Nuclear Infrastructure Council (NIC)
Special Summit on New Nuclear Energy
Prepared Remarks of William D. Magwood, IV, Commissioner U.S. Nuclear Regulatory Commission
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I appreciate the opportunity to meet with you today. I have been on the Commission for a bit more than one year. It's been a fantastic experience – mostly because of the people who work at this agency. They are among the most committed and passionate public servants I have ever encountered and it is a true pleasure to serve with them.

The last year has been replete with complex and sometimes controversial matters. The Commission has wrestled with issues related to the medical uses of radioactive materials, blending of low-level wastes, long-term storage of spent fuel, oversight of fuel cycle facilities, and many more important topics. But nothing has had more impact during my first year at NRC than the tragedy of the Fukushima-Daiichi nuclear plant.

I expect that most people who have worked in the nuclear technology arena experienced a very personal reaction to the events following the March 11 earthquake and tsunami. This was certainly the case for the people of the NRC. We could only watch as the 24-hour news cycle reported the deterioration of the Fukushima plant. It was a depressing and frustrating time.

NRC staff could not just sit and watch – they wanted to help. Many staff immediately volunteered to provide whatever assistance was possible. By the Monday following the earthquake, 11 NRC staff were in Japan. In the months since the height of the crisis in Japan, we have remained very engaged with the Japanese as they continue the hard work of stabilizing the damaged units. Several NRC staff remain in Japan, providing advice and assistance. Back at NRC headquarters, much of our attention has focused on understanding what lessons the events at the Fukushima Daiichi might have for the U.S. nuclear regulatory framework.

NRC considers itself a learning organization. As we have done in the past, we will evaluate and analyze the events and seek to gain insights from the experience and make the adjustments that are needed. As I'm sure you know, we have established a senior level task force to conduct a 90-day review of our processes and regulations in light of the Fukushima to determine whether the agency should make additional improvements to our regulatory system. The final report of this task force will be made to the Commission in mid-July.

The Commission has instructed the staff to set up a longer-term review to respond to the task force report. This effort will proceed well into next year and we will ensure that this process is conducted in an open and transparent fashion. I await the report of both the task force and the longer-term staff review. However, as Fukushima and its aftermath have unfolded over the last months, I have begun to draw some basic conclusions that I would like to share with you today.

First, I think it is important to note that many of the technical details associated with the crisis at the Fukushima Daiichi plant are still uncertain. There is a lot we do not know and as more information becomes available, views are certain to change and evolve.

As a general matter, I think the plant behaved more or less as one might think after getting hit with an earthquake and tsunami of historic size. But there is still much to understand about the condition of plant systems immediately following the earthquake but before the tsunami. From what we know so far, it appears that the plant performed as designed when the earthquake struck, but many questions remain. If, for example, we were to find that vents or cooling systems at Fukushima were compromised by the earthquake itself that would have a significant impact on our analysis and the actions NRC would need to take in response.

While it is important to understand the technical details of what happened at Fukushima, these details will not in all instances bound what I believe we must consider in our review. I think this has been the case with all modern nuclear reactor incidents. We learn from them in both highly detailed, technical ways and in broad conceptual ways. Often, the broad conceptual lessons are more important than the details.

From Three Mile Island, we learned the importance of assuring operational excellence and emergency communications. From Chernobyl, we learned the importance of safety culture and effective containment systems. With the facts still coming in, I believe the broad lesson of Fukushima may be the critical importance of accident management and recovery.

I believe we do a very good job of analyzing the conditions surrounding plant sites in the United States. I believe we are very good at applying history, scientific investigation and analysis, and technology to anticipate the realistic threats natural phenomena might pose to a nuclear facility.

However, in reflecting upon the sight of the massive tsunami that swept over northeastern Japan in March, it is difficult not to think that try as we might, with all the best intentions and all the best technologies, we can simply never be absolutely certain that we have anticipated every natural disaster that might challenge a nuclear power plant. We have to recognize that once in a while—hopefully very rarely—the earthquake will be more powerful than expected. The flood will be more severe. The storm may be more violent. Thus the conclusion I draw, is that we must not only plan for and mitigate what we believe might happen—we must also be prepared to recover from the unexpected.

Fortunately, in the U.S. our framework is prepared to adapt to such a lesson. We already have elements of regulation and operations in place that go some distance in helping us to assure that we are taking the appropriate actions to protect the health and safety of the public. The question I believe we must face is whether, in the light of Fukushima, these elements must be enhanced.

One such element is the Station Black Out rule.

As the events at Fukushima reached a critical period during that first week, I recall telling a friend who was asking questions about what was happening that if you want to postulate a scenario in which a nuclear plant is most likely to run into serious problems, the most obvious starting point is to assume a station black out—a complete loss of both off-site and on-site AC power.

This, of course, is what we saw happen in Japan. As offsite power was lost, the plant's emergency diesel generators activated to supply power to the core cooling systems. This is not unlike what we have seen in several plants in the mid-western U.S. that have experienced violent weather events in the last few months.

However, the tsunami that followed the earthquake reached a height of over 14 meters, much higher than the plant was designed to resist. The sea walls collapsed and the fuel tanks supplying the diesels were washed away. Worse, the generators themselves and their supporting equipment were submerged and stopped functioning.

In the U.S., nuclear plants are required to cope with the loss of onsite and offsite power until one or the other is restored. We rely on batteries to power monitoring equipment, valves, and other systems to enable plant staff to manage the situation until power is restored to the primary systems. Typically, U.S. plants have sufficient battery power to cope for four hours. Obviously, in event of a widespread disaster such as an earthquake or tsunami, it may not be possible to restore power in four hours.

Our rules were predicated on the thought that offsite power could be restored reasonably soon and that if generators were to fail, they would fail through some unexpected means. We have not considered a common cause, simultaneous failure of both offsite power and the onsite diesels. Fukushima has illustrated that such a common cause failure cannot be ignored.

While large earthquakes and tsunamis are unlikely in most parts of the U.S., severe weather and floods certainly are and challenge U.S. nuclear power plants even as we meet here today. So what does this tell us about our station blackout requirements? Should we simply increase the coping time to 24 hours? 72 hours?

Now, as it turns out, we do have another layer of defense that could prove important if a plant were to lose AC power for an extended period. After the terrorist attacks of 2001, we required U.S. plants to establish the capability to provide emergency cooling water to the reactor and spent fuel pools in response to an extreme event that disabled plant systems—such as an explosion or large fire. These requirements are generally known under the banner of "B.5.b."

Clearly, these B.5.b. capabilities were not intended to respond to a large-scale natural disaster, but having a portable, independently-powered pump available to deliver water where and when it is needed provides an important backup capability that could be used to deal with a host of emergency situations. If the staff at Fukushima had had these systems available, it could have made a significant difference during the early hours of the crisis.

However, in the U.S., this equipment is maintained a short distance from key areas such as reactor buildings and is generally kept either outside or in sheds and garages. Equipment stored in this manner would not have survived at Fukushima. This highlights the need to consider a modification to our strategy in the U.S. Should these emergency systems be protected? Should they be located at some greater distance to protect them from a site-wide catastrophe?

A final area I'd like to discuss before making some general observations are Severe Accident Management Guidelines—SAMGs. SAMGs and the procedures each plant maintains to implement them are intended to provide operators with a structured approach to respond to severe accidents during which core damage has already occurred.

SAMGs are design to minimize further core damage and maintain containment integrity and to minimize radioactive releases. The SAMGs provide symptom-based guidance to assist plant staff in stabilizing the situation. SAMGs were implemented in the 1990s in the United States and are a voluntary initiative. They are not included in NRC regulations and thus have not received rigorous oversight by many licensees. Thus, it is not surprising that our recent inspections have revealed inconsistent implementation of the SAMGs amongst licensees. Moreover, SAMGs do not cover actions to be taken in the event of damage to a plant's spent fuel pools.

An immediate instinct, which several industry executives shared with me in the weeks after Fukushima, is that NRC should establish a regulatory footprint to require SAMGs to be upgraded to deal with spent fuel pools, effectively maintained, and the subject of regular staff training. But this raises very significant issues. SAMGs are specifically designed to respond to beyond design-bases events. What is the appropriate regulatory role in this regime? And if NRC does move more aggressively into this area, how far do we go? How can we regulate to guidelines that were established more than 20 years ago and never received a full regulatory review?

These are the types of questions we will encounter over the coming weeks, months, and years. And these are the issues foremost in my mind at this stage. But as we proceed, I believe that we must also recognize three very important factors. First, the elements I mentioned today are not independent. They are fundamentally interconnected. SAMGs should ideally capture the availability of B.5.b equipment. The availability of B.5.b equipment should inform requirements for coping with station black out.

Second, there cannot be a one size fits all approach to these issues. Plans must be tailored carefully to the assets, conditions, and needs of each plant. It is vital that we approach these issues with sufficient flexibility to allow the best solutions to develop for each facility.

Third, and perhaps most important, it is my view that these matters would best be addressed in the context of an unrestricted dialogue between NRC and licensees. If we attack these issues independently and separately, we may find that the most effect approaches are bypassed. For example, a voluntary effort by industry to assure the availability of emergency equipment might prove a valuable mechanism that could enhance the effectiveness of NRC action in other areas.

Finally, I think it important that we reiterate that U.S. nuclear power plants are safe and safely operated. We will learn from Fukushima and if we find improvements that can be made in our regulatory framework that truly enhances safety, we should implement them quickly and effectively.