

**WRITTEN STATEMENT**  
**BY ALLISON M. MACFARLANE, CHAIRMAN**  
**UNITED STATES NUCLEAR REGULATORY COMMISSION**  
**TO THE**  
**SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS**  
**DECEMBER 3, 2014**

Chairman Boxer, Ranking Member Vitter, Chairman Whitehouse, Ranking Member Sessions, and Members of the Committee, my colleagues and I appreciate the opportunity to appear before you today on behalf of the U.S. Nuclear Regulatory Commission (NRC).

The NRC remains deeply engaged in activities to oversee the operational safety of nuclear reactors, fuel cycle plants and other materials facilities on a daily basis. We are successfully meeting a variety of challenges we face while also seeking to continuously improve our processes to remain a strong and effective regulator. Today, I'd like to highlight some of the NRC's accomplishments and challenges and address the agency's efforts to ensure it is operating efficiently and effectively.

**THE COMMISSION**

As the Committee is aware, the Commission is once again operating as a full group of five members with the arrival of Commissioners Jeff Baran and Stephen Burns. We are working well together and I am confident that the Commission will continue to operate collegially and effectively after my departure.

**FUKUSHIMA**

The NRC and the industry continue to make significant progress in implementing post-Fukushima safety enhancements at nuclear facilities across the United States. The agency

remains committed to completing this work. We have seen the first reactors come into compliance with the Mitigating Strategies and the Spent Fuel Pool Instrumentation Orders. Reactors that are required to come into compliance with these orders during their upcoming spring outages are preparing to make safety system modifications that will enable them to complete their required safety enhancements on time. The NRC continues to monitor licensees' progress and conduct thorough inspections to ensure that licensees are in compliance with NRC requirements.

#### Enhanced Capabilities to Mitigate Beyond-Design-Basis Accidents

The NRC's Mitigating Strategies Order required licensees to ensure that they are prepared to respond to beyond-design-basis accidents. These requirements include procuring additional equipment to maintain or restore core cooling, containment integrity, and spent fuel pool cooling for all units at a site.

Nuclear power plant licensees also continue to make plant modifications and procure additional equipment for their individual sites to support full implementation of the Mitigating Strategies Order by their established due dates. In October of this year, North Anna Unit 2 became the first plant to complete implementation of all mitigating strategies requirements. Many sites are scheduled to achieve full implementation by the end of 2015, with the remaining sites to be completed by 2016. These dates were established to align with refueling outage schedules. The one exception to this schedule is that some boiling water reactors are requesting schedule extensions for those parts of the mitigating strategies affected by the NRC's revision to the order on containment venting, which I will discuss further in a moment. During and after implementation, the NRC will conduct inspections to verify that nuclear power plants have put appropriate strategies in place to mitigate beyond-design-basis accidents.

In the past six months, both of the industry's National Response Centers – one in Phoenix, Arizona and one in Memphis, Tennessee – opened their doors. Both centers contain emergency diesel generators, pumps, hoses, and other backup equipment that can be delivered to any site within 24 hours. The centers are being managed by an industry group, the Strategic Alliance for FLEX Emergency Response (SAFER), which also maintains two control centers to coordinate equipment deliveries. Last summer, the NRC observed and evaluated two simulated exercises SAFER conducted to demonstrate that the centers could meet their commitments to deliver equipment quickly and safely. In one exercise, emergency equipment was sent by truck from Memphis to the Three Mile Island Nuclear Station in Pennsylvania. In the other, equipment was airlifted from Phoenix to the Surry Power Station in Virginia. SAFER has secured a contract with Federal Express for truck and aircraft shipments, and is coordinating with the Federal Aviation Administration to ensure that aircraft can have access to otherwise restricted airspace in an emergency. Thus far, the NRC is satisfied that SAFER has used the information gained from these exercises to ensure that the industry's approach would be effective if called upon.

This additional capability to address beyond-design-basis events, such as large earthquakes or floods, provides the most significant safety improvement that the NRC has required as a result of the lessons learned from Fukushima.

Consistent with our regulatory practices, the NRC is conducting a rulemaking that will adopt the requirements already imposed in the March 2012 Order. The NRC staff has consolidated into a single effort the mitigating strategies rulemaking, the Emergency Response Capabilities rulemaking, and codification of portions of other Japan Near-Term Task Force (NTTF) recommendations that are already being addressed as part of the Mitigating Strategies Order. Also included are implementation of other NTTF recommendations related to on-site emergency actions, and other actions already being implemented by industry. These rulemaking efforts were consolidated into a single Mitigation of Beyond-Design-Basis Events

rulemaking due to the interrelated nature of the activities. The NRC staff is on track to provide its proposed rule to the Commission for review by early 2015. After that review is completed, it will then be issued for public comment. The rulemaking remains on schedule to be completed by 2016.

### Seismic and Flooding Reevaluations

The NRC continues to make good progress in reviewing seismic hazard reports for licensees in the central and eastern United States. Through this process, we have identified approximately 35 sites with new seismic hazard estimates that exceed the previously evaluated hazard and for which further seismic risk analysis may be necessary. As we had previously informed this Committee, in order to ensure a coordinated and efficient staff review of the reports, the NRC categorized plants according to the size of their estimated hazard risk increase. The staff also is preparing to review “expedited approach” submittals due later this month from licensees whose hazard estimate required further seismic analysis. These licensees are required to inform the NRC about interim steps they have taken to identify and implement seismic-related upgrades to certain safety-significant equipment at their sites by 2016.

The three licensees located west of the Rocky Mountains are required to complete their seismic hazard reevaluations by March 2015, and the NRC staff is prepared to thoroughly review them when they are submitted.

It is important to emphasize that all nuclear power plants in the United States continue to operate safely. All plants have been designed and constructed with safety margins to withstand ground motion associated with a potential earthquake exceeding their original design bases. The seismic hazard reevaluations will enable both the NRC and licensees to better understand seismic issues associated with individual nuclear power plant sites based on the most up-to-

date scientific information available. The NRC will require safety enhancements as appropriate to address seismic risks that are higher than previously estimated.

The NRC is also continuing its review of reevaluated flooding hazards, for which plants were divided into three categories based on the complexity of the analysis and other factors. The staff is reviewing the reevaluated flooding hazards for plants that the new seismic hazard estimates exceed the previously evaluated hazard, and began issuing assessments of the licensees' reports in July. Other licensees are required to submit their reevaluated hazard assessments by March 2015. I should note that the NRC granted extensions to certain licensees that needed data from the U.S. Army Corps of Engineers regarding upstream dam failures or that needed to analyze complex watersheds.

Similar to the seismic hazard reevaluations, the NRC is working with those licensees whose site flooding hazard reevaluation results exceeded their current design basis and is conducting inspections to ensure that they are implementing appropriate interim safety enhancements. These licensees must perform an integrated assessment to reassess their flood protection and mitigation capabilities within two years of submitting the hazard reevaluation results to identify whether any further enhancements are necessary.

The NRC is also performing on-site inspections to ensure that the interim actions that licensees have taken are appropriate. Some of the on-site inspections have been completed while others are ongoing. The NRC will continue to review the interim actions as flood hazard reevaluation reports are received.

#### Emergency Preparedness Communication and Staffing

In addition to the on-site emergency response capabilities rulemaking, which, as described above, has been combined with the mitigation strategies rulemaking into the Mitigation of Beyond-Design-Basis Events rulemaking, the staff issued a letter to licensees

addressing prolonged station blackout conditions affecting multiple units. The NRC's work to assess licensees' substantial progress in addressing this issue is ongoing.

### Spent Fuel Pool Instrumentation

The Enhanced Spent Fuel Pool Instrumentation Order required licensees to install enhanced instrumentation to monitor the water levels in spent fuel pools. This work is closely related to licensees' efforts to implement the Mitigating Strategies Order. Licensees are currently in the process of meeting this requirement in accordance with their refueling outage schedules. They had previously submitted plans to the NRC detailing how they intended to address the order, and the NRC's input on these plans has informed their implementation. The NRC is inspecting licensees' progress, and some reactors are already in compliance. The NRC staff will be conducting inspections and issuing safety evaluations for each licensee, and will conduct thorough post-compliance inspections after all licensees are in full compliance with the order.

### Reliable Hardened Vents

The NRC ordered licensees with boiling water reactors with Mark I and II containment types to install reliable hardened vents. This order was subsequently revised to require that licensees ensure these vents are severe accident-capable. As a result of this new requirement, certain licensees requested, and were granted, extensions for the aspects of their work on the Mitigating Strategies Order that related to containment venting. The NRC is currently reviewing integrated plans and conducting audits of licensee progress towards compliance with the first phase of the order. By June 2015, the NRC staff plans to issue interim staff evaluations to all applicable licensees. Licensees must then submit their integrated plans for the second phase – design and installation of venting capability from the containment drywell under severe accident conditions, or, alternatively, developing and implementing a reliable containment venting

strategy that makes it unlikely that a licensee would need to vent from the drywell during a severe accident - by the end of 2015 in compliance with interim staff guidance.

The Commission also directed the NRC staff to undertake a rulemaking to consider additional filtration strategies for boiling water reactors with Mark I and II containments to enhance their ability to vent containment without releasing radioactive material during an accident. The staff is currently developing the regulatory basis for a rulemaking in this area.

#### National Academy of Sciences Study

As directed by Congress, the NRC issued a grant to the National Academies of Science (NAS) to assess the causes of the Fukushima accident and lessons learned that could enhance nuclear safety and security at U.S. facilities. The NRC staff is currently reviewing the report, which NAS issued in July 2014, and will inform the Commission of its assessment of the study's findings and its plans to address them in the near future.

#### Longer-Term Actions Associated with Fukushima Lessons Learned

Our primary focus is on the highest-priority, most safety-significant enhancements to maximize the safety impact to the nuclear power plants. The agency will complete the most safety-significant enhancements on or ahead of the five-year goal.

Over the coming months and years, we will gain additional insights from implementation of the highest-priority actions, and the decommissioning activities at the Fukushima Dai-ichi site. As NRC staff with critical skills are freed up from the highest-priority and most safety-significant Fukushima work, we will focus our efforts on the remaining lessons learned activities, and we will disposition the remaining recommendations from the Near-Term Task Force.

The NRC continues to interact with our licensees and interested members of the public as we move forward to implement these Fukushima safety enhancements. We have held more than 150 public meetings over the past three years to keep the public apprised of our activities.

The NRC is mindful that we must take a careful and deliberate approach to this work to prevent these regulatory actions from distracting us or the industry from day-to-day nuclear safety and security priorities, and to avoid unintended consequences. As with the NRC's response to previous events, such as the September 11, 2001 terrorist attacks, we remain cognizant that a change in one system has the potential to adversely affect another system if not considered holistically.

The NRC continues to receive regular reports on the efforts to remediate the Fukushima site and makes use of this information to help identify potential lessons learned for U.S. reactors. The NRC is also maintaining an awareness of the activities of other federal and state agencies in monitoring and sharing information with the public about the very low levels of radioactive materials that scientists have now identified off the coast of the western U.S.

## **DECOMMISSIONING**

The NRC has shifted its oversight at San Onofre Nuclear Generating Station (SONGS) Units 2 and 3, Kewaunee, and Crystal River Unit 3, to focus on decommissioning. In the past few months, the NRC and these licensees have taken a number of important steps in this direction. For example, Southern California Edison submitted its Post-Shutdown Decommissioning Activities Report (PSDAR) for the SONGS facility in September. The report included information about the estimated cost associated with decommissioning the two units and a plan for managing spent fuel. In October, as required by our regulations, the NRC held a public meeting in California to hear from interested parties about the PSDAR and answer questions. The staff also accepted written comments from the public.

The SONGS PSDAR indicated that the licensee intends to pursue the DECON method for decommissioning the facility; that is, promptly removing or decontaminating all components and structures contaminated by radioactive material.

Southern California Edison has formed a Community Engagement Panel with members of local government, public interest groups, the business community, and academia to advise the licensee on the ongoing decommissioning process. NRC supports this type of community engagement and has participated in some meetings to communicate the NRC's regulatory role to the Panel.

All of the plants undergoing decommissioning have requested certain amendments to their licenses and certain exemptions from the NRC's regulations – which were written primarily for operating reactors – that reflect the impending reduction in risk that will occur when fuel is permanently removed from these reactors. For example, Dominion Energy Kewaunee has requested, and been granted, exemptions from NRC requirements to maintain a 10-mile emergency planning zone and offsite radiological emergency plans. However, the NRC denied a separate request from Kewaunee for exemptions from certain NRC physical security regulations because the licensee had not adequately justified the reductions. Similar requests from SONGS and Crystal River, as well as Vermont Yankee, which will soon permanently cease operations, are still being evaluated by the NRC. The NRC staff reviews each request with a careful focus on individual circumstances at each site and whether the exemption would provide an adequate level of protection.

Though there has been significant attention paid to the sites that have most recently begun the decommissioning process, 17 other nuclear power reactors are in various stages of the decommissioning process. Since 2000, ten power reactors have been successfully decommissioned. The NRC remains committed to maintaining rigorous oversight at all of these facilities as they move through the decommissioning process.

## **NEW CONSTRUCTION**

Construction of the new reactor units at Plant Vogtle in Georgia and V.C. Summer in South Carolina continues to progress under NRC oversight. Major sections of the primary

containment vessels at Summer Unit 2 and Vogtle Unit 3 are being set in place. Construction and installation of structural modules continues. A significant milestone was recently reached at Vogtle Unit 3 when the module that includes the chemical and volume control system and the passive core cooling system was placed in containment.

The NRC staff continues to provide oversight of module fabrication and other construction activities at the sites to ensure that all identified quality issues are corrected and that the plants are being constructed in accordance with the approved design.

The NRC also continues to oversee construction at Watts Bar Unit 2 in Tennessee. The NRC staff's review of the Tennessee Valley Authority's (TVA) Operating License Application for Watts Bar Nuclear Plant Unit 2, while mostly complete, is still in progress. Construction inspections and inspections of operational readiness remain on-track to support upcoming licensing decisions. The NRC staff continues to document its findings in supplements to the safety evaluation report, and construction inspection reports to ensure that TVA has met applicable regulatory requirements. Currently, the staff is working toward issuing a decision on an operating license in mid-2015.

In October, the agency issued the final rule to certify the Economic Simplified Boiling Water Reactor (ESBWR) design. That brings to five the number of new reactor designs that have been certified by the NRC, including the ABWR, System 80+, AP 600, and AP 1000.<sup>1</sup> The NRC is currently reviewing two combined license applications referencing the ESBWR design. The NRC also continues to review other design certification, combined license, and early site permit applications. Additionally, we anticipate the submission of the first design certification applications for small modular reactors in 2016.

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<sup>1</sup> System 80+ is no longer valid as of June 20, 2012; and AP600 will not be valid after January 24, 2015.

## **CONTINUED STORAGE RULE AND GENERIC ENVIRONMENTAL IMPACT STATEMENT**

In August 2014, after a two year rulemaking process that included extensive public engagement, the Commission approved the NRC final rule on the environmental effects of continued storage of spent nuclear fuel and its supporting generic environmental impact statement (GEIS), which became effective in October, 2014. The rulemaking took into consideration more than 33,000 public comments.

The rule adopts the findings of the GEIS, which analyzes the environmental impact of storing spent fuel beyond the licensed operating life of nuclear reactors over a short-term timeframe of 60 years, a long-term timeframe of 100 years after the initial 60 years, and indefinitely. The GEIS found no significant impacts for any of these time periods.

The implementation of the Continued Storage rule enables the NRC to complete several reactor licensing actions that had been suspended pending the outcome of this rulemaking.

## **YUCCA MOUNTAIN**

In keeping with the Commission's direction, the NRC staff continues its work on the Safety Evaluation Report (SER) on the proposed repository at Yucca Mountain. In October 2014, the staff issued Volume 3 of the report, which is its technical analysis of the period after a repository at Yucca Mountain – if licensed and ultimately constructed – would be permanently sealed. The staff is scheduled to issue the remaining volumes - Volume 2 (Repository Safety Before Permanent Closure), Volume 4 (Administrative and Programmatic Requirements), and Volume 5 (License Specifications) -- by January 2015; they will be released as they are completed. The Commission will provide further direction to staff on completing the tasks of making documents from the Licensing Support Network publicly-available, and issuing a Yucca Mountain environmental impact statement using the agency's remaining Nuclear Waste Funds.

Completion of the SER is the next important step in a long and complex licensing process. Many other steps would remain if the licensing process were to continue. Among

other things, the adjudicatory proceeding associated with the construction authorization would recommence sometime after issuance of the SER. The adjudication would involve the reinstatement and maintenance of the Licensing Support Network (or its functional equivalent), resolution of approximately 300 pending contentions challenging the license application, resolution of any new contentions, Commission appellate activities, and completion of the Commission's supervisory review of the application.

## **SOURCE SECURITY**

Radioactive source security has been, and continues to be, a top priority for the NRC. The NRC collaborates with the 37 Agreement States and domestic and international agencies on a variety of initiatives to make risk-significant radioactive sources even more secure and less vulnerable to malevolent use.

Immediately following the events of September 11, 2001, the NRC, working with other Federal and State agencies, prioritized actions to enhance the security of radioactive sources and facilities. At that time, the NRC disseminated a number of security advisories to NRC and Agreement State licensees, recommended specific actions to enhance security, addressed potential threats, and communicated general threat information. The urgency revealed by the threat and facility security assessments made it essential for the NRC to remove any security gaps by issuing immediately-effective Orders, rather than undertaking a more time-consuming rulemaking process.

In 2005, the Energy Policy Act expanded the NRC's authority to ensure the security and control of additional risk-significant materials, and mandated the development of a national registry of radioactive sources. Accordingly, in 2007, the NRC and Agreement States issued additional security Orders to comply with the Act.

The Energy Policy Act also established an interagency task force on radiation source protection and security under the lead of the NRC to provide recommendations to the President

and the Congress relating to the security of domestic radiation sources. This task force has to date submitted reports to the President and Congress in 2006, 2010 and 2014. The most recent report, while providing continuous improvement recommendations, did not identify any gaps related to radiation source security in the United States.

Recognizing the need to enshrine the Orders in regulations, the NRC commenced rulemaking activities related to source security. The 2013 rule (10 CFR Part 37), which incorporates pragmatic security approaches and interfaces with the NRC's existing safety rules, is an optimized mix of performance-based and prescriptive requirements that allow a licensee to develop a security program for risk-significant material with measures specifically tailored to their facilities. Licensee compliance with the rule was required by March 19, 2014; Agreement State licensee must fulfill compatible requirements by March, 2016.

The NRC radioactive source security program has been the subject of two recent Government Accountability Office (GAO) audits, the first focused on U.S. medical facilities, and the more recent focused on industrial settings. Unfortunately, both audits pre-dated the implementation of the expanded 10 CFR Part 37 regulations, and thus focused only on the NRC security requirements that were issued to licensees by Orders.

The NRC is committed to monitoring and assessing the effectiveness of the Part 37 requirements to determine whether any additional security enhancements are necessary. After the completion of this review, the NRC advocates the conduct of another GAO audit related to the effectiveness of the requirements of 10 CFR Part 37 for NRC and Agreement State licensees.

## **ENSURING EFFICIENT USE OF RESOURCES**

Despite receipt of a late appropriation and future budget uncertainty, the NRC executed \$1.1 billion of FY 2014 current and prior year funds, including Nuclear Waste Funds, and it recovered \$931 million in license and annual fees of its FY 2014 new budget authority. As of

September 30, 2014, the NRC had \$34.2 million in prior year fee-based funds, \$4.8 million in Nuclear Waste Funds and approximately \$6.3 million in other special use funds available as carryover funding. Under the current FY 2015 Continuing Resolution, the NRC is able to meet all safety and security mission requirements and has sufficient remaining unobligated Nuclear Waste Fund resources for the remaining Commission approved Yucca Mountain license application review activities.

The NRC continues to be prudent in expending agency resources and to carefully scrutinize all budget requests in order to conduct the agency's mission in an efficient and cost-effective manner. The NRC has also taken further steps to address the large fee increases for power reactor licensees in FY 2014. The staff has launched an agency effort to fully understand and maximize staff productive hour rates. Additionally, to further ensure fairness and equity in fee billing, the NRC has engaged an independent firm to conduct a study and provide recommendations on other fee allocation methods, and we plan to conduct a public meeting early in calendar year 2015 to address out-of-scope public comments received on the FY 2014 Fee Rule.

The Commission has directed the NRC staff to take a hard look at how to increase our flexibility and resiliency so that we can adapt more quickly to a changing environment and still ably address tomorrow's unanticipated challenges. The staff is currently working both internally and externally to analyze a range of scenarios that may affect the workload and activities of the agency over the next five years and anticipate commensurate changes to necessary NRC staff skill sets and resources. The objective of this initiative is to develop recommendations corresponding to each scenario to enable the agency to ensure it can effectively, efficiently, and flexibly meet its safety and security mission under any circumstances. The work of our staff's

team and that of the National Academy of Public Administration, whom we have asked for assistance and assessment, is ongoing.

## **UNDERSTANDING THE CUMULATIVE EFFECTS OF REGULATION**

The Atomic Energy Act requires the NRC to provide reasonable assurance of adequate protection of public health and safety and promote the common defense and security in its regulatory activities, and the requirements the NRC imposes are intended to meet this mandate. We recognize that important safety and security enhancements will be most effective if necessary regulatory measures are prioritized appropriately so that licensees can maintain focus on the most safety-significant issues and activities. The NRC has had enhancements to the rulemaking process in place since 2011 to better address the cumulative effects of agency decision-making.

In particular, we are interacting closely with various groups, including industry, government, and members of the public, to ensure that we understand and manage the impacts on licensees of regulatory initiatives and activities that are being implemented concurrently. We are reviewing implementation timelines for new or revised regulations, the priority associated with each action, and the availability of critical skills to complete implementation.

The NRC has also engaged the operating reactor industry to perform “case studies” reviewing regulatory cost and schedule estimates. In addition, we are working with other parts of the regulated community and with our Agreement State regulatory partners to assess and control cumulative effects.

## **A LOOK AHEAD**

In summary, the NRC is fully engaged in our mission of protecting public health and safety, promoting the common defense and security of our Nation, and protecting the environment. We will continue to focus on:

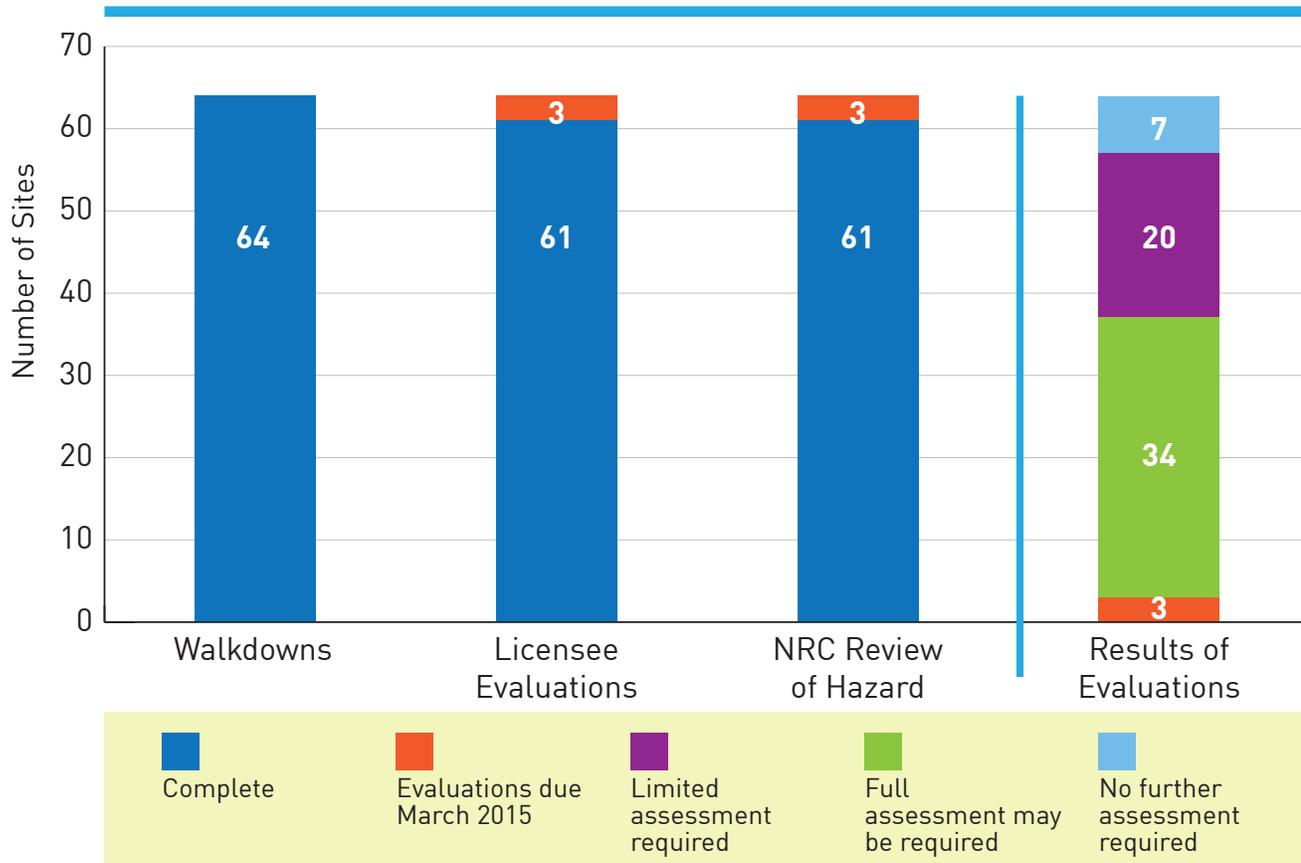
- Ensuring safe and secure day-to-day operations at all licensed facilities;
- Completing additional safety-significant work on post-Fukushima lessons learned;
- Completing the Safety Evaluation Reports and other activities for the proposed repository at Yucca Mountain using remaining Nuclear Waste Funds;
- Overseeing construction activities at the new Plant Vogtle, V.C. Summer, and Watts Bar 2 reactors;
- Overseeing decommissioning activities at SONGS, Kewaunee, Crystal River-3, Vermont Yankee, and other decommissioning sites;
- Boosting the effectiveness, efficiency, performance, and agility of the agency; and
- Continuing to strengthen our close cooperation with international and interagency partners.

I have been proud to be the Chairman of the NRC over the past two and a half years, and sincerely appreciate the dedication and work of all the men and women at the NRC.

Chairman Boxer, Ranking Member Vitter, Chairman Whitehouse, Ranking Member Sessions, thank you for the opportunity to appear before you today; I would be pleased to answer your questions.

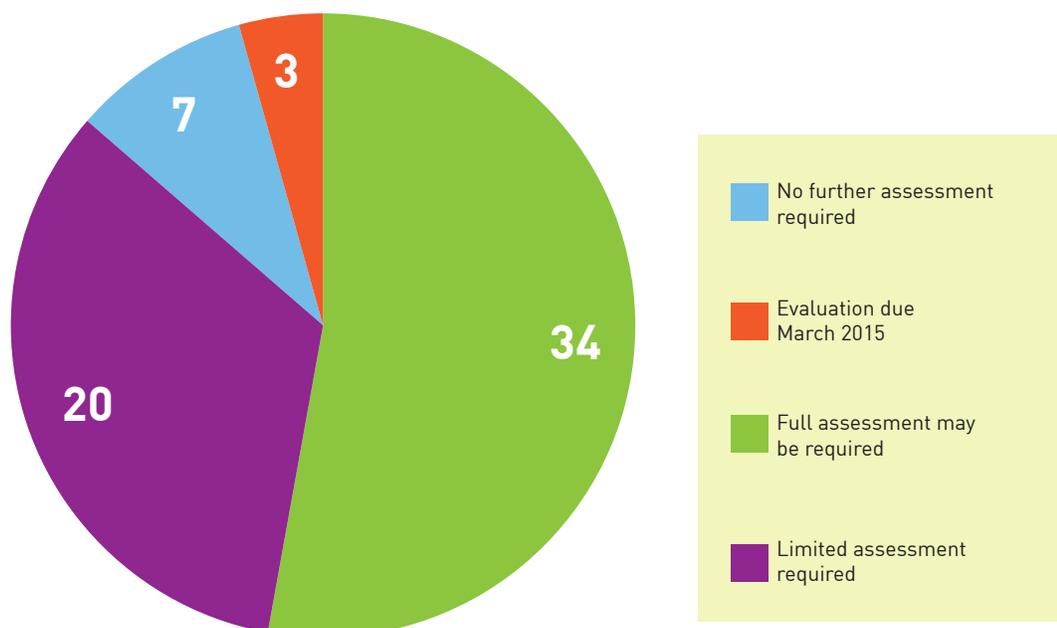
# Seismic Hazard Reevaluation Progress

(Total sites: 64)



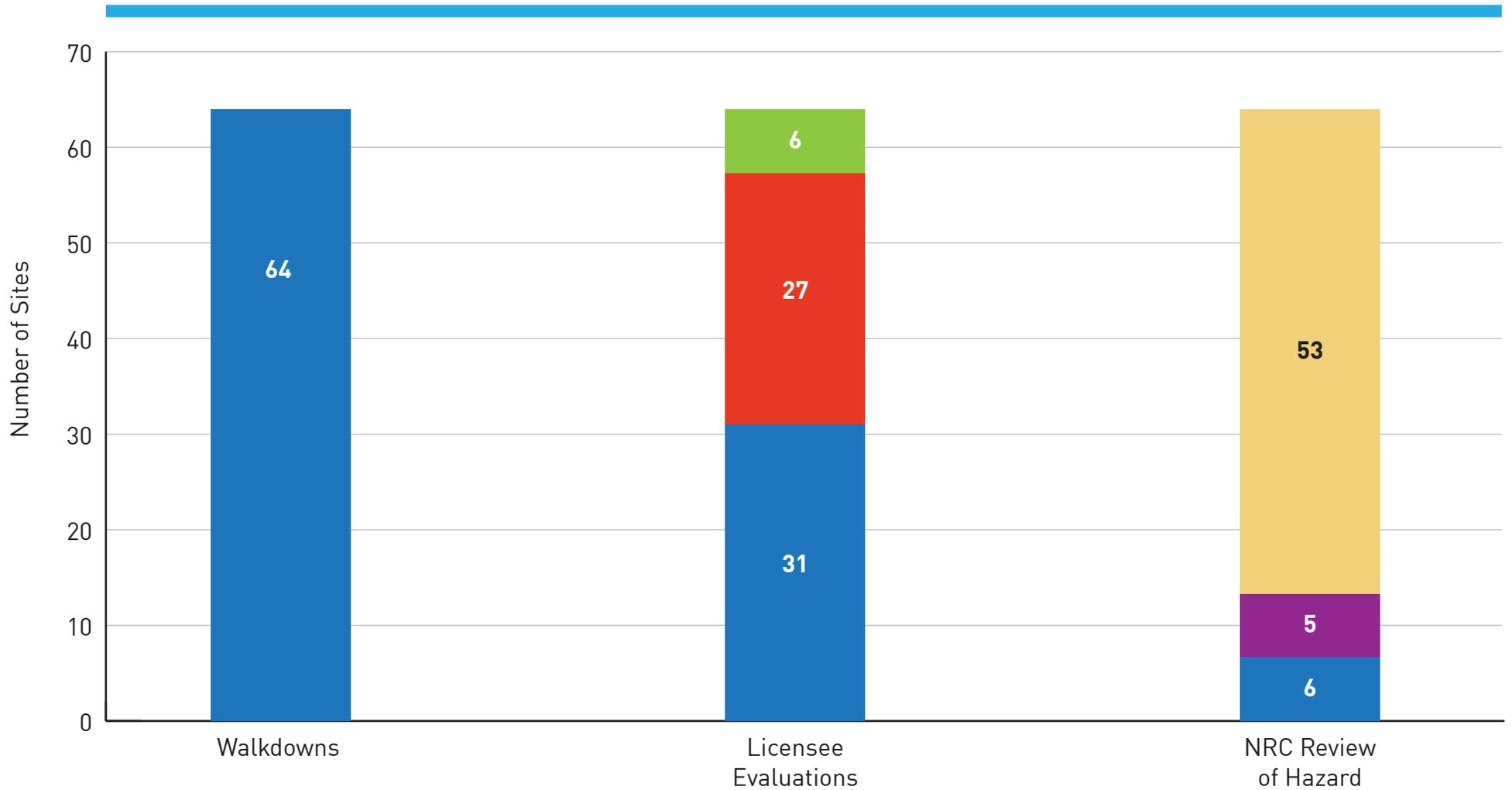
# Seismic Hazard Reevaluation Results

(Total sites: 64)



# Flooding Hazard Reevaluation Progress

(Total sites: 64)



Complete



Evaluations due  
March 2015



NRC review  
complete  
January 2015



Evaluation  
expected  
March 2016

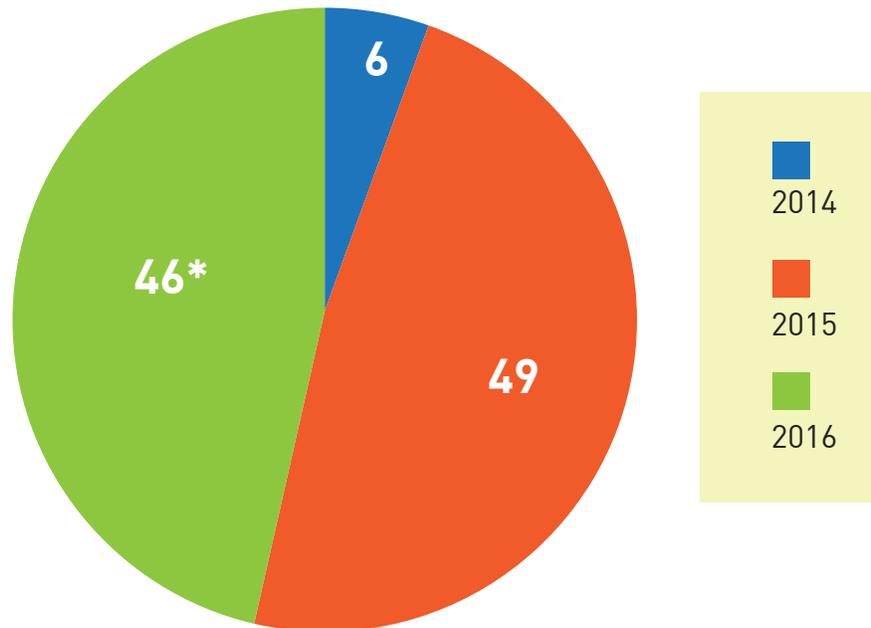


NRC review  
pending

## Mitigating Strategies Equipment: Full Compliance

(Total units: 101)

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\*Ten units will have all the required equipment and connections in place, but will not be in full legal compliance with the Mitigating Strategies Order until they are in compliance with the Severe Accident Capable Vent Order in 2017-2018.

## Spent Fuel Pool Instrumentation: Full Compliance

(Total units: 101)

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