Written Testimony

Of

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On behalf of the

US Nuclear Regulatory Commission

Senator Durbin and Senator Kirk, I'm honored to appear before you today on behalf of the U.S. Nuclear Regulatory Commission to address the continuing safety of the nuclear power plants in Illinois.

I would first like to offer my condolences to all those affected by the earthquake and tsunami in Japan. Our hearts go out to all those who have been dealing with the aftermath of these natural disasters, and we are mindful of the long and difficult road they will face in recovery. We know that the people of Japan are resilient and strong, and we have every confidence that they will come through this difficult time and move forward, with resolve, to rebuild their vibrant country. As an NRC employee, I am especially proud of the efforts of my colleagues who are providing technical assistance to Japan, to aid in their efforts to control a very challenging situation at the Fukushima plants. Since Friday, March 11, when the earthquake and tsunami struck, the NRC's headquarters' operations center has been substantially augmented in order to monitor and analyze events and to provide expert assistance and review. At the request of the Japanese government, and through the United States Agency for International Development (USAID), the NRC sent a team of more than 12 experts to provide on-the-ground support. Within the United States, the NRC has been working closely with other Federal agencies as part of our government's response to the situation.

Background to the NRC

The NRC is an independent federal agency, with approximately 4000 staff. We play a critical role in protecting public health and safety of the American people. We have inspectors who carry out duties full-time at every commercial operating nuclear power plant in the United States, and we have world-class scientists, engineers, and professionals who work together to assure that the nuclear material and nuclear power plants in our country are safe and secure. From the NRC resident inspectors, who work at and live near the reactors, to the dozens of region-based specialists, who visit the plants regularly to

assess emergency planning, security, maintenance, or engineering, there are about 225 people in NRC's Region III office in Lisle, Illinois; we are absolutely dedicated to making sure that the 24 reactors in the Midwest are safe.

The NRC carries out rigorous reviews to confirm that our nuclear plants are built and operated safely. All commercial U.S. nuclear power plants are designed and built to withstand sit-specific environmental hazards, including earthquakes, tornados, floods, and tsunamis. Even those plants located outside of areas with high seismic activity are designed for safety in the event of such a natural disaster.

The NRC requires that safety-significant structures, systems and components be designed to take into account the most severe natural phenomena historically reported for the site and surrounding area. The NRC requires an additional safety margin to provide added robustness. This basically means that U.S. nuclear power plants are designed to be safe based on historical data from the area's maximum credible earthquake, floods, tornadoes, and tsunamis.

Nuclear power plants in the U.S. are subject to strong safety oversight:

- Every reactor in this country is required by NRC regulation to be designed for natural events based upon the specific site where that reactor is located;
- There are multiple barriers to the release of radioactivity at every reactor;
- There are a wide range of diverse and redundant safety features in order to provide assurance of public health and safety;
- The NRC has a long regulatory history of conservative decision-making. We use sound risk insights to help inform our regulatory process, and have continued to require improvements to the plant design and operation as we learn from operating experience over the more than 35 years of civilian nuclear power in this country;
- Our regulatory process has been informed by lessons learned from previous significant events, such as Three Mile Island, Davis-Besse, and September 11th, 2001;
- We also have severe accident management guidelines, emergency operating procedures, and procedures and processes for mitigating scenarios such as large fires and explosions, regardless of the cause;
- Further, we have a station blackout rule which ensures an appropriate response to loss of power at a plant, and a hydrogen rule for reactors to prevent explosions within containment.

Reactor Safety

I would like to focus on the factors that go into assuring the NRC that domestic reactors are safe, including the nuclear reactors here in Illinois. The NRC has, since the beginning of the regulatory program in the United States, used a philosophy of Defense-in-Depth, which recognizes that nuclear operations require the highest standards of design, construction, oversight, and operation. But even with these high standards, the NRC will not rely on any one level of protection for maintaining public health and safety. So, the design for every single reactor in this country, after accounting for site-specific threats – such as earthquakes, tornadoes, hurricanes, floods, or tsunamis – also has multiple physical barriers to prevent radiation release. On top of this, there are diverse and redundant safety systems. NRC regulations require these safety systems be maintained in a state of readiness and frequently tested. It is my job, and that of the NRC, to ensure that they are. My inspectors and I are determined, exacting, and thorough in this pursuit. Should a very unlikely significant event occur, each plant has emergency preparedness plans which would be put into action. These plans are developed in cooperation with the NRC, FEMA, and State and local officials.

The NRC has always sought to learn from previous operating experience to review and amend our requirements as necessary – and we will continue to do so. The most significant nuclear event in this country was the Three Mile Island accident in 1979. As a result of lessons-learned from that event, changes were introduced across the spectrum of NRC's regulations. The NRC significantly revised emergency planning and emergency operating procedures. Many rules for control room operators were enhanced. We created requirements for enhanced indication of the status of pumps and valves. To further reduce the likelihood of any explosions inside of reactor containments, the NRC added new requirements for hydrogen control. The NRC introduced requirements for a post-accident sampling system that monitors for potential radioactive material release and possible fuel degradation.

One of the significant changes after Three Mile Island was the establishment of the Resident Inspector Program, which provides for the posting of at least two full-time NRC inspectors at each plant. These inspectors have unfettered access to all licensees' activities 24 hours a day, seven days a week; they also live in the community and have a direct stake in the safety of the facility.

Also as a result of operating experience and ongoing research programs, the NRC has developed requirements for severe accident management guidelines. These are programs that perform the "what if" scenario. What if all of this careful design work, all of these important procedures and practices and instrumentation all failed? What procedures, policies, training, and equipment should be in place to deal with the extremely unlikely scenario of a severe accident? These programs have been in effect for many years and are evaluated by the NRC.

As a result of the events of September 11, 2001, we further enhanced our requirements, and identified mitigation strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with the explosions or fire. These enhancements and strategies are directly applicable to the kinds of very significant events that are taking place in Japan.

The NRC also has requirements related to what is termed "station blackout;" every plant in the country has to maintain a response for loss of power. A plant could respond by using batteries for a while, but must also have procedures and arrangements in place in order to restore power to the site and to provide cooling to the core. As I mentioned earlier, there's a hydrogen rule to mitigate the impacts of hydrogen generated as a result of beyond-design basis events and core damage. There are equipment qualification rules that require indication equipment, pumps, and valves, to remain operable under the kinds of environmental temperature and radiation conditions that you would see under a design basis accident.

I also mentioned earlier very important emergency preparedness and planning requirements. In coordination with our federal partner, FEMA, and with state and local governments, these emergency preparedness programs are evaluated and tested on a yearly basis.

Local Concerns from events in Japan

Speaking directly to the containment design at Fukushima, which has received considerable attention in the press, the NRC has had a Mark I Containment Improvement Program since the very late 1980s. This initiative required the installation of fission-product scrubbing equipment, enhanced reliability of the automatic depressurization system, and new hardened vent systems for the containment cooling for all BWR Mark Is—including 4 units here in Illinois.

Another local issue I specifically want to address is regarding the spent fuel pools at Zion nuclear power plant and GE Morris facility. Both maintain cooling systems and closely monitor water levels and temperatures. The spent fuel at these facilities has been cooling in the pools for many years, allowing for the residual heat to dissipate significantly. At this point, there is not enough heat being generated in the GE spent fuel pool for the water to boil. At Zion, the fuel has also significantly cooled. .

Learning from Fukushima

Despite our confidence in the safety of U.S. reactors, more will be done. The Nuclear Regulatory Commission has issued an Information Notice to all currently operating U.S. nuclear power plants, describing the effects of the March 11 earthquake and tsunami on Japanese nuclear power plants. The notice provides a brief overview of how the earthquake and tsunami are understood to have disabled several key cooling systems at the Fukushima Daiichi nuclear power station, and also hampered efforts to return those systems to service. Based on the NRC's current understanding of the damage to the reactors and associated spent fuel pools as of Friday, March 18, 2011, the notice reflects the current belief that the combined effects of the March 11 earthquake and tsunami exceeded the Fukushima Daiichi plant's design limits. The notice also recounts the NRC's efforts, post-9/11, to enhance U.S. plants' abilities to cope with severe events, such as the loss of large areas of a site, including safety systems and power supplies. The NRC expects U.S. nuclear power plants will review the entire notice to determine how it applies to their facilities and consider actions, as appropriate.

Over the near term, the NRC will be enhancing our activities through additional inspection, utilizing the resident inspectors and the region-based inspectors in our four Regional offices to verify the readiness of licensees to deal with both design basis accidents and beyond-design basis accidents.

. These additional inspections will focus on the capabilities to mitigate conditions that result from severe accidents, including the loss of significant operational and safety systems. NRC inspectors will be re-verifying the capability to mitigate a total loss of electric power to the nuclear plant. They will also re-verify the capability to mitigate problems associated with flooding, and the impact of floods on systems both inside and outside of the plant. And they will verify the equipment that is needed for the potential loss of equipment due to seismic events.

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In the longer term, the NRC will be developing lessons-learned from the earthquake and tsunami in Japan. The Commission has directed the NRC staff to establish a senior level agency task force to conduct a methodical and systematic review of our processes and regulations to determine whether the agency should make additional improvements to our regulatory system and make recommendations to the Commission for its policy direction. This review will encompass domestic operating reactors of all designs, including their spent fuel pools, in areas such as protection against earthquake, tsunami, flooding, hurricanes; station blackout and a degraded ability to restore power; severe accident mitigation; emergency preparedness; and combustible gas control. The NRC will evaluate technical and policy issues to identify additional research, generic communications, changes to our reactor oversight program, potential new rulemakings, and adjustments to the regulatory framework that may warrant action by the NRC. This evaluation will then consider inter-agency issues and applicability of these lessons learned to other, non-reactor facilities. This will be a very substantial and lengthy undertaking, but in order to fully learn and appropriately respond to the lessons of the recent events in Japan, we must proceed methodically and systematically.

In conclusion, the NRC has full confidence that the current fleet of reactors and materials licensees are operated in a manner that protects the public health and safety and the environment. There are a number of immediate, short-term, and long-term evaluations that we are embarking upon with an aim to ensure the continued safety of U.S. facilities. After we have been able to thoroughly study and understand the events in Japan, we will apply the lessons learned to our domestic fleet of nuclear reactors and facilities. We are strongly committed to protecting public health and safety, and will take any additional actions needed to do so.

Thank you.