviews into one to gain efficiencies, both of process and resources, of both NRC and the licensees.

As you heard the previous panel talk about, there's a lot of things on their plate, and we're trying to do this in the most efficient manner possible. Also as part of that more efficient approach, after we merge them, we instituted the audit process that we were conducting for mitigation strategies, for the spent fuel pool instrumentation order.

We went out to look at the three vendors that are providing these pieces of equipment. It's Westinghouse, AREVA and MOHR, and after we've audited them, we are in the process right now of developing those audit reports and we expect those to be out by the end of August.

Licensees. It's important to note that licensees are on track to meet the original order compliance dates, and again staff will document our review as part of the overall mitigation strategies safety evaluation reports.

Next slide, please. With regard to Order 109 on severe accident capable hardened vent, Phase I of the hardened vent order, as you know, established the requirement to have a reliable means for their wet well vent. It's following a similar process that we're using again for both the other two orders.

Licensees have submitted their overall integrated

plans this past June, and staff has started into those reviews. The first set of plants that will have a compliance outage date of fall of 2016, we will issue those, our interim staff evaluation for those at the end of this year, and then the remaining plants are integrated, excuse me, our interim staff evaluations will be issued by June 30th of next year.

For Phase II of the order, which deals with the drywell venting, requires licensees either to install a severe accident capable drywell venting system, or develop and implement some type of strategy that would make it unlikely that you would need that. We're on schedule for that as well.

Industry has recently, I guess I would say, proposed that compliance for Phase II of the order should first focus on water in addition to water management, that would help them further or better define the design parameters for the drywell vent if they were to need one, and it also provides safety benefits sooner.

So we have been in discussions previously with them on this in the last month. There's more discussions in August that are going to take place. We certainly recognized the safety benefit of water, additional water management. We just need to make sure that we're doing the right thing and that we're meeting the order.

Next slide, please. We've been reviewing and considering for some time now on how best to capture the long-term regulatory treatment of the orders. This is to ensure the durability and establish an appropriate regulatory process for change management, particularly while still recognizing the beyond design basis nature of the events we're talking about and extreme natural phenomena.

Certainly, the rulemaking effort will codify all this. But we still need a licensing basis process that's durable and looks at how you deal with changes and modifications going forward, because there likely would be, as the years go by. Likewise, staff is also redoing and considering how to execute a long-term oversight process for these activities.

Certainly, short-term compliance verification is going to be accomplished through inspections under a Temporary Instruction. You are going to hear Cindy Pederson give you a lot more details about that later in this presentation.

But with regard to the overall long-term approach, there's two aspects to it. One is the mechanism of oversight. That is, what's the regulatory process, what would the frequency be, how would we accomplish that, and then the other piece of it is what do you if you have any findings? How do you disposition those findings? And again, understanding that in the context of it's a beyond design basis type of event, the nature of the redundancy of the equipment, the redundancy of the strategies, and then there is a further nuance to it, and that's to understand that there's a difference between the onsite portion and what we do in an oversight capacity, and then what we do with the regional response centers or the national response centers, as they're called now.

There's a difference between those, and we need to look at that carefully and recognize that there may be a different approach, rightfully so, for an oversight of that particular entity versus the onsite portion.

No matter what, whatever approach we take, at the end of the day, what are we trying to do? We're trying to ensure that these strategies, that the equipment, the people, the training, it's there when you need it, if you ever need it. That's the bottom line. With that, I'm going to turn it over to Dave, and he's going to continue to tell you about other Tier 1 activities.

MR. SKEEN: Well thanks Jack, and good morning Commissioners and Chairman Macfarlane. As always, it's a pleasure to come and brief you on the progress that we're making on the Lessons Learned. While this will be the last time I do this, I'm sure our paths will cross on other issues, as I go into other things.

Even Commissioner Magwood, moving on to NEA. Since I'm moving on to the International Programs side, our paths may cross as well. So -- for my portion of what we're going to talk about today, Jack's described the orders pretty well. We're going to talk a little bit more about the other additional Tier 1 activities that are ongoing right now.

So I'm not going to into detail on this slide, but I will talk about each of these things in the subsequent slide. So next slide, please.

We'll start with the seismic hazard reevaluations, and as you may recall, because we had updated information from the U.S. Geological Survey on the seismic hazards in the Central and Eastern portions of the United States, the seismic hazard reevaluations were split into two groups: the plants that were in that area of the country and then the plants that were in the western part of the U.S.

So the staff received the central and eastern U.S. seismic reevaluation reports from our licensees in March of 2014. The majority of those reevaluated hazards did align with our independently calculated estimates that the staff had performed.

However, for those sites that differed from our estimates, we've held several public meetings to talk about what our differences are, and to understand maybe where we need to revise either licensee estimates or our estimates.

These meetings have been very effective in identifying the information needs and reducing the differences between the two sides. So those have been very helpful. So now by September of this year, we hope to have an understanding that we can -- of any of the remaining issues that we don't resolve, that we can ask RAIs, requests for additional information, by the fall, and then so we can get final resolution on the areas that are outstanding.

Then after completing the technical reviews, we'll issue staff assessments on the hazards reevaluations some time beginning in May of next year, and that will probably go out to the end of August by the time we get all the plants done. That is being done to support the licensees' ongoing reviews, if they have to move into the seismic PRAs or the high frequency evaluation pieces for the seismic issues.

So currently, we're developing a template that the licensees can use to submit their evaluation of a set of key plant systems or components, that can maintain the reactor in a safe shutdown condition, even if they have a larger earthquake than what they were designed to.

We call this the expedited seismic approach, and it's intended to provide the confidence that a plant that maybe would have at least one way to cope with this larger earthquake, while they do the longer-term evaluations that they need to do with the seismic PRA or what have you.

So the licensees right now are scheduled to submit their plan for the expedited approach by the end of this year, and then if modifications to these systems are necessary, they would be making those between the end of 2014 and 2016, with the one caveat that if there's something that needs an outage to implement, some of the modifications, that may go out to one outage past end the 2016 to implement that.

Then similarly, the western U.S. plants will have to deal with the same kind of issue. They're just on a track that is a little further out, because they didn't have the advantage of having the information, and they had to go develop that seismic information on their own. So we should be getting their reports in March of 2015.

Next slide. For the flooding hazards reevaluations, you may remember that we broke those up into three separate groups, about a third of the plants in each group, and we called that Category 1, 2 and 3. They were to provide those in March of 2013, then March of 2014 and March of 2015. So we're in the middle of that process right now.

So the first assessments on the Category 1 plants or the first year plants, we've been working through those, and we've issued the first one, and we plan to have the bulk of those issued by the

end of October of this year, for most of the Category 1 plants.

As far as Category 2, 11 of the Category 2 plants submitted a request for an extension to their schedule, to provide their flood hazard reevaluation reports to us. That was based mainly on issues with upstream dams. Because we brought up the issue of upstream dam failures, and the new analysis had to be performed on what is the impact of a dam failure on the watershed or the river or the reservoir, wherever the plant is located.

That's going to take a little more time to get those done. So we have that in process right now, and those are being done by the U.S. Army Corps of Engineers or TVA, of course, is doing theirs or I think one or two licensees are doing their own analysis. But those are very complicated analyses that have to be done, and they're working on those now.

Then currently, we're looking at the interim actions that licensees have provided us, where they have done their reevaluated flood hazards and they may exceed their current design basis. So we're looking through those, and then we'll document the findings on that, to assure that the interim actions they have in place are adequate.

So next slide, please. To touch just briefly on the rulemakings that are ongoing, I'll start with the combined rulemaking, and we appreciate the Commission did approve the staff's request to combine both the station blackout and mitigating strategies rule with the severe accident management guidelines rulemaking that we were working on.

So I think that's going to be helpful and it has some

efficiencies there. That also picks up a part of the emergency response capabilities issues, and in particular, things like the planning for the multi-unit events and a prolonged station blackout, such as doing personnel and staffing, dose assessment capabilities, protective equipment, command and control structure, radiation monitoring and even public education.

All this feeds into the rulemaking that we're working on now. So I think that's -- when that gets done, that will be a good benefit to the lessons learned.

So right now the plan is to have the proposed rule to the Commission by December of this year, in 2014, and then of course the final rule is still on schedule to be done by the end of 2016. So I think that will be a great benefit.

Moving to the filtration strategies and confinement order, we've been engaging with the industry and the public to develop the regulatory basis for that rulemaking, sorry, and that would prescribe some performance-based requirements to prevent the release of significant amounts of radioactive material from containment after a severe accident sequence, and this is for the boiling water reactors that have Mark I and Mark II containments. So there was an extension request that we submitted to the Commission, and if that gets approved, the draft reg basis is on schedule to be completed in December of this year, with the final reg basis would be done by September of 2015.

The proposed rule would come to the Commission then in December of next year, and the final rule would be due to the

Commission in March of 2017. That's the current schedule that we hope that the Commission approves for that.

Next slide, please. So I want to touch just briefly on the other tiers, the Tier 2 and Tier 3 activities, and I guess if you recall, the Tier 2 recommendations that we put out were those that we couldn't initiate at the time of the -- when we came up with the lessons learned, because of things like it needed further technical assessment or alignment or perhaps they were dependent on some of the Tier 1 issues, or just the availability of the critical skill sets.

The folks that we had were working on the Tier 1 activities that we thought were very significant and important. So we had to move these down to the Tier 2's. I guess the good news to talk to you about on that is that as part of our Tier 1 efforts, we've moved several of the Tier 2 activities up into Tier 1.

The enhanced spent fuel makeup capability and enhanced emergency preparedness were both added to the emergency -- the mitigating strategies order. So those are being addressed in that and in the subsequent rulemaking.

In addition, the licensees have already established the multi-unit dose assessment capabilities, and they sent us a letter to that effect, and we'll be going out to inspect, to make sure that they have that capability in place at their plants.

As far as the reevaluation of the other external hazards, part of that is being addressed through our mitigating strategies effort. Not only are we looking at seismic and flooding events, but it's also taking into account temperature extremes, whether

it be extreme heat or extreme cold or icing conditions that could cause a problem, or even high winds or missiles, tornado-driven or hurricane-driven missiles.

So several of the other external hazards are being addressed as part of our mitigating strategies. At the end of this process, of course, we'll look to see what other types of external hazards should we be looking into, and we'll pick those up as we get the resources, as we finish up some of the Tier 1 activities.

So with that, let's go to the next slide, please. As far as the Tier 3 activities go, I'm not going to touch on those, talk about those in great length. You know, the Tier 3's were those that either again, similar to Tier 2 activities, they were going to need the resolution of the Tier 1's or the insights that we get from the Tier 1 activities, before we could take those up, or perhaps they needed research.

There's some forms of research that have to be done, or we're waiting on studies, either on other studies, maybe international studies or Japan is doing some work or even other federal agencies or other bodies. So those are going to take some time to deal with.

The only ones I would mention out of the Tier 3, there would be two that I'd bring up for you today, would be of course the expedited transfer of spent fuel. We moved that up and treated that as a Tier 1 activity, so that it would inform the Commission as they were looking to the waste confidence issues. So we have given that to the Commission and you've already disposed of that one, and gave us the response back on that.

The other one I would mention is the issue of hydrogen

control, because it gets a lot of interest. A lot of people talk about that and why is that maybe not a Tier 1 activity. I guess I would tell you that we thought about this early on, and there were many Steering Committee meetings where we had discussions, when we were trying to come up with the prioritization of how we were going to do all the different issues.

One of those was should hydrogen control be a stand-alone issue? At the time, because we were developing the Tier 1 orders and the requests for information and other things, the Steering Committee decided that well, there may be hydrogen control issues that need to be looked at, but we're addressing several of those already in some of the Tier 1 activities.

So let's go forward and get those done, and then see what else might need to be done. So you know, of course the mitigating strategies order, the thing there is if I protect the containment, protect the core and keep it cool, then there's less likelihood of over-pressurizing the containment in the first place and having the hydrogen release.

The severe accident capable vents that we're installing now is another way to ensure that you could depressurize the reactor, so that you don't have an overpressure condition. The reason we thought of it that way was when you look back at what happened at Fukushima, they believe and we believe right now that Unit 1 exploded because they stretched the drywell head bolts because of the overpressure condition, and hydrogen got into the upper part of the reactor building and caused the explosion.

If you look at Units 3 -- well 4 wasn't operating at the time. But if you look at Unit 3, that explosion happened even lower in the reactor building, not just up on the refueling floor and above. So there is some thought currently that maybe some of the penetration seals had leaked because of the overpressure condition, and hydrogen had got out through some of the seals that caused hydrogen to collect in a lower area of the plant.

So again, if we can prevent the overpressure condition, of course, that's the best thing to control the hydrogen. Then the other thing I would say in the mitigating strategies order, as far as looking at the hydrogen control, for the smaller PWR containments, the ice condenser plants, as well as the Mark III BWRs, part of the mitigating strategies order is having them repower the hydrogen igniters with power after you have a loss of power, if you have this complete loss of power.

So again, there's another area where we're addressing some of the hydrogen control issues. So again, that was the thought we had, and that's why it stands as a Tier 3 activity right now. Not that we won't look at it, but we want to get some of these other things implemented first, and then we'll fall back on that.

So with that, I'll go to the last -- my last slide, about consistency with the international community. Again, we've worked diligently with our international counterparts ever since the event happened in Japan, not only with the Japanese but other international counterparts, either in bilateral discussions or multilateral interactions that we've had.

Certainly, we want to thank the ASN for coming today and their involvement in this meeting, for sharing their progress with us. We have a very good relationship with our French counterpart, and we've interacted with them as well as the other EU countries, to understand their stress tests and how they were performed and how they've implemented those in several of the countries in Europe.

I believe that overall, our activities here at the NRC are consistent with those being conducted in Europe as well as the other countries that have nuclear power programs. For instance, we have a very active role in the Convention on Nuclear Safety, and of course you know there's a diplomatic conference coming up to talk about potential changes to the convention itself that we're involved in.

Even with the Nuclear Energy Agency, as far as if you think about through international research activities that we're involved in with the Committee on the Safety of Nuclear Installations, as well as we were part of the working group at the Committee on Nuclear Regulatory Activities, that did a lessons learned activity with the Fukushima activity.

So you know, we are involved internationally. I guess I think it's important to note that we believe that all the high priority lessons learned that are being addressed in the international community are consistent with where we are in the Tier 1 activities that are currently being implemented in here.

While the approaches that different countries take may be different on the lessons learned, we think that we've identified the same things, and we expect to get the same outcome of the initiatives

that we have underway, that would result in a similar benefit to reactor safety worldwide. So with that, I'll turn it over to Cindy, and she'll talk to us about the inspections.

MS. PEDERSON: Good afternoon Chairman, Commissioners. As you know, the regions play a key role in the follow-up to the post-Fukushima actions. Our inspectors are the agency's eyes and ears for verifying plant safety and plant readiness. We have been and we will continue to do inspections in these areas, including those for the new requirements to come.

This boots on the ground oversight is important to ensuring that the licensees meet our regulatory requirements, and to maintain their plant readiness. Regional involvement also facilitates our effective and efficient communication with our stakeholders. We often are the first ones that they seek out to get updates on plant improvements and plant status.

Our continued involvement in post-Fukushima oversight allows us to provide this timely, up to date information to these stakeholders. Since March 2011, our inspectors have completed four different Temporary Instruction inspections. These are on immediate response to the accident, severe accident management guidelines, flooding walkdowns and seismic walkdowns.

In addition, there is one in progress regarding interim actions, relationship to flooding reevaluations. I'd highlight one of those Temporary Instructions, and that's the flooding walkdown instruction. We identified a number of significant findings from that particular Temporary Instruction, which I will highlight in a minute.

The photos on the first slide that I have, I did just want to take a moment to point out, these are pictures of our inspectors out in the field doing their safety-focused work. At the lower left, you'll see one of our inspectors, Karla Stoedter, who's examining a Prairie Island diesel generator, obviously one of the pieces of equipment that must maintain its operability in these external event environments.

In the photo in the right is Paul Zurawski, actually measuring one of the flood barriers that is newly-installed at the Monticello plant. These are examples of direct eyes-on inspection.

Next slide, please. A number of additional inspections have been completed at all of the operating sites. At most, the results resulted in compliance or findings of lower safety significance or green. However, there were some notable examples to the contrary. I'd like to highlight several flooding issues that clearly show the value added by our inspectors.

These findings are based on current licensing basis and not on the reanalyzed flood levels. I'll also note I won't be talking about the complete list of findings. On the left in the photos, you will see before and after photos of flood barriers at Point Beach.

Here, NRC inspectors identified that the licensee failed to have adequate procedures to prescribe how to protect safety-related equipment in the turbine building and circulating water building. These procedures did not appropriately prescribe the installation of barriers, so that the gaps that you see on the top left were eliminated, and did not provide for equipment to put barriers in front of things such as doors. This finding was categorized as low to moderate safety significance or

white.

Of particular note at Point Beach, when we did the supplemental inspection earlier in this year to follow up on that white finding, the inspectors identified that the licensees' corrective actions introduced unrecognized hazards, creating a new problem.

The barriers that were installed to prevent the problem that you see in that photograph actually created a new problem, which blocked natural drainage paths credited for flood relief, and rendered those paths non-functional.

In other words, the licensee created a new problem by trying to address the first problem, an example of losing the big picture oversight of flooding strategies.

The photos on the right are at Monticello, where the NRC inspectors identified the licensee could not implement their strategy within the 12 days credited in their design basis. The procedures directed that the site build a ring levy similar to what you see in those photos, should a flood be expected.

Now as determined by our inspectors, that overall process of flood preparations would actually take more on the order of 26 days, significantly beyond the 12 days in their design basis. In addition, the viability of their mitigative strategies was hindered by the lack of detailed procedures and the lack of pre-staged equipment.

This finding was characterized as yellow, an issue of substantial safety significance. The photos that you do see up there are the flood walls that they were installing, such that if they do experience a flood, they won't have to install them at that point.

Next slide, please. Photos on the left are before and after photos at Ginna, where NRC inspectors identified that the licensee did not identify the need to seal certain cable penetrations during a change to their probable maximum flood height, or implement thorough corrective actions in a timely way, when inspectors identified problems with the rigor of the licensee's reviews.

This could have resulted in the loss of key electrical equipment and a station blackout due to inadequate drainage capacity or poorly sealed cable penetrations. This resulted also in a white finding, a finding of low to moderate safety significance.

Upper right is Watts Bar, and you see an example there of a flood barrier that was installed as corrective actions in Unit 1, where NRC identified that the licensee was not able to implement their flooding strategy, especially in the short time frames necessary for essential raw cooling water pump room.

The licensee was able to demonstrate timely implementation of its abnormal instructions, to reconfigure and realign for flood mitigation. The current design basis was to be 27 hours; however, demonstrations showed on the order of 39 hours. This issue was also categorized as yellow, an issue of substantial safety significance.

In the lower right is a photograph at Sequoyah of degraded conduit seals. Here, the NRC inspector has identified inadequate sealing of penetrations into the essential raw cooling water building.

Flooding of this building would have resulted in

submerging of service water equipment relied on during the design basis event, which would have compromised the functionality of the diesel generators. This was also categorized as white, a finding of low to moderate safety significance.

The licensees that I have discussed have taken actions to correct these deficiencies, and I also will note that these and other examples have been shared through our operating experience communications.

Next slide, please. As you can see, the additional inspections since the Fukushima accident have enhanced safety by identifying multiple significant findings. In the future, regional and resident inspectors will continue to be in the field to follow up on the orders that are in progress, and as you heard earlier, those will be completed after the safety evaluations are issued by NRR.

The inspections will be completed using a new Temporary Instruction. The areas to be inspected include mitigating strategies, spent fuel pool instrumentation, emergency staffing and communications. In the future, severe hardened capable vents will be added.

This Temporary Instruction has been drafted and has been recently discussed at a public meeting on July 2nd. Training of our inspectors is planned for early 2015, with those inspections planned to be completed by June of 2019. The exception to that time line is Watts Bar, which has the earlier compliance date for the post-Fukushima orders, and that will receive its inspection yet this fall.

That Temporary Instruction will be used as a pilot

there. We will then incorporate lessons learned from that while we proceed with the rest of the fleet, which will be targeted for next summer. Also some licensees are currently doing modifications to the plant to prepare for full implementation of the post-Fukushima orders.

Therefore, as part of our baseline inspections, we were taking opportunities to inspect modifications that could have an impact on current safety systems. And as always, we are looking for ways to be more efficient. In this regard, NRR and the regions are working together to use our inspection resources as wisely as possible.

We'll be looking for opportunities to substitute order-related inspections for baseline inspection requirements, in areas that are similar to the Temporary Instruction. For example, inspectors will be able to use the new Temporary Instruction for required baseline samples in areas such as flooding and adverse weather protection.

Also looking several years down the road, the regions will be working with NRR to identify what aspects of the order should be incorporated into our ongoing baseline inspection program. At this time, I'd like to turn it back to Mike.

MR. JOHNSON: Thanks, Cindy. I want to just acknowledge that we're a little bit over time. So for the sake of time, I'm going to skip past the last two slides, which would have done two things.

One is to thank the academies for their effort, to acknowledge that effort and to commit that we will do a detailed review of that effort. We've not yet done that but we will, and we'll consider that in terms of as we move forward, things that we might do in addition

to what we're already planning.

Then the last is a summary slide that reemphasizes the points that we've made in the presentation. So with that, that ends the staff's presentation. We're ready to take your questions.

CHAIRMAN MACFARLANE: Great. Thank you very much. I'm going to turn it over to Commissioner Magwood.

COMMISSIONER MAGWOOD: Thank you, Chairman, and thank all of you for your presentations today, and more importantly for all the work that's been going on for the last three years. I appreciate it. The relatively detailed overview you were able to give this morning, to give anyone listening a pretty clear impression that there's been an awful lot of work that's been going on in the last few years.

And quite successful work, I think, which has enhanced safety significantly and given plants a lot more resilience against extreme events. I do look forward to, I suppose, put it that way -- we the Commission look forward to, you know, your views on the National Academy report. I think the report has some interesting aspects.

I don't agree with absolutely everything that's in the report, but I think in the aggregate, it's a very, very good piece of work, and there is certainly a lot to talk about. I'm going to use most of my time to give you a chance to respond to a few things.

One, an item that the Academy did bring up, and I'm just curious to see if you had any thoughts about this initially, is this issue of the digital, the logic affected the operation of the isolation

condensers at Fukushima. Was this an issue that the staff had heard about before, or is this news to you as well?

MR. SKEEN: Yeah thanks for that, Commissioner. Yeah. I listened to that with interest this morning as well, and that's -- we had heard some issues about design early on, but that wasn't our impression at the end of the latest information that we had.

So we definitely want to look at that part of the report, and go back and look at some of the other reports that we've looked at, and probably also talk with our regulatory colleagues, NRA in Japan and maybe even go back and pulse TEPCO, to understand what that issue is there, because we had a little bit different understanding of how that went.

COMMISSIONER MAGWOOD: Okay, I appreciate that. If staff could bring up Slide 19 from David Lochbaum's presentation. I did want to spend some time on a few of these issues, and give you a chance to react to it. See how long it takes him to bring that up. Sometimes you forget you're on TV when you're talking here.

There we are. No, I'm sorry 19 from UCS report. Okay. While they're bringing that up, one item that he spent some time on was this -- was the issue about the high pressure water capability, to add water to pressure vessels that had not been depressurized.

This is something we really haven't had a lot of conversation with the staff about yet, and as I've gone around to visit various plant sites, I have seen that most of the pumps are relatively low pressure pumps, and not necessarily designed to pump water into a vessel that's at a high pressure level.

I did see, however, at the now National Response Center, is that they do have some of the larger pumps. But those would not be brought to bear quickly. So can give us some thoughts about where we are with that?

MR. DAVIS: Yeah. First I'd like to say that I think what Dave was getting to in his overall presentation was that we need to have a strategy that we think is credible and reliable, and with that, we wholeheartedly agree with him. A lot of the questions that he was raising were questions that either we had or still have for a lot of the facilities.

The fact that they're using the reactor core isolation cooling system is high pressure injection, right. So as part of Phase I, they're allowed to use their installed equipment, until they can make it to a point where they have -- they can bring to bear either the portable onsite or the offsite equipment.

But the questions that he's having about, you know, would this be reliable, is it going to go the way we hope, we take that very seriously, and that's one of the things we're looking at. The fact that our interim staff evaluation is out there and said that we find that that particular strategy looks to be reasonable, as long as a whole bunch of other questions and a whole bunch of other analysis satisfies it, then that may turn out to be the right way.

But we're a long ways from there, right? We have in Pilgrim specifically, I think there is about two dozen open or confirmatory items that we still have to look at, and go through and make sure that we believe that it actually would be a credible strategy

that could be done.

COMMISSIONER MAGWOOD: I'm just trying to remember. Isn't it true that at the Fukushima site, that RCIC actually was lost early in that accident, and was not available?

MS. UHLE: No. Thanks. Let's see. On Unit 1, the isolation condenser was not available. I think as we just heard today, that it was not working. Unit 1, RCIC operated for quite a while, and then HPCS, high pressure core spray, sorry, acronyms. I know what it does; just couldn't remember the words, okay.

And actually -- so Unit 2 was the last to have a melt. So it went 3-1/2 days and had turbine-driven systems available. Unit 3, RCIC lasted, I think, for over a day, and then their HPCS, high pressure core spray, failed before Unit 2's did. But the core, excuse me, the turbine-driven systems that are supporting the high pressure systems in both Units 2 and 3 did work for a substantial period of time.

COMMISSIONER MAGWOOD: Okay. So really the exception to the rule of installed equipment operating was really the isolation condensers in Unit 1. That is the exception.

MR. JOHNSON: Yeah, I just wanted to -- it goes without saying, but I want to just say it anyway. So these strategies that deal with Phase I, installed plant equipment, Phase II, portable equipment and then this indefinite capability, we really do anticipate, expect that they will be holistic.

So if a licensee's relying on some installed plant capability to get them to Phase II, we're going to make sure that that works. So we're not going to have a question at the end of the day

about whether this series of strategies in fact meets the requirements of the order.

COMMISSIONER MAGWOOD: No, appreciate that. That's a good comment. Now one thing that occurs to me is that because the orders were written specifically to deal with situations to prevent core damage, they are not necessarily written to deal with what happens if you have core damage, right?

That's where I think the other -- the rulemaking comes in, the filtering and containment strategies rulemaking. Now do you have any early thoughts for what the interplay will be between those two, and how FLEX, for example, might perhaps need to be modified, to deal with whatever comes out of the back end of that?

I recognize we're still way in the future, but just give me some of your thoughts about that.

MR. SKEEN: Yeah, let me start. So you're right. The mitigating strategies order, as it stands, is pre-core damage equipment. As we're working through, and I know some of the rulemakers are here, and they might be the better ones to talk about this in the detail.

But as they're working through the rulemaking, on what that's going to entail with the severe accident management guidelines, they don't call it FLEX but FLEX-like equipment or something like that is how they're referring to it right now in the public meetings that they've been having, to say similar kind of strategies would be brought to bear once core damage has occurred.

So the rulemaking would capture that, because you're

going to have to have SAMGs in place, severe accident management guidelines, that will be able to get you through this event, right? So I guess I would start with that. I don't know if any of the rulemakers want to weigh in with where they are.

But from the meetings I've seen, that's the thinking, is that you would apply these same types of strategies after core damage, as we're doing right now, requiring in the order.

COMMISSIONER MAGWOOD: I think Jennifer wanted to weigh in.

MS. UHLE: Thanks, Dave. I would just add to what Dave indicated, by the idea of providing water injection. That's been added to the vent order. So Phase I is the severe accident capable wet well vent, and then there's the Phase II, that looks at whether or not a drywell vent needs to be installed.

At this stage, we do recognize the importance of getting water into the containment, not only to prevent containment liner melt-through, but also to control the conditions in the containment, so that one, it allows for less of a severe condition that would be on the vents.

So with that water injection there, that would have be brought to bear under severe accident conditions, that is going to provide a next, an additional capability under the severe accident conditions.

COMMISSIONER MAGWOOD: Okay. This is helpful. One last thing. You heard the conversation I had with Joe Klinger about the coordination with the states, and as we're reviewing

these plans, are we also talking to our state colleagues, to make sure that there's been some kind of coordination on their side?

Because as he points out, there's no state role in coordinating this. How do you know you can actually get everything together and have these plans implemented?

MR. DAVIS: And it's an excellent point, and in fact it's one of the things that we've been focusing on, is the coordination hand-off between these types of things. It's easy to think about FedEx being the particular entity that would deliver some of the stuff, that yes, they do this for a living every day.

But it's really the coordination between the state boundaries, with the people that have to get it to the site or to the staging area and then to the site and so on. There's a lot of coordination, and you would imagine, under these types of situations, it's probably a regional devastated area.

So it's not as simple as saying I have one little problem that I have to deal with. So it's been one of our major issues that we're looking at, yes.

COMMISSIONER MAGWOOD: And what's our approach to really wrestle with that?

MR. DAVIS: Right now, we've been interfacing with a lot of the folks, to under what their understanding is of their roles, and then also with SAFER, the organization that's handling the regional response centers, what their -- how they think the role is going between the licensee, between the Ops Center for SAFER and both for the plant, and then how do they reach out, right?

So you know, they have us as a resource. They have INPO as a resource, and we're looking at those connections to make sure that they're sufficient, I guess I would say. There's a number of other issues related to that, right, getting fuel to the site for the refueling strategy. There's a number of things that we're still evaluating, to make sure that these plans sound good. Let's make sure they really can be implemented.

COMMISSIONER MAGWOOD: Okay, all right.

MR. JOHNSON: Commissioner, I did notice that Jim Wiggins is in the room. I was almost going to wave him up, would hope to flush him up to the podium. But I'll just talk, and if I say something, maybe he'll come up and correct me.

But there is an entire area of, of course, the lessons learned, that are focused on strengthening emergency preparedness. So of course that folds in, for example, the role of the state and locals, both from an emergency preparedness perspective, but by necessity in terms of whatever they would need to do, to be able to exercise, for example, the strategies that help support their role in those particular strategies.

So I know that's a high level conceptual answer, the details could be given by the staff if they were available. But we are working and aware of, trying to resolve those issues.

COMMISSIONER MAGWOOD: And I appreciate that. It seems to me that while admitting that the same partners are involved, this is a little bit outside the emergency preparedness space. So it's a new topic. So it probably would be somewhat complicated.

But just in closing, I just wanted to thank Dave Skeen for the work he's done over the last several years on this.

He's been, as you said, sort of the face, as unattractive as that might be, of the effort --

(Laughter.)

COMMISSIONER MAGWOOD: And has really provided tremendous leadership, both here in the agency and really, as he's been participating in this internationally. So I'd like to thank him for that. I also wanted to thank you, Mike, for -- because I recall that when Marty left, he sort of dumped this in your lap, when it was sort of half-baked, and you had to bring it to reality.

So your leadership in watching this, over-watching this has been very valuable. So appreciate that, and with that, Chairman, I yield back. Thank you.

CHAIRMAN MACFARLANE: Okay. Commissioner Ostendorff.

COMMISSIONER OSTENDORFF: Thank you, Chairman. Thank you all for your presentations. I will pick up where Commissioner Magwood left off, Mike, in thanking you for your leadership of this. Truly, it's not a marathon. It's probably a 50-mile race, and I think nose to grindstone, perseverance, patience, willingness to step back and make course corrections where appropriate.

Those are all things I've seen you and your team do, and I think those are very important. So I'm going to start out with maybe just a couple of comments for a few of you, and then I'll get into

some questions.

First is in the category of communications. I think it's been important to highlight Mike, what you and the Steering Committee and JLD have done. I think the communication with the Commission have been outstanding, and I've always felt like you've kept us informed about what's going on and why, and where there have been changes. So I want to thank you for that.

And I'll turn now to Jennifer on communications, the same thing. I look at your Slides 8 and 9, the progress in Tier 1 activities, that provides granularity and specificity of what's been done so far, and we've not always seen this type of a presentation from some of our external stakeholders.

So I encourage us to continue to provide this specificity, as I know you are, as to tell the American public and Congress what we're doing as a regulator, because sometimes this progress gets glossed over or not correctly characterized.

Finally on communications, Cindy what you and the regions are doing, I think, is very important. I think your slides where you're showing specific examples of regional inspectors, resident inspectors, etcetera, going out and finding issues at plants and talking about them, but also communicating to the American public what we're doing as a safety regulator. So I appreciate what y'all have done and will continue to do in that area.

Jack, I wanted to go to a question for you, and I think this cuts across things that you and Dave have said. I believe there's -- if I interpret the slides correctly and the comments, there's been 63

interim evaluations of the implementation for the mitigating strategies order.

Overall, are you satisfied with the progress being made by individual licensees in this area? I'm trying to get maybe just some qualitative assessment by you and your team, as to how that's going, because some of the mitigating strategies orders are the heart and soul of what we're doing here as an agency.

MR. DAVIS: Yeah, that's a good question. It's been a continuous process, and we're continuing to learn, both the licensee and ourselves, as we were going through this effort to come up with what the strategies are. Licensees themselves would identify and say well, I was going to go down this path, but I realize now that's not the best path, and I'm going to go this path.

Likewise, we've questioned them throughout this process, of asking very hard questions. Dave brought up the issue about Pilgrim specifically, when he said debris removal equipment. That was one of our questions. In fact Pilgrim, if you read the next paragraph down in our ISE, says that they're going to have two sets of redundant equipment for debris removal.

So it's been a continuous and evolving process, and we've learned from it. I think by the time we got to the 63 ISEs, we feel comfortable that the plans that have been proposed to us, again if implemented as described, and I keep saying that word very carefully, that they provide a reasonable path to success to meet the order.

COMMISSIONER OSTENDORFF: So let me bore down on this just a bit, and I appreciate your caveat about "if

implemented as described." That's so critical, but do you feel like we're going to end up with a set of mitigating strategies, order implementation plans that have some uniformity, some coherence, that we don't have a bunch of one ofs, this plant does it this way, this plant does it that way? I mean are we going to have some overall consistency?

MR. DAVIS: Yes. I think the industry has done very well with that, from a lessons learned standpoint, that the connections, the types of equipment are all standardized as much as possible. There's a few -- obviously they're not all perfectly consistent, right. There's a few different pieces of equipment that are needed for specific situations. But for the most part, the majority of them are all very consistent.

The approaches that they're using, whether it's a P or whether it's a B, the strategies that they're using for feed and bleed if you will, are all about the same.

COMMISSIONER OSTENDORFF: Okay.

MR. DAVIS: So and I think that's good, because again, if you remember, the plants, they have portable equipment on site. If they need to use additional equipment, their buddies up the street, if you will, can provide that same equipment, even before getting equipment from the regional response centers.

So the same consistent training, the same types of procedures, the same type of load training are all similar.

COMMISSIONER OSTENDORFF: Okay. I think this is a question for Dave, but it may be Jack as well, so I'll just throw it

out there. This is in the filtering strategies rulemaking progress. I know you mentioned the extension request and so forth.

Let's put that aside just for a moment. Are we on a reasonable track, as far as getting the information we need from industry, to pursue this rulemaking? Whoever wants to take that it's fine.

MR. SKEEN: You mean for the filtration rulemaking itself?

COMMISSIONER OSTENDORFF: Yes.

MR. SKEEN: Yeah. I think there were some issues early on, but I think those have been resolved, and we are getting the information that we need to get the rulemaking done.

COMMISSIONER OSTENDORFF: Okay. Dave, I want to stay with you. On Slide 15, your second bullet, you talk about the template for the expedited seismic approach submittals.

Going back to almost three years ago, when we had the North Anna earthquake, with the cumulative absolute velocity and the calculations of margin, would I expect this expedited approach to have some commentary or some methodology to discuss margin, if you do have a seismic event at a given plant? Or how is margin -- is margin going to be addressed or not?

MR. SKEEN: Yeah. I may have to get the tech staff involved in this one. But the thinking is that they would have a strategy in place, and by using the template, we get a consistent everybody's doing it the same way, so that it makes it easier for us to review.

Plus they're not giving us a lot of information that we

don't need, that they're getting us the right information that we can help make our decision. I don't know if Scott -- if Scott's here. Scott Flanders is the --

COMMISSIONER OSTENDORFF: And maybe I'm not asking the question as focused just on the template, but more broadly. How is the group looking at margin for existing plant structures?

MR. FLANDERS: This is Scott Flanders, Director of the Division of Site Safety and Environmental Analysis. The expedited approach and the purpose for the expedited approach is to do exactly that.

It's looking at a review level earthquake that's two times its current design basis, and determining whether or not the plant has a success path to cope with an event that could be as much as two times the design basis earthquake level. So that's a primary part of the process for the expedited approach.

COMMISSIONER OSTENDORFF: Okay. Thanks Scott, appreciate it. Lastly for Mr. Skeen, I add my thanks to that of Mike Johnson and Commissioner Magwood. You have truly been the face of the efforts here, and I think your contributions and leadership quite frankly are at a very historic time for this agency. I emphasize the word "historic."

So we're all grateful for what you have done. I want to give you the opportunity, in the two minutes remaining, are there any big takeaways you have from your experience, that you think is important for this regulator, as a body, for us to capture and take -- and

memorialize going forward from the Fukushima experience?

MR. SKEEN: Yeah. I don't know if I have any great words of wisdom. I would say that I think early on, the wisdom of having the Near Term Task Force go off and take a quick look, to try to see what could be done. The fact that we put a Steering Committee in place then, again to review what that group did a quick and dirty look in just a couple of months and gave something back to the Commission.

Then you had a broader body of senior regulators look at it within the agency, to say how can we do some of these things? What's the right answer? We did change some of the recommendations from where they were. But it was to lay out a better plan for how could you go forward on this.

So I think the process that we used is probably something we need to look at, if we run into something like this again, that that would be something that would be worthwhile to look at. So other than that yeah, I think just the fact that I guess cooperation we had from all of our stakeholders, the industry folks as well as some of the NGOs that are very interested in these issues.

Once you go beyond the design basis of where we're very comfortable in regulating, it's very difficult to make changes. So I think the communications that have taken place and all of the deliberations we've had internally, the Commission's had internally, has helped move this forward. So I have nothing but good things to say about how this process is going.

COMMISSIONER OSTENDORFF: Thank you, and thank you again, Dave, for your service. Thank you, Chairman.

CHAIRMAN MACFARLANE: Okay, thanks. So I'll add my thanks to everybody else, Dave, and just, you know, I've learned a lot from you, and I am sure I'll continue to learn a lot from you. I'm sure they'll never really let you go, too. So I don't really think that you're free.

But anyway, he's laughing, because he knows it's true. But I know that you've also had a great team, and I do want to acknowledge Rob Taylor, who's given you great support, and all the rest of your team.

MR. SKEEN: Yeah. Clearly, I always say what makes the NRC the great place that it is the people that we have here, right. So yeah, anyone could have come in and did what I did with the people that we had involved in this, and I'm sure they're going to serve Jack just the same way. He'll pick up right where I've left off and it will be a bumpless transfer as we move forward.

CHAIRMAN MACFARLANE: Right. No, I think it already is, it already is. That's been my experience so -- and I appreciate all the interactions that I've had with you Jack, and I know I'm going to learn a lot from you too. So I'm looking forward to it.

I also want to note that although we are actually an agency of a bunch of pointy-headed nerds, we are actually, I can tell from you guys sitting right here, that we are fashion-forward, and Jack and Mike are displaying a new tie knot that, you know, we're setting a trend for the world, and I am so proud of you guys for doing that, okay. We are not just a bunch of pointy-headed nerds.

(Laughter.)

MR. DAVIS: I couldn't get Dave to do it.

MR. SKEEN: They convinced me not to wear my overalls on the last day of work.

CHAIRMAN MACFARLANE: We have another discussion about West Virginia later Dave, but anyway. All right. So let me ask a few questions. You know, Commissioner Magwood asked the question about what the National Academy folks talked about with the Unit 1, and one thing they noted, looking at Unit 1's situation, was that it was really important, it should be a high priority to make sure the DC batteries are protected.

I just want to understand from you whether you think we are doing enough there, or whether we need to do more.

MR. DAVIS: That's in mitigation strategies, and it's definitely a -- you're making a very good point, that ensuring that the batteries are operational is extremely important to us. So it's a big part of the strategy, as you know, and then reenergizing the chargers, to keep those batteries functional.

CHAIRMAN MACFARLANE: Right, and you know, I'd just note some of the plants I recall going to, the batteries are, you know, maybe going to be the below design basis flood, and so what's the plan there?

MR. DAVIS: Yeah. There's no denying that as Scott's organization comes back through and looks at the reevaluated flood hazards, if those numbers are higher, then that has to be fed back into the mitigation strategies, and then we would relook at that to say would your strategy still be viable, given that new number?

So it's for right now, they've looked at it from their design basis standpoint, design basis flood. But they all know that that's something that they're going to have to look at going forward.

CHAIRMAN MACFARLANE: Okay.

MR. JOHNSON: Chairman, can I just add also, and it goes back to the point I made earlier. One of the things that we took away from our visit to Fukushima was when we went to the Daini unit, in addition to it being a difference in leadership, I guess, is how it's been described, there was also a difference in the way the installed equipment was able to perform at that plant.

So that goes back to the point that I made about we really want to make sure that the installed equipment that the licensee is relying on is capable of performing, to get them to Phase II. So we're going to look at the Academy's report, to understand it, to understand if there's something in addition that we haven't done that we need to do. We're going to start with that, and then use that to inform where we go.

CHAIRMAN MACFARLANE: Okay. So sticking on some of those points, Tier 3 activities, I know Dave, you talked a fair bit about hydrogen control. The Academy talked about how important it was. You know, I think it's important that we don't lose focus on that, that that is a really important Tier 3 issue to get to.

What are other countries doing in regards to hydrogen control? Are they doing other things, something different?

MR. SKEEN: Yeah. I think -- yeah. I don't have a good answer for you on what everybody else is doing. We have been through the Convention on Nuclear Safety. We had a whole meeting,

an extraordinary meeting on what the lessons learned were. But some countries are putting in hydrogen recombiners. Others are putting in extra igniters or power supplies for their igniters to do that.

We have not gone down that path yet, to see if that's something we need to require here in the United States. Again, I think we want to get through with the Tier 1 activities first, and see how much does that buy you, and is there more that needs to be done, such as maybe looking at hydrogen recombiners again.

CHAIRMAN MACFARLANE: So another Tier 3 activity that is near and dear to my heart is the periodic review of seismic hazards.

MR. SKEEN: Yeah. That's 2.2.

CHAIRMAN MACFARLANE: I never remember which one it is, 2.2 to 2.3.

MR. SKEEN: Yeah. It's Recommendation 2.2, right. One was to do the walkdowns; one was to go ahead and do the reevaluations, and then the third piece was that you should periodically go back and look at those. We haven't lost that. Again, the thinking was we would get through with the reevaluations the first time and see where we are, and then you would look at how often does this information get updated.

Does the USGS do studies? Does the National Weather Service do studies that tell you there might be a difference in flooding or what's going on? So that's something we'll have to look at, and we would go through a rulemaking process that would tell us, you know, can we make a case to require that in regulation or not.

MS. UHLE: And if I could add a bit there, we were looking at that under Generic Issue 199 before Fukushima, and one of, you know, the issues that comes up is well, there's new information that comes before us and comes before the licensee all the time, and in our regulatory structure, we have to understand the safety significance of that information, and the safety significance, of course, has to be enough that would make us take action.

So one thing that does have to be looked at, and was being looked at under the Generic Issue 199 work, is to come up with a way to -- without going through the process of a full seismic PRA, understand or at least get somewhat of an understanding of what that safety significance is given the change.

We have made -- I would say we have further advances on that in seismic, because we do have the probabilistic approaches on the flooding side that will for us is more difficult, and we have the flooding work ahead of us to continue.

CHAIRMAN MACFARLANE: Right, Yeah. It's important to not lose sight of that issue, and frankly, I don't think you really need to wait to decide whether it's essential or not. You can parallel process that. It's not going to take that much thought, I don't think. So I don't think that needs a whole lot of resources or anything, and I think the Academy has also spoken to that issue. So you'll want to be thinking about that as well.

Cindy, so I want to hear more about the interactions that the regions are having with headquarters, in developing the new rules that we're talking about here and the guidance, and whether you

guys, you know, whether you think an adequate regional perspective is being fed into this? Because clearly, it's really important.

MS. PEDERSON: A couple of things. There are regional representatives on the Steering Committee. So at one level, we certainly have that interaction there as well. But on some of the more detailed issues, we do have our staff participating with NRR. Just as an example, in the audits that are coming up and ongoing, for example in our region we have our resident inspectors that are participating on those.

I see that as a real win-win. I think NRR benefits from the content knowledge that our inspectors have regarding the plant, integrated operations and so forth, and our inspectors are certainly learning more about the strategies at the sites they're inspecting. So we have a lot of interaction on a lot of different issues. So I think it's going well.

CHAIRMAN MACFARLANE: Yeah. Where can we do more?

MS. PEDERSON: That's always a hard question. We always can do more. I think in where we are in our resources, and we're trying to be mindful of that. We don't have, for example, our inspection staff becoming license reviewers or rulemakers. We want to make sure we protect their focus on onsite safety.

So we do use them and I think we use them judiciously, to make sure that they're not distracted from operational safety, but the agency still learns and benefits from their insights.

CHAIRMAN MACFARLANE: Okay, good. All right.

I have a minute left. So the issue of drywell vents, so help me understand this a little bit more. You know, you talked about how the industry said well, you know, look at an addition of water. That's something we should be doing.

Isn't that being done in FLEX essentially? I mean do we have to really take a pause and do it all over again? Can't we just move on, and again, what are other countries that have boiling water reactors of these types, what have they done?

MS. UHLE: Well, in the case of the FLEX strategy, the FLEX or the mitigating strategies has really focused on before core damage, and it's doing what we can, what is necessary to prevent core damage.

The vent orders is providing that additional defense in depth, to say okay if we were wrong, then we still have the ability to control containment pressure, you know, through the vents and also look at releasing some hydrogen that's been generated. So that is the difference there, the core damage versus fuel core damage.

CHAIRMAN MACFARLANE: I know, but like during core damage and --

MS. UHLE: But during core --

CHAIRMAN MACFARLANE: It's essentially the same as pre-core damage, in terms of additional water.

MS. UHLE: Well it's -- I mean the SAMGs, the severe accident management guidelines that are also going to be incorporated in the station blackout mitigating strategy rule, that of course is going to provide the guidance to the operators, to take action to arrest whatever

core damage is going on in the core, using whatever they have available, okay.

So that's still going to be there. But again, the FLEX strategies were not -- the equipment is not necessarily designed to withstand the severe accident conditions. So that is why it's important to have the water injection added to the vent work that is going on.

We were going to do that always, but that was going to be under the rulemaking. The rulemaking, because of the technical basis development effort, has been protracted. That was delayed. So we're moving that now into the vent order, so that it gets done in the timely basis. That will have water injection provided during the -- after the core damage.

So it's making sure that there is the capability to one, access the locations where they would be moving portable equipment, to get the water into the drywell. So that's, in a nutshell, I think the difference. But Jack --

MR. DAVIS: May I add just one point. The focus was on the wet well vent first, because that provides you a lot of benefit. To design the drywell vent, they need to consider water management, because that would set the design parameters for the drywell vent.

By focusing first on the wet well vent, that buys them time, if you will, if you want to look at it that way, so they can then focus on okay, how do I need to do water management really? That's the real issue in throttling this, so that I can design my drywell vent correctly, or perhaps maybe you don't even need a drywell vent, right?

I mean it depends on how you do that process and, as

I said in my slides earlier, that they had proposed that maybe we look at that resequencing. We're looking at that right now, to figure out is that the right sequence and the right approach to this.

CHAIRMAN MACFARLANE: Okay. All right, thank you. Commissioner Svinicki.

COMMISSIONER SVINICKI: Well, I want to thank all of you for your presentations. You know, as close as most of us in this room are to this body of work, today's presentations and discussions are a reminder if we're struck by the tremendous advancements and progress, and just the volume of work that's been done, you know, so for us being so close to it, for us to be struck by it, I think, is really an acknowledgment of how far we've come and how much we've accomplished.

I agree with Commissioner Ostendorff, that I think that some of our critics, well they may have their own reasons for maybe not acknowledging that. But I do appreciate, I liked the chart with the -- it showed the progress bars, with the dots going across. I think that that may be a good communication tool for us to talk about.

While it may not be all the way to completion through implementation, but it gives an indicator of some of the progress. Maybe we were actually having some sidebar talk about that's a very -- I think a very, better communication tool for that.

Dave Skeen, you know, I want to say that I appreciate all that you've done. I think that your contributions since the events in Japan, will really serve you well in the assignment that you're going to, and I think you'll be well-positioned for that.

But I have to say, Jack, as I listen to Dave go through all of these milestones coming up, I thought you must be thinking he's getting out while the getting's good.

MR. DAVIS: That's exactly what he's doing. But I'm going to know where he exists on the other floor.

COMMISSIONER SVINICKI: That's true, but on a more serious note, Jack, your selection for something of this responsibility and profile is clearly a reflection of your management's confidence that they reside in your capabilities. So since they're people of good judgment, I'm sure that you'll step up and do well, and you'll have lots of opportunities to excel.

Speaking of that, I think everyone's been a bit too easy on this panel. So you don't get a chance to swing for the fences if no one pitches you one fast own the middle. So Mr. Johnson, in responding to one of the six month status reports, our Commission directed the staff, it says "For activities transitioned back to line organizations, as well as future issues that may be evaluated, the staff should return to the full utilization of existing agency mechanisms, such as the Committee to Review Generic Requirements, as well as continuing to make full use of the expertise available, and the Advisory Committee on Reactor Safeguards in reviewing the staff's analyses, outcomes and recommended resolution of issues."

So a two-part question. Has the staff returned to utilizing the Committee to Review Generic Requirements, and the second part of the question is that the staff also has direction "to seek detailed Commission guidance regarding the use of qualitative factors

in a notation vote paper."

So as the staff develops that notation vote paper on qualitative factors, is the staff or does the staff plan to engage the ACRS?

MR. JOHNSON: So let me start with the last one. With respect to qualitative factors, we've worked that product. We did engage the ACRS. That product -- I was just trying to think about. Yeah, it is with you. So we have --

COMMISSIONER SVINICKI: Or perhaps on its way to us, because it goes to a good friend Annette, and that is a way point on the way.

MR. JOHNSON: All right, so thanks Jennifer.

MS. UHLE: Actually, I did. I'm the one that said it's in the front of the Commission. So that's my fault, not Mike's.

MR. KOKAJKO: Lawrence Kokajko. It's not in front of the Commission.

(Laughter.)

MS. UHLE: Thanks.

COMMISSIONER SVINICKI: That's good, because the Commission didn't think it was in front of the Commission.

MR. KOKAJKO: It did -- it is -- we've had some additional comments. We're still -- we've gone back to some of the other offices that were affected, to get their re-concurrence again. It should -- hopefully, by the end of the day, it will be back to the EDO for their final review.

MR. JOHNSON: Yeah. I just want to just -- just on

that to add -- I'm sorry Lawrence. Were you finished?

MR. KOKAJKO: Yes sir.

MR. JOHNSON: Okay. I have seen the paper. I've seen a very smooth draft of it. I think it scratches the itch. In fact, I think I've talked about it maybe a little bit in some of the periodics I've had. So we will deliver a good product and we will make sure that we have engaged all of the appropriate stakeholders. So it's not with you yet. It's coming soon.

MS. UHLE: And I think it's because I've seen it about ten times, and providing some of those comments, that's maybe why I thought it was further along.

MR. JOHNSON: So I'm not going to answer. I'm going to allow the staff to answer the other detailed question about CRGR. But I do want to tell you that we have made every opportunity to reengage, through normal processes, as we move forward on issues, starting with about a year ago, when we looked at those individual actions that remained, to make a decision whether we still needed the Steering Committee, sort of a recognition that we need to get things in the line, use routine processes.

COMMISSIONER SVINICKI: So you're moving in that direction.

MR. JOHNSON: And so we are moving in that direction.

COMMISSIONER SVINICKI: I think the creation of the division is a little bit of a reflection of that as well, on moving away from the Directorate. The staff also does, again, it's been noted, the

communication with the Commission on status has been very good. You submit routine reports on the status of the items in the various tiers.

In the most recent of those reports, the staff noted regarding this new combined EP-related rulemaking, it said "The Steering Committee also agreed that the current draft SAMG requirements align with supporting a tentative backfit proposal, based on defense in depth justification for adequate protection."

Now I want to note that previously, in your most recent six month status report, the staff proposed in there -- this wasn't the Commission -- the staff had a proposed approach to the combined rulemaking, wherein you stated it was the staff's intention to bifurcate any issues in the combined rulemaking that did not satisfy 50.109.

So I guess the first part of the question is does the quote about supporting "a tentative backfit proposal based on defense in depth justification for adequate protection" mean that the staff is now departing from the previous statement about basically putting things through the backfit screening, and for those things that couldn't satisfy that, those would be bifurcated?

So if the Commission so chose, it could just excise those completely from the rulemaking, which I thought I supported that approach for that reason. Is it that the -- has the staff made a decision to recommend that the Commission waive backfit or deem this an adequate protection measure for that rulemaking? It would seem to me a little early in that rulemaking to be deciding that now.

MR. REED: Hi, Commissioner Svinicki. This is Tim Reed, the lead for that rulemaking, and currently there's no decision on

backfit at this time. We are in fact going to have a public meeting here in a couple of weeks we hope, and put that out there and get some stakeholder feedback on the issue.

You're correct, that we've tried to construct this rule in such a manner that if necessary, we could in fact extract SAMGs from that if necessary, if we can't support that what they -- in what is in fact a defense in depth current argument. That's what we have right now as far as backfit.

But nevertheless that is our philosophy in trying to do that, and we certainly do intend to follow the backfit rule. I mean that's been our position consistently so --

COMMISSIONER SVINICKI: Okay, all right. Thank you for that. I just needed to clarify. Sometimes when things are stated a bit differently, you don't know if people have abandoned the previous course or not.

MS. UHLE: If I can add to this -- that this is a one rulemaking effort. It will not necessarily be one rule. So that, I think, helps to describe how some of it can be adequate protection, some of it could be for redefining adequate protection. Some could be for cost beneficial reasons.

COMMISSIONER SVINICKI: Okay, thank you. Well, I look forward to that, and again, as you've acknowledged, it's a little bit early to be binning things right now. So Mr. Skeen, you talked about the flood hazard reevaluations.

Is it true -- well, you mentioned the fact that dam failure analyses for some locations is being conducted by or provided by the

U.S. Army Corps of Engineers. Is it true that some licensees then, because of concerns about critical infrastructure information, cannot see the basis upon which NRC will accept or reject their analyses?

How does staff square the fundamental fairness and due process concerns of rejecting something, on the basis that the regulated entity can't be provided with the basis for the rejection?

MR. SKEEN: Yeah, and again, we may have to get someone else up here to help answer this. But early on, when we went to the Corps of Engineers, to get them to help with this, because they know the watersheds better than anyone else. They're the ones that regulate the waterways, for the ones that they regulate.

So because they have the technical knowledge, we used -- asked them, basically contracted with them, to do the analyses for us. There was certain information, critical infrastructure information, that they said they would not share, could not share with the public. They would share with a sister federal agency, but that's as far as they were willing to go.

So that was how we constructed the plan then, was for the Corps to do the analysis, provide what the licensees do need to take the information out of their analysis, so that they can do the analysis that they need to do for their specific plant. We do the best we can in having the licensees early on, we have a couple of meetings with the Corps.

We have the licensees come in before the Corps does the analysis they're going to do, to talk about assumptions that will be made and how they will do the analysis. Then after the analysis is

performed, licensees can come back and ask questions about how did you get this or how did you get that.

So there's quite a bit of information we can share. There's a limited amount of information we cannot share, and so, you know, yes, I realize we're in a little bit different place here, with trying to do these dam failure analyses and what that means for a specific plant.

COMMISSIONER SVINICKI: And it sounds like at least you realize that we're navigating something that's complicated here.

MR. SKEEN: It's quite complicated.

COMMISSIONER SVINICKI: But I just have to say that, you know, it does matter to me. I think there's a fundamental right when the government, you know, rejects something, for somebody to be able to know the basis to challenge it adequately.

To obscure that, and I acknowledge the practical realities here on critical infrastructure information. Our colleagues at FERC have been having some interesting times about what should be out in the public and what shouldn't.

MR. SKEEN: Yes.

COMMISSIONER SVINICKI: But that being said, it's going to get difficult when, you know, the core tenet of the regulated community or citizen being able to challenge what the government says, and there needs to be some ability to do that.

MR. SKEEN: Yeah. We understand that. I understand.

COMMISSIONER SVINICKI: Okay, thank you. And

I'm over my time, but I love hearing from Scott Flanders. So but he doesn't have to say anything.

(Laughter.)

COMMISSIONER SVINICKI: I'm just a big fan of his work, and the precision with which he goes about things. So I'll just say hey, it's really good to see you Scott. Thank you for coming to the microphone.

MR. FLANDERS: Dave answered the question perfectly.

CHAIRMAN MACFARLANE: All right. Well, if that is all the questions we have, then I will close this meeting now that it is afternoon, and thank you all very much for the discussion, for your presentations. Thank the earlier panel as well. I think it was a very productive morning and afternoon. So we will now leave this refrigerator. We are adjourned.

(Whereupon, the above-entitled matter went off the record at 1:07 p.m.)