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U.S. NUCLEAR REGULATORY COMMISSION

BRIEFING ON THE STATUS OF NRC RESPONSE TO EVENTS IN JAPAN AND BRIEFING ON STATION BLACKOUT

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TRANSCRIPT OF PROCEEDINGS

Public Meeting

Before the U.S. Nuclear Regulatory Commission:

Gregory B. Jaczko, Chairman

Kristine L. Svinicki, Commissioner

George Apostolakis, Commissioner

William D. Magwood, IV, Commissioner

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APPEARANCES

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P R O C E E D I N G S

CHAIRMAN JACZKO: Good morning, everyone. Before we begin today's meeting, I wanted to recognize that this is National Administrative Professionals Week and take this opportunity to acknowledge the dedicated efforts and the high-quality performance of our agency's administrative professionals. It's always, I think, a great opportunity during this week to make sure we highlight the work that those people do every day to allow us to do our jobs and to keep everything working and functioning. This is also a very special day at the NRC. This is Bring Your Children to Work Day here at headquarters, so there'll be lots of people, our future work force, running around, learning the business, I think, at the agency.

With that, I'll turn to the agenda for today's briefing. The Commission meets this morning to receive a brief update on the situation in Japan and the NRC's ongoing efforts there to assist the Japanese government, but then the remainder of today's meeting will focus on the NRC station blackout rule, which is our regulatory approach for ensuring that licensees can effectively cope with a loss of alternating current electrical power. And, I think, certainly this is a situation that has relevance, as our task force looks at the situation in Japan, but we also have seen that this is a rule that has relevance here for us in the United States. Severe storms in the south last night provided a reminder of this. One or more nuclear power plants experienced a loss of nearly all their off-site power, leading to shutdowns of those plants. All of the safety systems performed as they were designed and all available diesel generators started and loaded. And, ultimately, the core cooling systems are operating normally. In addition, the spent fuel cooling is currently in service. So, all these plants are stable and they're being placed in a cooled-down condition.

Of course, these storms are also a reminder that these storms have tremendous impact, and there have been many people who have lost their lives as a result of this, so we always want to remember that as we talk about these issues. But it was certainly a reminder of the importance of this particular rule and dealing with the potential that not all of the alternating power capabilities function.

So, today, the staff will give us a general background on the rule’s development as well as more detailed information on the structure of our regulatory approach for dealing with station blackout. And this is one of the many significant issues that the agency's senior level task force is examining as part of our comprehensive review of the safety of the U.S. nuclear facilities as a result of the situation in Japan. And, certainly, from my perspective, I think the purpose for us today is to get a good base line of information for the Commission to get us all at the same level of knowledge about this rule, so that if we get recommendations from the task force in this area, we'll be able to move expeditiously and promptly to address those, and we'll have a good understanding of the basis of the existing rule, and then, if there are changes to be made, what those changes would be and how we would effectively and expeditiously move forward with those recommendations. With that, I would offer any colleagues, my colleagues to make any comments that they would like. Commissioner Svinicki.

COMMISSIONER SVINICKI: Thank you, Mr. Chairman. First of all, I appreciate your recognition of the hard-working administrative professionals here at NRC who make possible all of the important work that we do here. And I also would add, that, although, as you've indicated, we're still working to gain knowledge of the events in Japan, station blackout certainly identifies itself as an important issue that we need to be looking at, so thank you for today's meeting.

CHAIRMAN JACZKO: Okay, Bill. I'll turn it to you.

MR. BORCHARDT: Well thank you, good morning, what I'll do is begin today's briefing with just a very brief overview of the situation in Japan. Since March 21, when we held the last Commission meeting, on the Japan issue, I would say that the situation has definitely improved but we're still in the accident mitigation phase. Off site and on-site AC power has been restored, however they're still using temporary pumps and hoses to inject water into the reactor vessels and spent fuel pool, and into the containments. There's still many unanswered questions regarding the status of various pieces of equipment, the reactor vessel integrity, the spent fuel pool.

Regarding the core, the reactor vessel, and the containment, as well as the spent fuel conditions, I would describe the situation as not being quite stable, but certainly not as highly dynamic as it was on March 21 when we last met on this subject. The changes that are occurring within the plant are slower and allowing more time for the Japanese operators and regulators to respond and take corrective actions, as necessary.

There's still feed and bleed operations in progress. That is a somewhat dynamic situation, as well as there's unfiltered and unmonitored release paths that remain to be a concern at the Fukushima site. One of the things that make this difficult for the Japanese in responding to this event and for to us to understand the exact situation is that there's a number of suspect accuracy and failed instrumentation at the site, affecting all of the units that really hamper our ability to get a clear and consistent picture of the situation.

As you know, the site team in Japan continues. We're providing technical support to the ambassador. We're interacting with the Japanese officials of NISA, our regulatory counterpart, and the operator TEPCO. And the team in Japan is also coordinating the efforts of the consortium of private companies as well as non-government organizations as they work with the government of Japan. Our operation center remains on a 24/7 response capability. We're providing direct support to the site team as well as coordinating all of the related headquarters activities by the technical staff.

One of the major developments over the last month has been the creation and development of TEPCO's recovery plan, which is called a road map towards restoration from the accident at Fukushima Power Station. There is a number of elements in this road map, and it focuses on nitrogen injection that will help minimize the potential for future hydrogen detonations, flooding of containment to cool the core, working on process to provide reliable spent fuel pool makeup to achieve long-term cooling. They'll also work on the Unit 4 structural integrity of the spent fuel pool, looking at ways of providing waste storage and processing as well as controlling radioactive material on-site and off-site. And then, finally, to address the issue that I mentioned earlier, enhanced monitoring of off-site conditions at the plant. So, our overall assessment is that the Japanese are making progress on addressing the safety and the environmental issues and that the road map that's been put into place is certainly a good start towards long-term restoration.

Moving into today's Commission meeting. Obviously, the earthquake and then the following tsunami resulted in a station blackout at the site, which greatly complicated and contributed to the serious events in Japan. Today's briefing's going to be a technical background about the conditions in the U.S. plants, both the regulatory background and what processes and equipment exists in the plants. As I mentioned, on March 21, we did, what I would say, was an instant review of the situation and of the capabilities of U.S. facilities and concluded that there was no need to make immediate changes or to impose immediate orders on U.S. licensees. However, we have well underway the short-term, or 90 day review, that is looking at station blackout and a number of other issues, out of which may result in some future regulatory action or some requirement on licensees.

Following that 90 day review, there's going to be a longer-term review that will continue to use all of the technical information available from Japan in order to inform our regulatory approach moving forward. Very recently, we've issued a temporary instruction to our inspections staff that has been performed to evaluate the compliance with the existing regulations, and those results are being provided to the headquarters staff for analysis now.

We'll be hearing from three speakers today. The first is going to be Pat Hiland, who's going to provide an overview of the NRC station blackout rule, as well as the advanced accident mitigation strategies implemented at U.S. plants. George Wilson is going to discuss, in detail, the station blackout rule requirements and guidance, and the preparedness of U.S. power plants to cope and recover from a station blackout. And then, finally, Eric Bowman will discuss the mitigating strategy requirements imposed following the terrorist attacks of September 11, 2001. So I'll now turn the briefing over to Pat.

MR. HILAND: Thank you, Bill. Good morning Commissioners, Chairman, and go to slide two, please, station blackout background. Looking back over 35 years ago, the WASH-1400 document was issued. And that document clearly stated that station blackout could be an important contributor to the risk of nuclear power plant accidents. In particular, it concluded that if a station blackout were to persist, it could lead to a core melt and containment failure. In 1980, the Commission designated the issue of station blackout as an unresolved safety issue, A-44. Additional regulatory requirements were imposed in 1988, when 10 CFR 50.63 was issued. It's known as the SBO rule, that rule requires each plant to be able to cope and recover from a station blackout event, specifically to assure that the core is cooled and that the containment integrity is maintained.

When the station blackout rule was issued, coincident with that was a Regulatory Guide 1.55 that was released. That regulatory guide endorsed an industry standard, 8700, providing guidance in how to implement the rule. All of the operating fleet, all 104 plants today, met the station blackout rule at the time based on a detailed review of each applicant's submittal of how they complied with the rule, as well as, we conducted two on-site inspections in each of the regions, for a total of eight, to provide us confidence that the rule was being properly implemented.

After that time period, under the reactor oversight program, we have our Component Design Basis Inspection, or CDBI inspection, that continually looks at those components that may be involved in the station blackout mitigation strategies, as well as there are other inspection modules for our regional inspectors and our site resident inspectors, such as the corrective action inspection program, a plant modification inspection module, as well as an equipment alignment module. All of those items might touch on the station blackout.   Feedback from the regions and from the inspections to date indicates that the component design basis inspections are pinpointing some of the SBO activities that we see in the field.

Regarding license renewal activities, the evaluation for renewing license has a specific requirement, and they're 10 CFR 54 for a review of the station blackout aging and components required, the safety systems and structures required for the SBO must be included in their aging management process.

Regarding new reactors, now, all new standard, that's a word I used in this slide, standard meaning that's not a passive new reactor, because the second bullet would tell you that's not all plants, but all new standard reactors are required to have an alternate AC power source. It's a diverse source, meaning that it must be different than the installed emergency or standby diesel generators. For new reactors with a passive design, that's an AP1000 has a passive design, its design includes a battery-power coping strategy of up to 72 hours.

As you're aware, we responded to the September 11, 2001 terrorist attack through a number of initiatives. Initially, we issued interim compensatory measures in an order in February of 2002. Within that order is section B.5.b, and that's, we've heard the term B.5.b, and that's where it comes from. Those interim compensatory measures were inspected at each site, evaluated, and eventually became a license condition for all of our facilities. Just two years ago, in 2009, 10 CFR 50.54(hh) was issued to codify those requirements.

And the last slide is just a paraphrase of that paragraph in

50.54(hh). And these mitigation strategies are for beyond designed basis events that could be beneficial in the context of the station blackout. With that, I'd like to turn it over to Mr. George Wilson to go into more detail.

MR. WILSON: Thank you, Pat. Good morning, Chairman, Commissioners. As Pat had stated, the 10 CFR 50.63 rule will also involve alternating current power. It intended each site to have to cope, and the big key here is to recover from the loss of off-site power, and we'll get both a little bit later on in the procedures. Once this rule was issued, the NRC staff met with the industry and several working groups, and they started developing the strategy that the rule would be implemented. So we developed Regulatory Guide 1.155. At the same time, the industry developed a NUMARC guide, it's 87-00, on how they would implement and deal with the rule. The NRC endorsed the NUMARC guidance as a way to implement and comply with the station blackout rule.

The real key with the station blackout rule was coping, and coping is defined as the time that it takes to recover either on-site or off-site alternate current power back into the plant. The rule specifically gave guidance on how you would calculate and how you would go about doing the coping of the plant. One of it was the on-site redundancy, the amount of diesel generators that you would have at the site, the reliability of the diesel generators. Their reliability was evaluated by different starting mechanisms; 10, 20, 50, to 100 start times, and then that was evaluated. Also, the expected frequency of the loss of off-site power, whether it would be hurricane-type winds, icing. That was also evaluated. And the probable time needed to restore the off-site power that you would restore based on your experience. All that criteria went into the coping analysis, and to the plant. And that's how it was defined.

I want to point out here that we have had several, we have had hurricanes here, and the diesel generator liability is a key here, both at Turkey Point in Hurricane Andrew and at Waterford in Hurricane Katrina, the diesel generators started and ran for multiple days. They never did go into a station blackout based on the reliability of the emergency diesel generators that we have at the American plants.

And the coping methods; there's two different coping mechanisms that can be used in U.S. plants. Forty-four of the plants in the U.S. are battery-only, so they can have a maximum coping period of up to four hours. When it was analyzed if the coping period went above four hours, then they had to either do modifications to the plant to reduce the coping time, or they had to install an alternate AC power that would come up. The AC, to be an alternate AC plant, with to do no coping analysis at all, you had to be able to be able to bring the power up within 10 hours, excuse me, 10 minutes, and tie it on to the buses. If it took longer than 10 minutes, then you had to do a combination of having an alternate AC power and a coping analysis that was done for the time that you would bring the plant up.

Sixty of the plants in the United States are alternate AC plants. They cope from anywhere from coping analysis of two hours up to 16 hours. The coping -- the alternate AC power sources are either hydro-generators, combustion turbines, gas turbines that they can use. It can be the alternate, it can be an opposite unit's diesel generator, if they have excess capacity.

The staff reviewed the SBO rule implementation by writing a safety evaluation for all 104 sites, and, in addition, as Pat had mentioned, we also went out and performed eight inspections with a temporary instruction that was written.

We did two units, or two plants, in each region, and there was no major issues identified during the temporary instruction. We did find some of the assumptions in the coping analysis, and those were resolved. And so, based on that and the safety evaluations, the staff had determined that the industry properly implemented the station blackout rule, and they were in compliance with that.

Basically, the design overview of the plants with the station blackout is that, as I stated, battery coping was a maximum of four hours. They also evaluated and looked at how you could extend battery life, and I'll get on to that in a little bit in the procedures by shedding loads. You had to evaluate the effects of ventilation. You had to use ventilation, so heat up calculations were done in each room to see what the impacts were. You looked at condensate any way that you could do manual operator actions, bringing in compressed air, minimize RCS inventory leakage. The leakage was based on, one of the key components is that for the reactor coolant pump seals in a pressurized water reactor, you could only assume 25 gallons per minute leakage for a total of 100 gallons.

And the big key here is, operator training was performed and procedures were written. So not only did they have to write specific procedures on how they were going to deal and cope with a station blackout, but they had to be trained upon it.

For the specific SBO procedures, they did specific actions on the restoration of AC power. We, in the United States, were a little bit different, because there's a very close relationship between the grid operators and the nuclear power plants. And one of the things, when we wrote a generic letter, in Generic Letter 2006-02, that had to do with the grid interface with the nuclear power plants, we verified that each one of the nuclear power plants would be the first load that would be restored if the grid was lost. So we went back and made sure that the primary reason is that for the safety of the power plants, but that is the first load that's restored in a grid when it goes down in that area.

They also developed procedures to enhance emergency diesel generator troubleshooting, and they looked at additional ways to bring power back on, so you look at additional procedures where you bring an alternate AC power on, and look at different ways you can tie it into the plant. They also ensured that the support equipment would be functional without alternating occurring power. That could be bringing in bottled air, putting in nitrogen air stations in there, looking at what valves would have to be manually operated and associated throttle position of those valves. Protection is done to any of the steam-driven pumps, HPCI, RCIC because that is used to mitigate an action of a station blackout, identify the RCS leakage packs, try to minimize the amount of water, and conserve the inventory of water that you have in the primary. Additionally, you look at past, the procedures actually look at past -- the first primary water source, which would be the Condensate Storage Tank, and looking past that, look how you could get additional water sources into the Condensate Storage Tank to further provide inventory water. Also look at stripping non-essential loads off on the DC, which is looking at taking off DC-powered pumps, or removing the starting-flash circuitry for a diesel generator, because that takes down the battery.

Also, you would look at, during the heat-up calculations that you would do in the room, that can cause some actuations to happen. So some of the actions, the procedures would direct, would have operators go out and bypass the isolation for HPCI or RCIC to ensure the steam valves would stay open, you still have the steam supply for the steam-driven pumps. Also, look at the equipment that you would actually use to cool down and shut down the plant, and evaluate what that usage would be. This is -- the procedures got very specific, and they were site specific on exactly how they could cope and deal with a station blackout.

Also, in the United States, the grid interface, as I explained earlier -- there are agreements between each one of the nuclear power plants and the local grid operators, based on voltage and frequency and the restoration of the plant. In addition, the NRC staff here locally, on Monday through Friday, do a grid report, and we look at what potentials for the grid is. And based on the fact that if the grid is stressed or strained, then sometimes maintenance at the power plants would minimize, to ensure that there’s no trips, or minimize the chance that there would be a trip of the plant to maintain the grid reliability. We also have grid-reliability standards in the United States now, that are in full force by the Federal Energy Regulatory Commission, and those grid-reliability standards were written after the Northeast blackout, and they ensured additional reliability and stability in the grid, and additional studies are done on that to ensure that that is one of the reasons that, to try to maintain the stability of the off-site power. In addition, there’s a specific grid-reliability standard for the nuclear power plants only, which is Nuclear 001, which specifically goes into voltage and frequency requirements at a nuclear power plant, because those are a lot tighter than normal loads that are on the grid.

In summary, in the United States, there has only been one identified case of a station blackout. That was at the Vogtle plant in 1990, and that event lasted for approximately 55 minutes. The plant was in a shutdown during the time, and it was because a truck had backed into one of the other transformers that was being used, caused a ground, and ended up being in a station blackout. The plant was able to restore one of the diesel generators and get power restored, and come out of the blackout. As Pat had stated earlier, we do still evaluate for station blackout compliance, and in the license renewal, we make sure that the recovery paths have an aging-management plan. And once again, that is recovery paths. And power uprates, if a licensee changes something, the staff goes back and ensures that the battery-loading capacity didn't change, which could potentially change your coping. We also look at license amendment requests. As stated earlier, one of the plants is a 16-hour coping plant, and originally it was a four-hour coping plant, but there was some operating experience that had happened at the particular plant out west, and based on that operating experience the staff was aware of, the licensee re-performed a coping analysis, and went from four hours to 16 hours. Which included -- that includes some modifications to ensure that the amount of fuel oil that they would need would be there.

And we also interface with FERC and NERC. We meet quarterly with FERC and NERC. If there's any issue at all that happens on the grid, there's a memorandum of agreement and a memorandum of understanding to sign with both agencies, which, if there is issues with the grid up to a certain level, if it does get severe, then our headquarters operations officer is called by

NERC, and the electrical branch is contacted to look at it. We also get anything that would cause local problems in the grid, so we're very in tune with the grid in looking at issues, and we would get those back out to the plants as they would get stuff back into us. Now I'm going to pass this on to Eric.

MR. BOWMAN: Thank you George. Good morning Chairman, Commissioners. I'm Eric Bowman. I'm the staff lead for the mitigating-strategies requirements that were imposed following the terrorist events of 9/11. As Pat had mentioned, we imposed these requirements through a series of regulatory actions, but for convenience' sake, I'll refer to them generically as the B.5.b requirements. By their terms, the B.5.b requirements are broadly applicable to any events that are related to explosions or fire. Due to the context in which the strategies to meet those requirements were developed, most of the details of the strategies on a site basis are designated for official use only, as security-related information. Although they were developed to address impacts to the plant due to explosions or fire, the result was a set of flexible, deployable strategies to accomplish the key safety functions for the reactor sites that could be useful in a wide variety of circumstances.

Throughout the development process for the B.5.b requirements, we met periodically with our international partners to share information on approaches to the problem and improve our response. The B.5.b development process was a deliberate, phased approach. Initially, we started out looking at what could be done with readily available materials or personnel. Then we moved on to see what can be done further to aid in the cooling of the spent fuel in the spent fuel pools, and the final phase of the development process was looking at the core cooling and maintenance of containment. The efforts started out under the lead of the Office of Nuclear Security and Incident Response, ultimately transitioning to the NRR in the lead for operating reactors. We had great support from the regional offices, and analyses that came up from the Office of Research during the effort.

As I had mentioned, Phase 1 looked at what could be done with readily available materials and personnel. In large part, the reason for that was because we wanted to see what could be put in place rapidly to address the need, and also the terms of the order itself referred to the use of readily available materials and personnel. Phase 1comprised a series of inspections, assessments, and analyses, drawing on existing equipment and procedures, best practices the licensees had for their initial responses, and lessons learned that came about from the research analyses. That phase culminated in the Phase 1 guidance document that was produced in February of 2005, describing what our expectations were for the characteristics of the strategies that would meet the requirements of the Interim Compensatory Measures Order. That guidance document is designated safeguards information.

High-level overview of what we can speak of publicly about the Phase 1 strategies; they involved coordination of response with off-site responders, improvements to the firefighting capabilities on-site, and what I would term as passive measures, such as configuration of fuel within the spent fuel pools in order to enhance coolability.

In Phase 2, we looked further at what could be done to promote spent fuel cooling using measures that didn't rely on readily available materials or personnel. The results of this phase were a set of mitigating strategies that are required for the licensees to be able to provide makeup water, or cooling spray to the fuel, using means that are diverse from the normal methods for makeup water or cooling of the pools. The diversity includes a diversity from the power supplies within the spent fuel pool building, or the building containing the spent fuel pool -- whatever it's called on the site. And a number of the strategies within this group are use of motor forces diverse entirely from on-site power distribution.

The Phase 3 looked at what else could be done for core cooling and containment. In that effort, we worked with the industry to identify just what are the key safety functions that would need to be satisfied, based on the design characteristics of the plants. The results here were two sets of mitigating strategies; one that is required of pressurized water reactors, and one that is required of boiling water reactors. For the majority of these strategies, the entry conditions assume a loss of all internal power distribution, both alternating current and direct current, and minimum staffing on-site, so it's slightly more conservative than a station blackout condition.

Because of the passive nature of the initial strategies, as well as the entry conditions being more conservative, assuming a loss of all internal power distribution, the B.5.b strategies, if they were used in the event of an extended station blackout, would have the potential to extend the period for which a licensee could supply the key safety functions without on-site power available. Subject to your questions, that concludes my briefing.

MR. BORCHARDT: That completes the staff's presentation.

CHAIRMAN JACZKO: Thanks, appreciate the insights. We'll start with Commissioner Magwood with questions.

COMMISSIONER MAGWOOD: Thank you. Thank you for your presentations today. Very informative. Let me ask sort of a basic question on station blackout, something that I've been looking at in the last several weeks, and I just wanted to sort of hear your thoughts about this. The -- you've talked about the maximum life of the batteries and the coping strategy being four hours. And I wonder if you could describe how the agency dealt with this, came up with a four-hour coping duration, while at the same time, the procedures clearly indicate that this is supposed to be a site-specific analysis where you look at site-specific characteristics of the plant, off-site power resources, and one would think you would have a variety of conclusions after going through that analysis. But yet most of the plants, a vast majority of the plants, have this four-hour coping strategy. Can you reconcile those for me?

MR. WILSON: Yeah, the four-hour coping analysis was arrived when the staff worked with the industry, and they looked at how long, roughly, it would take to restore off-site power in various places. The estimate was .9 to two hours, so based on that, the staff doubled the time and said you will cope with a station blackout for four hours. So the industry came up with, it would be .9 to two hours, like I said, and we doubled it to have a safety margin there, to -- you'd cope with four hours. We chose four hours based on the size and the capacity of the batteries, so anything longer than that, modifications were made or you brought an additional source on, but that's where the original four hours came from.

COMMISSIONER MAGWOOD: What's our actual experience with loss of off-site power, in terms of how long it takes to restore off-site power?

MR. WILSON: There is some data that was -- we used a NUREG, 6890, that has some data in it, and it would go anywhere from .5 hours to three hours. We're also in, one of the statements that I made is we have constant communications with NERC and FERC, and they have done some studies and done some projections across the country on certain circumstances. How long it would take to restore an off-site power, and we're presently looking at that, and we have that to the quick-look team.

COMMISSIONER MAGWOOD: When you're thinking about the restoration of off-site power, it's interesting that having an alternative source of off-site power is one of the options that you look at in mitigating a station blackout. However, when you think about the sorts of events that lead to the loss of off-site power, what is the thinking in terms of, if you lose one source of transmission from one off-site source, why do you think you have a second? What sorts of scenarios would it be useful to have the second, redundant off-site power source if you lost the first one? If you have a hurricane that takes out the transmission lines for one source of off-site power, why would you think there'd be a second?

MR. WILSON: I would go ahead and say you're not asking a question with alternate AC source, or are you asking a question about the redundancy of off-site power?

COMMISSIONER MAGWOOD: Yes.

MR. WILSON: Well, the more off-site power lines that you have, unless you would have a common cause failure that would wipe out a switchyard, the more lines that would come in and you have a more redundant off-site power, then that would give you more capability to mitigate an accident. You would want an alternate AC source, the staff would like to have an alternate AC source, because the capacity of an alternate AC source is above that of the battery, so there's more margin if I have an alternate AC source. There's no requirement, as you had mentioned, to protect that alternate AC source from events. I mean, from environmental effects. There's no requirement. We have, Appendix A, GDC-2, that affects safety-related stuff from environmental effects, but those requirements are not for the alternate AC source, so it is not a safety-related source as robust as the emergency diesel generators, but it does have a longer capacity and capability. That's the reason we'd want it, but there's no requirement as such to have an underground cable which would protect it from, like, high winds. There's no requirement that we have for that.

COMMISSIONER MAGWOOD: But you mentioned that the procedures that have been developed for station blackouts -- how much work has been done to reconcile, or I guess to merge the station blackout procedures with the severe-accident management guidelines? How much coordination is there between those two?

MR. WILSON: Well, the station blackout is an abnormal operating procedure. The SAMGs are above anything that you would have, so they're way beyond what a station blackout. The basis of the SAMGs, when you go through them, is you would have power to do certain things, to get water back or to minimize the release path. So as far as I know, they're not in tune, they don't go from one to the other. The station blackout specifically tries to restore power, but as far as I know, and -- Donny, can you add anything?

MR. HARRISON: You got it.

MR. WILSON: But they're not in tune where one feeds into the other. They're used for a different purpose.

COMMISIONER MAGWOOD: So you never assumed that in the case of a severe accident, that you lost offside power? Is that what you're saying?

CHAIRMAN JACZKO: Donny, do you want to maybe go up to the mic?

MR. HARRISON: I'm Donny Harrison from NRR. The answer to your question would be no. If you're into the SAMGs, you're into an event that's gone beyond your normal emergency procedures and your abnormal procedures, but what you might be in is going through the SAMG guidelines looking for water sources, for containment flooding, and that type of thing. But at the same time, you may have your station-blackout procedures open also, and you're trying to recover AC power. You might be doing the coping strategies of taking loads off your batteries so you can prolong their life. So you may be actually in both at the same time. That's kind of what would probably happen.

COMMISSIONER MAGWOOD: I mean, I've looked at some of the SAMGs. I haven't looked at all of them. I've looked at some examples of SAMGs for specific plants. You might want to stick around for this. And I'm just curious as to what -- most of the SAMGs, as I read them, seem to anticipate that you do have power

MR. HARRISON: Well for most things, you need water and you need to pump it, so implicit in that, you're going to need some type of power supply or steam, if you can run a RCIC pump off the steam and have DC power for the control of the pump. So the SAMGs basically are geared towards a list of water supplies for containment flooding. Some of them need AC power, some of them probably need DC power for control. Again, then you get into the strategy of, "Can I prolong the battery life so I can control the RCIC pump?" if that's what you're using to provide water to the core. So it's a mix, and the SAMGs are guidelines. They're not procedural for specific events. So what it is is a list, oftentimes, and so you'll get into that and you'll start going through the list saying, "What is available? What isn't available?" and you'll get down to what you've got.

COMMISSIONER MAGWOOD: All right, I think I'll leave it at that for now. Let me ask just sort of a broad question. This is something that actually, Eric, Leeds and I have talked about a little bit already. Which is, what are the options if one were to have the desire to have a longer coping time? A longer coping duration? What technical options immediately present themselves in your mind to increase the duration?

MR. WILSON: Well, the way you would have to -- right now, we don't know about the batteries. You could potentially have a higher-capacity battery would be one way, but even with an alternate AC source, you have to have everything on-site. Like the one plant that has a 16-hour coping analysis. That means their alternate AC source has enough fuel capacity. It's already there that it will run for 16 hours, and they need to get off-site power back within 16 hours because that is all the capacity that's there unless they're going to mitigate and bring additional fuel oil and stuff on for the source. So to go beyond a four-hour capacity, I think you would have to have an alternate AC source and you would have to have the capability of those -- well you'd have to have everything there for it to run if you wanted to cope with something for longer than four hours, or change the battery out to a higher-capacity battery that could handle a larger discharge.

Another option would be to potentially bring in a battery charger that you could bring in, with a power supply to recharge the batteries and maintain that capacity. That would be something that would -- you wouldn't have to change your batteries. That would be, just bring another battery charger, charge the batteries, and you could extend the capacity of those batteries that you have on-site now.

COMMISSIONER MAGWOOD: And I understand there are a small number of licensees that are doing something along those lines now, is that correct?

MR. WILSON: Yes, there is one licensee that I'm aware of that has brought a temporary battery charger in, they have it in their procedures that they would charge, and increase the capacity of that battery. And that is one of the coastal plants in the United States that a hurricane could actually affect.

COMMISSIONER MAGWOOD: Thank you very much. Thank you, Chairman.

CHAIRMAN JACZKO: Commissioner Ostendorff?

COMMISSIONER OSTENDORFF: Thank you Mr. Chairman. Thank you all for being here today. I wanted to maybe start out with Pat, I guess it's a question for you and perhaps George. Just a big picture, looking at what the NRC does via regions, resident-inspector programs, to assess the readiness of a specific plant to deal with a station blackout. I understand there was a one-time inspection done back in the ’80s that is part of, also, license-renewal application process. Are there any other looks that the NRC takes via its resident inspectors or by other mechanisms, to provide an NRC perspective on the licensee’s readiness to deal with the station blackout conditions?

MR. WILSON: Pat, I’ll take this one if you don’t mind. Actually, after Generic Letter 2006-02, we have written some procedures. We used to go out and do a temporary instruction that looked at the worst grid conditions, so whether that would be -- mostly in the summer, where the grid would be stressed. So we used to have a temporary instruction that would go out and look at summer readiness, to make sure that the plant was ready for the extreme grid conditions that could happen in the summer. We changed -- actually went in and changed one of the procedures. The adverse weather procedure actually looks at summer readiness for the plant, on a grid-type basis. Not specifically for station blackout, but it looks at -- are the diesels ready, or are they monitoring the grid? So specifically looks at that -- not looking at incompliance with station blackout, but looks at because the grid’s stressed during those conditions. And that’s something the resident inspectors do.

COMMISSIONER OSTENDORFF: Anything there, Pat?

MR. HILAND: I’d like to add something, just a minor comment. My first 10 years in the Commission, I was a resident inspector at three different power plants. PWR and two boiling-water reactors. And the job of the resident inspector is to be aware of the plant conditions every day. He goes into the plant, he hears what the plant modifications are, what the design changes are, he understands the need for the alternate AC sources on-site, both the standard diesel or in Oconee's case, the hydro plant, as well as what's there for the station blackout. And so you rely on that daily presence, five days a week or actually seven days a week, of the resident inspector. So I would add that only, just emphasize.

COMMISSIONER OSTENDORFF: Let me just kind of maybe add another question on to that, that is related to this precise query. And that is -- and Commissioner Magwood was asking questions about the four-hour battery time and so forth, as one component of the coping strategies for a specific plant. Can you talk a little bit -- I guess George, about -- is the coping strategy a dynamic, evolving, living piece? Or is it static? Can you talk a little bit about how that might be updated as conditions at the plant, or in that particular part of the grid, may change?

MR. WILSON: The coping analysis that was done was a one-time snapshot that the licensees had to look at their coping analysis. We do evaluate, as I stated, in some of the license amendments like power uprate, if the battery capacity would be affected if they were changing and adding DC loads, and we'd go back and look at that. And as in the case of the one unit, due to operating experience, we challenged them and they went back and redid their calculation, ended up being a 16-hour coping plant. There has been several findings on station blackout. They look at the assumptions. So it is -- there are issues that are identified in different inspection procedures, but we do not go back and reevaluate the full-blown assumptions and calculations that a licensee does.

MR. BORCHARDT: I think that's -- the key is that the regional inspections that are done, as well as the resident inspectors, will look at every design change that's made at the plant, or nearly every, and then they'll look at 50.59 evaluations to make sure that all the proper considerations were taken into account. One of those would be loading on diesels, and if you change the load of the diesel, or you change the load on a battery, those would all be evaluated and would likely lead to an issue, perhaps, with station blackout. We don't do station blackout reviews per se, but there's many, many ways that you would get to a station-blackout issue just in the normal course of our oversight activities.

COMMISSIONER OSTENDORFF: Okay, thank you. Let me go back to a comment that George had mentioned in his briefing, and that was, we do have experience with hurricanes, and the Chairman mentioned the tornadoes we've had just in the last 24 hours, and certainly we had a tornado here in the last couple weeks down in southern Virginia that impacted a switchyard at a nuclear power plant. From the hurricane experience, or tornadoes, is there any big area of query that you think the NRC needs to look at, or feel pretty comfortable that our exiting processes adequately assess the impact of these weather-related events on off-site power availability?

MR. WILSON: Well, I know one of the things that the staff has done, to give you an example to add defense and depth, when industry and utilities have come in and asked for an extension, an AOT extension, a lot of outage time on some sort of power source, either being a diesel generator or transformer or one of the lines, one of the things that the staff requires is the replacement of that power source with some sort of other power source. Not safety related, but they bring in temporary diesel generators, and with that, the temporary diesel generators, what we have seen is that there are temporary diesel generators, so if something would happen, you could easily get one of the temporary diesel generators, and they got them at Waterford during Hurricane Katrina, they had the temporary diesel generators brought on-site. They had them in case they did lose off-site power, or they had a problem with the other diesels, and they had that temporary diesel there. So that we know that they do have that capability to do it, and they also line up fuel sources, I think, based on some discussions -- and one of my staff members, actually out in Waterford during Katrina, the roads were blocked, they had no other way, so they were starting to bring fuel oil through with a barge. So we have had lessons learned from the hurricanes that not only do they have extra power sources that they can get, but also, you have to think outside the box, to look to see how you're going to get the fuel oil there if the roads were blocked. So that is stuff that we've got lessons learned, and it has seemed to work. At Turkey Point, they ran the diesels for a couple weeks, so it seems to work.

MR. HILAND: Yeah, let me just add -- and Turkey Point's a good example, where hurricanes are something that you see on the weather map, approaching you. And there are procedures at the site, and they initiated it at Turkey Point. They shut the plant down before the hurricane got there. They started up the diesels, and essentially, they were well prepared for that event. So there is a process, versus a tornado is unknown. That tornado, you get about, at luck, 15, 30 minutes of warning, for a tornado warning, to react. But for hurricanes, we have procedures in place. Our regional office goes into a standby mode in the response center. The resident inspectors for Hurricane Andrew were on-site throughout the entire event, and so there are some preparatory work that you can do for a hurricane.

COMMISSIONER OSTENDORFF: Thank you. Eric, I'd like to turn to you for a minute here on B.5.b. And again, thank you for your presentation, and I recognize that there are limitations as to what you might be able to address in this session, but let me just ask this question. Can you talk in general terms as to what the NRC does to inspect the ability of the licensee to carry out B.5.b-type actions, as far as equipment reliability, testing that equipment, operator training, et cetera?

MR. BOWMAN: That's examined on a triennial basis, as part of the triennial fire protection inspection. We added the B.5.b requirements and the strategies that meet them as an inspectable area there, January 1 of 2010. So they look at -- so they look at the capabilities of the equipment to be used to meet the strategies, the maintenance on the equipment, and the training of the personnel.

COMMISSIONER OSTENDORFF: So we have a little bit over a year experience with that. Is that what we -- you said January 1, 2010? Any big "ah-ha" kind of lessons learned from that level one year experience so far?

MR. BOWMAN: If I could defer that to the closed session, I'd prefer.

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

MR. BORCHARDT: Commissioner, I would also just acknowledge that the industry has done a review of that equipment, of their own. They've identified some issues that are being resolved. Some of them are being informed by the uniqueness of what happened in Japan, as to where equipment is stored, for example. It was looked at differently now, given the tsunami kind of flooding issues, than we might have looked at it previously.

COMMISSIONER OSTENDORFF: Thank you.

CHAIRMAN JACZKO: If I could just clarify, the tri-annual is not the first inspections we've done at B.5.b. We did, following implementation of B.5.b we did a temporary instruction, as I recall, to inspect all the B.5.b implementation.

MR. BOWMAN: That's correct, sir. There were, I believe, four or five temporary inspections that were conducted along the development process. In 2008, we did a final verification that everything was in place. Then we transitioned to monitoring it through the reactor oversight process and the tri-annual fire protection inspection, and --

CHAIRMAN JACZKO: Okay. So that, I just wanted to clarify.

MR. BOWMAN: That's correct.

COMMISSIONER OSTENDORFF: Thanks for the clarification.

MR. BOWMAN: Sure.

COMMISSIONER OSTENDORFF: Thanks, Chairman.

CHAIRMAN JACZKO: Commissioner Svinicki?

COMMISSIONER SVINICKI: Thank you all for your presentations. My colleagues have touched on some topics I might have addressed. They might not have posed the questions in the exact same way, so I apologize if I'm covering any of the same ground a little bit.

At a very high level, Bill, you talked about the fact, you gave a status report on what's happening in Japan, and you talked a little bit about our 90 day and our longer term review. As long as our colleagues in Japan are focused, as they are now, very immediately and deeply still on mitigation, dealing with the circumstances on the ground there, they're obviously appropriately focused on that and not focused, right now, in being able to look at detailed chronologies of events, or lessons learned, or things like that. And yet, we have underway this near term review.

And so, my thought turns on station blackout to a question that I still want to ask you, because we do know quite a bit, and we have a presence in Japan, and we've been learning a lot about the events. I would ask any of you if you want to respond: based on what you know today, is there anything about the events that occurred in Japan, with relation to station blackout, that cause you to immediately identify areas in our regulations that you would assess today are potentially inadequate, based on what you know right now?

MR. BORCHARDT: Right after the event, and every day since, we ask ourselves whether or not there's some regulatory action we need to take to assure the protection for the 104 plants in this country. And to date, we have not identified anything that requires immediate action. That doesn't mean we won't identify some things that we want to raise to the Commission for future consideration. Station blackout rule oversight might be one of those.

But the short term task force is looking at station blackout. I believe they'll address it to some degree. I think it'll, if I were to guess, would guess that will also be an element of the longer term review, as we gain more and more information about the existence or the conditions of switch gear inside of the plants in Japan, which we really have no idea of the condition of that equipment.

COMMISSIONER SVINICKI: And I think, somewhat, my question is rooted in a comment, that I believe you made representing the U.S., and you were also, I think, Vice President, the Convention on Nuclear Safety, a really important international meeting on national nuclear safety cooperation internationally. But I think you indicated in your remarks there that we may be learning about this event even a decade from now.

So is it accurate to say that, for our 90 day review and also the longer term, that we will, by, perhaps, the end of the year, we'll be looking at issuing some further recommendations if appropriate? It will still be challenging to have good fidelity and solid knowledge of all of the events that occurred over in Japan. Is it true that the team that's doing the 90 day review and our longer term review, they're going to struggle with that issue?

MR. BORCHARDT: Clearly. I mean, and their charter acknowledged that they're to use whatever information they have available today. Because we didn't want to wait until we had all of the information; who knows how long that would be? So we didn't want to delay in doing what was appropriate and prudent to do now, or in the near term. And so they will identify many holes in our knowledge that, hopefully, many of those will be filled during the time period of the longer term review. But it's not outside the realm of possibility that it'll be years before we know the full condition of, you know, the inside of the core, and various pieces of equipment that are currently in very high radiation areas.

COMMISSIONER SVINICKI: And this may sound simple, but sometimes things are more complicated than we think. Do we have a good ability right now to do a comparison between our requirements on station blackout and Japan's requirements on station blackout? That sounds very simple, like, as long as we can translate it, why don't we have the ability to just lay those side by side? Is that more complicated than we think?

MR. BORCHARDT: I don't know, you know, and I don't know how much of the short term task force, they've looked into that. But you're right, it sounds like it'd be pretty simple, it's something you could do through a web search even. But I don't really know, if Artie or -- where's Artie?

CHAIRMAN JACZKO: Right behind you.

MR. BORCHARDT: Yeah. We'll have to get back to you.

COMMISSIONER SVINICKI: Okay, but that is something that it would be your understanding that, for the 90 day review, they'll at least try to access whatever they can in terms of comparability, and that would inform whatever it is the 90 day review would put forward?

MR. BORCHARDT: I think that sounds reasonable.

COMMISSIONER SVINICKI: Okay.

MR. BORCHARDT: they're not doing it now, they will be later today.

[laughter]

CHAIRMAN JACZKO: Let's make sure that they have their, you know, that that's a task, that they can complete in the appropriate way, then they'll do that.

COMMISSIONER SVINICKI: And then I would characterize some of my colleagues' questions, based on the presentations you gave, they have to do with something I think the NRC has been questioned about since this event occurred, and it is: how frequently do we challenge and reassess underlying assumptions that we've made in developing the regulations we have in place? So, George, you talked quite a bit today about looking at any time a licensee might propose a change on-site, we will look at the evaluation they did to comply with station blackout. We'll see if there's any effect there, and we would challenge that.

But I think that some of the questions that I think NRC has been asked have to do with: do we look at our assumptions about broader external conditions? And George, you've mentioned working with the Federal Energy Regulatory Commission on grid reliability, grid status, the North American Electric Reliability Corporation. We have important relationships there where we reassess that. But, of course, that's very dynamic, as the nation looks at maybe having more renewable energy, the grid may look different in the future. Can you characterize our overall engagement on really having access to the best information about external things like grid reliability, so that we can constantly be informing whether our regulatory assumptions that we've made in the past are adequate?

MR. WILSON: We -- as I had stated, we meet quarterly with both NERC and FERC. And if anything comes up, we're aware of it. We actually are noticed and given information if they're going to change any of their reliability standards. We have commented on the reliability standards to ensure that the safety of the nuclear power plants are maintained. I feel very confident about the status of the grids.

When they do new reports, we know that they are doing new research reports, such as there's three reports out right now that we're looking at, based on the frequency response of the grid and the interconnection. We do have, joint Commission meetings with the Federal Energy Regulatory Commission and we also invite NERC. We have contacts with the Department of Energy on their grid sector, their energy sector, to evaluate that. So, as things do change, we do re-look at that. And to see if we do have to evaluate the grid assumptions and the staff has been looking very hard at this for the last three years, specifically with stuff that changes in the grid, and to see how the renewable sources such as, specifically, wind, and how that's taken, because it potentially affects the reliability. And there has been an incident where the wind just stopped blowing and there was 1100 megawatts that was lost in ERCOT, which is the Texas grid. So I feel very confident, we know the status of it and are evaluating that.

COMMISSIONER SVINICKI: And you mentioned, in response to a question from Commissioner Ostendorff, that our site-by-site evaluation of the compliance with station blackout was a bit of a one-time snapshot. Based on the answer you just gave me, do you have all of the authorities that you need, if you did need to change an underlying assumption that was external to the plant conditions itself, having to do with a grid or something else? Do you feel confident that you have the authority to compel that licensees have to take that changed circumstance into account?

MR. WILSON: Yeah, I think that we have the process that we do look at it potentially as plant-specific backfit, or if we thought there was a broad look at potential rulemaking, and route that through the process. So I would think that process is in place to do that.

COMMISSIONER SVINICKI: Okay. And my last question is -- I'll rope in Pat, because I think this is a little bit of a put you on the spot question, but for George and Pat: we've talked a lot about four hour batteries. We talked a little bit about eight hour batteries. But, you know, you're probably, like many of us, since this event occurs, there's been a lot of discussion about four hour battery life.

And I don't know if, perhaps, at a family event, or a barbeque, or anything, maybe some member of your family might come up to you and say, “Well, you know, we have natural events that can occur, like hurricanes: those can be multi-day events. What is the basis for having four hours?” Just to a lay person, when they come to you and say, “Is it really only four hours that nuclear power plants have to cope with some sort of event of a long duration?” What do you say to -- if you were talking to a family member, what would you say to that?

MR. HILAND: Yeah, I'll start. First of all, the, I would talk to the family member and say, “That's the maximum that we allow reliance on a battery.” We have a high expectation that you restore either off-site power or one of your emergency diesels, or an alternate AC power source. It doesn't mean that the battery -- as you heard, we have an example of a plant that has a small generator; maybe they bought it at Home Depot. And they bring it in, they charge the battery, or recharge the battery.

That means you can extend the life of the battery, but the four hour coping time is the maximum we allow. That's not to say the batteries can't last longer than that. I don't have the details of all the batteries at the plants, but they're tested periodically to assure that they're in a high state of readiness. That's how I would answer that question.

Our experience is the reliability of our emergency diesels is very high. Very high reliability, and it's very -- demonstrated very promptly to restore emergency diesel that either didn't start the first time, there's a problem with it, the mechanics are on-site, the operators know how to operate the controls of the diesel. So we have some high level of confidence that, within four hours, they'll get either off-site power back, of course that doesn't happen if you have a hurricane, or they'll get the emergency diesels back on line. That's my answer. George?

MR. WILSON: Yeah. What I would add is, because I've been asked this question. I commute two hours each way and I get asked this question a lot, recently. And how I've answered is that we've only had one station blackout in the United States. Our diesels are very reliable, and they restored that power within 55 minutes. I also explain that we have redundant power supplies. So you have to have something to take out multiple sources of power. And once I explain that, I've, usually they stop, or I run overboard -- [laughter]

COMMISSIONER SVINICKI: All right, thank you. Thank you all very much. Thank you.

CHAIRMAN JACZKO: Commissioner Apostolakis.

COMMISSIONER APOSTOLAKIS: Thank you, Mr. Chairman. I guess most of my questions have been asked, but I, we've been talking about assumptions and so on. It seems to me, two of the assumptions that we have been making regarding station blackout now have to be questioned in light of what has happened in Japan.

One is the time that we consider when we try to manage station blackout. I mean, we talk about four hours, eight hours, some PRAs go to 24 hours. But as far as I know, there are no studies that go to weeks. And that's the first assumption. The second assumption is that there may be major infrastructure damage. So when you, Mr. Wilson, talk about diesel reliability, I assume you are talking about under conditions that are not as severe as what we have seen in Japan. So are these the two assumptions that we have to revisit now, in light of Japan? The time and the state of the infrastructure?

MR. BORCHARDT: Well, in my view, clearly the state of the infrastructure is very important. I mean, it's for station blackout, it's for emergency preparedness, it really cuts across the entire spectrum of plant response to an event. We practice emergency response activities assuming that there is the infrastructure surrounding the plant. So there's clearly a good lesson learned.

Regarding the duration of the time, I think there is something, we certainly need to evaluate. But I do believe that our regulatory processes and requirements, even though they might, you know, they talk about four hours for the batteries. We, as Pat and George mentioned, have requirements for reliability of the diesel generators, for tech specs, times for how long they can be out of service, and all of those requirements, and fuel storage tanks requirements, that assume that it's going to be a longer duration event than just four hours, certainly.

COMMISSIONER APOSTOLAKIS: But certainly not weeks, though. I don't know of any study that went out that far.

MR. BORCHARDT: No, but I think that there are, there are plant procedures and protocols in place to get the tanks refilled for diesel generators. I mean, diesel generators are an incredibly important system for plant response.

And there are -- every plant that I'm aware of has arrangements to have their facilities, their tanks refilled, in the event that they need to go on long term operation of the diesel generators. When we had the northeast blackout a number of years ago, there were some plants that had, off-site power was out, for a time period, and all those preparations were put into play in order to go, assume that we would have long term loss of transmission capability.

COMMISSIONER APOSTOLAKIS: Now, I have a question regarding the temporary instruction. I'm trying to understand what exactly the inspectors did that led you to the conclusion that there are no issues. Did they go in there and look at whether our regulations and the commitments of the licensee are met? Or did they go beyond that and they looked at, you know, what if we have a major external event, natural phenomenon, what's going to happen? Are you prepared to cope with it? Is that something that the task force will look into and the inspectors just looked at the current commitments and made sure that they are, in fact, satisfied? And then, of course, the conclusion that there are no issues probably makes sense.

MR. BORCHARDT: In general, we want to give our inspectors guidance to go out and inspect against existing requirements. They may identify topics and ideas that go beyond the design basis or beyond the regulatory requirements. We were certainly becoming aware of some of those ideas, but as a general rule, we inspect against existing requirements. The task force would be the proper vehicle to say, okay, that's fine, but do we need to revisit what the regulatory requirement is? Does it need to go further than the current construct does?

COMMISSIONER APOSTOLAKIS: The B.5.b equipment. I don't know if it's appropriate to ask the question now, but did you consider major catastrophe and what it could do to the B.5.b equipment?

MR. BOWMAN: The B.5.b was the response to an event that involved explosions and fire, so that was generally the focus of what was looked at in developing the mitigating strategies that would meet the requirements. We can discuss it further in the closed session. I think that would probably be appropriate.

COMMISSIONER APOSTOLAKIS: Commissioner Magwood mentioned earlier that what will happen at a particular site is, of course, site-specific. And I'm wondering whether we have site-specific accident sequences and somebody, the licensee, or us, or both, are looking at these sequences and make sure that the regulatory requirements we have, or the commitment of the licensee, since it's beyond design basis, are actually consistent with the site-specific nature of these events.

And one example, for example, we -- one example, for example, okay. When we assume that the operators will actually do something, are we considering the possibility they won't do it? Or that they would do the right thing, or the wrong thing? You know where I'm going with this. Are you using PRA at all, when you're doing these evaluations?

MR. HARRISON: I think, in a general sense, if you go back to the IPEs and IPEEEs, there was considerations that would be PRA-oriented analysis to address some of this. The IPE and IPEEE were used to close out a number of the safety issues that were, in the mid-80s, related to various capabilities. So those were reviewed in that context. Now, we also have SPAR models, and licensees have internal event PRA models that they have. And again, that should inform their SAMG's as to, like, if you need a diesel generator or fire pump capability, if you have that capability, you can put that in your plant-specific PRA and show that you could mitigate some severe accidents using that.

COMMISSIONER APOSTOLAKIS: So some of it is done.

MR. HARRISON: Some of it is there.

COMMISSIONER APOSTOLAKIS: Okay. Thank you, Mr. Chairman.

CHAIRMAN JACZKO: Okay, I'll go back to Commissioner Svinicki's question about the family picnic, or whatever, wherever it was. One of the things I'm having trouble reconciling, I think Commissioner Magwood raised this point too, is the four hour, the four hour time, the coping time, and I think, Pat, you did a nice job explaining that's the maximum time that we would allow before we would expect off-site power to be restored. Where I'm having a hard time reconciling that is we have lots of examples where it takes longer than four hours to restore off-site power. So there seems to be an inconsistency with that assumption, and I think, George, you said the same thing: that our data says that restoration takes about three hours. So I'm not sure if that, if that includes some run time for the diesels and then four hours, or if that is four hours with, say, an immediate loss of off-site power and an immediate inability of the diesels to operate. How do you reconcile those two issues?

MR. WILSON: Well, the four hours is based on losing all alternate current power. So that's the losing the diesels and losing off-site power. As to diesels are running and you have your power supply --

CHAIRMAN JACZKO: Right.

MR. WILSON: -- and that's what we've seen here, in the U.S., the diesels have ran. We've only had that one event. But the four hours, like I said, is, that's just based on having no power and just doing, only coping on the batteries by itself. If you have -- if you can do a combination, then you do an analysis. You do a coping period that, if you think your batteries, you're going to need your batteries for two hours, you would do a coping analysis that says, I can handle just on the batteries for two hours, then I have my alternate AC power come on, and then I do an analysis on how long I would think that alternate AC power needs to run before I would restore the power. That's how they're all combined. So the four hours is the, what I would consider to be the worst-case scenario, where I have nothing, I'm just on my batteries. And, like I said, there are processes that --

CHAIRMAN JACZKO: And I appreciate that. The point, though, is that, clearly, if we get into a situation which is the situation we have in Japan, which is, where you lose the diesels, it takes more than four hours, in some cases, to get off-site power restored. In the hurricane situation, you know, Turkey Point, you said the diesels were running for days? I'm interpreting that to mean that it was days before off-site power was restored. I mean, I think, from Browns Ferry last night, they still have not restored, maybe they have one line, not fully restored, but they have one line, so that they seem to be okay, there. So --

MR. HILAND: [inaudible] emergency diesels there.

CHAIRMAN JACZKO: And, again, and in that case, the diesels are running. But, of course, the station blackout is the rule for when the diesels aren't running, is not the rule for when the diesels are running. It's intended to be that situation in which they don't, they don't run, for whatever reason. So, again, that's why I think, from a risk perspective, we don't believe it's a significant event. But four hours doesn't seem to be a reasonable time to restore off-site power if you've, if you've lost the diesels immediately. So I'm not sure where we have the data that supports that right now. I mean, unless I'm, I mean, tell me if I'm wrong, I guess it's what I'm trying to ask. Am I wrong about hurricanes? Did it only take four hours to restore site power and they just didn't --

MR. HILAND: No, you're correct. You're correct. But the four hours, as George described, came from an analysis that what was the ability to restore off-site power, and what was the ability to restore, how reliable were the emergency diesels. Now, they came up with two hours. And we said, okay, two hours is the average at the time. We're not going to allow anyone to give an analysis greater than four hours, with that expectation.

And you're right. In the hurricane situation, the reason the plants have, you know, preemptive procedures, when they see a hurricane approach, they shut the plant, they turn on their emergency diesels, and that's, they anticipate the loss of the off-site power. You know, the four hours is, you want to restore either off-site or an emergency diesel. And we, we may confuse emergency diesel with alternate AC power. And alternate AC means your emergency diesels are out of service, as some, some mechanical problem or common mode, and you have this alternate AC. And there's a number of plants that chose that path. The alternate AC, and the reason for the time frames, is how much fuel do you have on-site for this alternate AC, whatever the gas turbine, how much gas do you have available to run it? And you know, typically -
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CHAIRMAN JACZKO: Those alternate ACs are not seismically qualified.

MR. WILSON: That's correct, they're not.

MR. HILAND: Right, that's correct.

CHAIRMAN JACZKO: So they're not intended to necessarily survive --

MR. HILAND: That's correct.

CHAIRMAN JACZKO: -- some of those type of events.

MR. HILAND: Right.

CHAIRMAN JACZKO: Well, I appreciate that and as I said, I'm just trying to understand the, you know, kind of the basis. And, again, just to reiterate, it's not, the diesel reliability is very high, and I was just looking back at the statement's consideration for the original ruling, even, I think, in the time from the 80s to the time in which the rule was ultimately implemented, there were improvements in diesel generator reliability. I assume that those improvements have only enhanced over time, to today. So the likelihood of a station blackout is very low, but in the event that there is a station blackout, that's externally driven, I'm not convinced that, in that situation, four hours is a reasonable time to restore off-site power. And that may be something that we want to look up a little bit more.

There's been, I think, a lot of good questions about the coping analysis and the living nature of that coping analysis. I understand that the staff has looked at this issue in the past, and one of the, I think one of the options that was considered, given that the rule doesn't appear to allow, directly, the agency to require an update, that coping analysis, one of the issues that was presented was the possibility of a generic letter. I don't know if you have any information on the status of that. Is that something the staff is pursuing, or are they no longer pursuing a generic letter to update coping analyses?

MR. WILSON: Actually, we were, we have evaluated looking, looking into going to the rulemaking as what we have looked at. So that is something that the staff is still looking, and we'll pass the data that we have on to the 30 day look team --

CHAIRMAN JACZKO: Okay.

MR. WILSON: We do have, we do have some data that we've done and that data will be passed on to the, to the look team. And I was not aware of a generic letter. We were looking at a lot of data that we had received, both from FERC and NERC, and some of the NUREG studies, and looking to see whether or not we had to go after rulemaking and --

CHAIRMAN JACZKO: Okay.

MR. WILSON: -- enhance the station blackout rule itself.

CHAIRMAN JACZKO: So that is, that is effectively ongoing at this point, although not at a, maybe not gotten to a --

MR. WILSON: Yes, we're still, we're still accumulating data.

CHAIRMAN JACZKO: Okay. Good. Thanks. To what, and we've talked a little bit about, kind of from the external perspective, what the station blackout does, but I wanted to explore just an issue of, obviously, a significant consideration that we've seen from Japan is the impact on spent fuel pools. And to what extent are the spent fuel pools and the limited power needs that they may have included in the station blackout considerations. Is that a piece of it, or is it just the core?

MR. WILSON: No, the station blackout rule did not evaluate the spent fuel pool cooling, so that was not part of the rule itself. That was one of the reasons that we had added the other portion, and had Eric go over some of the B.5.b strategy, because that specifically evaluated the spent fuel pool.

CHAIRMAN JACZKO: They, maybe under severe -- I mean, are there procedures, maybe under severe accident, or under, I guess it would be more under the B.5.b, to provide power to, to whatever systems are necessary for circulation in the pools? Do those procedures exist more on a kind of a severe accident perspective, or?

MR. WILSON: Well, I have some rough data that, we have conducted a survey of the spent fuel pools. It was done in the mid-90s, and about a third of the plants, the spent fuel pools themselves are actually on a -- the back-up power is the diesel generator, so they're actually on the safety buses. They're manually loaded, so they are on a safety-related power supply. A large number of the other ones actually have RHR as a back-up to provide spent fuel pool cooling or make-up, so RHR is a safety-related system, then that would be the back-up of the diesel.

And then there's several others that they can put a spool piece in to cross-connect systems, to provide additional cooling and make-up mechanisms. So we did look at that in the 90s and evaluate that. So there are ways that they could transfer power, since they could get the battery backup, or a system that is powered by the 1E safety-related system, to provide that. So that has been looked at.

CHAIRMAN JACZKO: All right. And then, just turn to the last question. And maybe it, almost may be the opposite of, the flip side of what Commissioner Apostolakis raised, which is: to what extent are we, and how are we modeling station blackout in some of the risk assessments that we do? Do we have a good way to model these kinds of events as we look at our severe accident and the, I mean, particular in the PRA? How exactly do we model these kind of events? And I think, hinting from Commissioner Apostolakis, we don't necessarily look beyond 24 hours for this kind of situation, into the longer, longer time frame. And is that a non-conservatism or a conservatism in the PRA analysis that we have.

MR. HARRISON: The way that the point-specific PRA's are developed, the key becomes the probability of recovery of off-site power, ultimately. I know back in the '80s, it was, like, 50 percent of all events were recovered in the first half-hour, and it kind of works down from there. So, and most of the data says that at least prior from my past, we had no events that went beyond like 10 or 11 hours, or something like that. So that gives you a tail of the curve on the recovery curve.

So most PRAs run for 24 hour mission times, if there's some critical issue that occurs after that, they may run to 32 hours, or something like that. But what they're looking for is reaching a safe, stable condition at the plant, so if I can -- I got power back or I've got some capability where I can maintain that, then they'll stop the analysis and declare it successful. What that will mean is if you're into an extended outage after an earthquake or whatever, you're going to have to provide fuel to the diesels, and in that situation it's determined that, within a day, you can get those supplies there. Or, within eight hours, you'll be able to get that fuel supply to the plant and be able to provide it. So, that's an inherent assumption, I would say, that's underneath the PRA: that those capabilities will be there.

CHAIRMAN JACZKO: As we go forward, I mean, and again, as we get more information and the task force is looking at this kind of things, I mean, that obviously would probably be relevant data inputs to see if some of those assumptions are no longer unnecessarily valid as we go forward. So, again, we appreciate your information. I don't know if anyone has any other questions. Commissioner Magwood?

COMMISSIONER MAGWOOD: Just a quick question about Japan. One of the things about the early portions of the events in Japan that was a bit frustrating was recognizing that the Japanese were unable to provide emergency power to the plant and weren't able to connect the -- they brought generators in but couldn't get them connected. Do we have any more insight or understanding as to what the problem was in the early days of the event?

MR. BORCHARDT: I don't have a definitive answer. It's another one of those areas where we don't have clear information, but we do have good indication that the switch gear on the lower elevations of the building were severely affected by the tsunami, and that probably, and this is just my opinion, probably caused serious degradation to the electrical distribution within the plant. So even if you had an electrical supply, the temporary generator, there's no place to make an easy connection.

CHAIRMAN JACZKO: Any other questions?

COMMISSIONER APOSTOLAKIS: I'd like to make one brief comment. The key in developing the accident sequence in a station blackout is the recovery of off-site power, as Donnie mentioned. The 0.9 to two hours range that you mentioned referred to routine failures of the grid. People now have two separate curves, which goes back to your question, Mr. Chairman. There is one curve for recovery from these routine events, and another one from major external events. And that time goes much longer than two hours. So the four hours which was conservative I guess applies only to the routine events and not to the longer.

CHAIRMAN JACZKO: Well, again, I thank you all for your insightful information, and it's given us lots of things to think about. And we'll adjourn now and have just a brief closed portion to discuss some of the B.5.b. issues. Thank you.

[Whereupon, the proceedings were concluded]