



*Protecting People and
the Environment*

STATUS REPORT ON IMPLEMENTATION OF THE NEAR-TERM TASK
FORCE RECOMMENDATIONS BASED ON INSIGHTS FROM THE
FUKUSHIMA DAI-ICHI ACCIDENT

UNITED STATES NUCLEAR REGULATORY COMMISSION

March 12, 2012

I Summary

The U.S. Nuclear Regulatory Commission (NRC) has taken appropriate regulatory action in response to lessons learned from the nuclear accident at the Fukushima Dai-ichi site in Japan. The March 11, 2011, Great Tōhoku Earthquake and subsequent tsunami highlighted the possibility that extreme natural phenomena could challenge the prevention, mitigation, and emergency preparedness layers of the defense-in-depth strategy for nuclear safety. Therefore, the NRC determined that prompt regulatory action was needed to ensure that the health and safety of the American people would be protected. In the year since the event, the NRC has evaluated insights from the event, prioritized recommendations for action, carefully considered input from public and industry stakeholders, and issued three orders modifying the licenses and construction permits of nuclear power reactors in the United States. The NRC also issued a request for information to all power reactor licensees that requires them to respond with evaluations or assessments of additional issues raised by the events at Fukushima. The NRC will evaluate those responses and take additional regulatory action, as necessary.

II Background

Following the nuclear accident at Fukushima, the NRC chartered a Near-Term Task Force (NTTF) to review insights from the event and provide recommendations for enhancing reactor safety in the United States. On July 12, 2011, the NTTF issued its report, entitled, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan." This report is available in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession No. ML1186A950. The NTTF concluded that continued U.S. plant operation and NRC licensing activities present no imminent risk to public health and safety. While the NTTF also concluded that the current regulatory system has served the Commission and the public well, it found that enhancements to safety and emergency preparedness are warranted and made a dozen general recommendations for Commission consideration.

On October 3, 2011, the NRC staff proposed to the Commission a three-tiered prioritization of the NTTF recommendations (ADAMS Accession No. ML11272A111). The Tier 1 recommendations are those actions that should be implemented without unnecessary delay. The Tier 2 recommendations are those actions that need further technical assessment or critical skill sets to implement. The Tier 3 recommendations are longer-term actions that depend on the completion of a shorter-term action or need additional study to support a regulatory action. On December 15, 2011, the Commission approved the staff's recommended prioritization (ADAMS Accession No. ML113490055).

The Conference Report on the Fiscal Year (FY) 2012 Energy and Water Development Appropriations Act (P.L. 112-74), signed by the President on December 23, 2011, states in part:

The conferees recognize the progress that the Nuclear Regulatory Commission has made on the recommendations of the Near Term Task Force. Commission staff has proposed a prioritized list of the Task Force recommendations that reflects the order regulatory actions are to be taken. The conferees direct the Commission to implement these recommendations consistent with, or more expeditiously than, the "schedules and milestones" proposed by NRC staff on October 3, 2011.

In response to the conferees' request and the input it received from stakeholders, the NRC accelerated the schedule originally proposed in its October 3, 2011, paper. On February 17, 2012, the NRC staff proposed orders and a request for information to the Commission in SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned From Japan's March 11, 2011, Great Tōhoku Earthquake and Tsunami" (ADAMS Accession No. ML12039A103). SECY-12-0025 also discussed the disposition of recommendations from the Commission's Advisory Committee on Reactor Safeguards (ACRS), as well as six additional recommendations identified after the NTF report was issued, that the NRC staff has determined may also warrant additional action.

On March 12, 2012, the NRC issued three immediately effective orders and the request for information. These regulatory actions are discussed in more specific detail in the following section.

III Regulatory Actions Taken

To ensure the NRC made well-informed decisions on the Tier 1 regulatory actions, the NRC staff conducted over a dozen public meetings with stakeholders to better understand the public's point of view, as well as the industry's views on the NRC's proposed actions. The staff also established an e-mail box so that members of the public could send input on the NRC's resolution of the Tier 1 recommendations. The NRC staff considered this input when developing the orders and request for information.

By letter dated December 16, 2011 (ADAMS Accession No. ML11353A008), the Nuclear Energy Institute, the policy organization for the nuclear industry, presented its plans to respond to Fukushima-like events. The industry developed a concept of a diverse and flexible mitigation capability called "FLEX." The NRC staff has considered this industry approach and is generally encouraged by the actions the industry is taking in this area. The NRC staff envisions that many elements of FLEX may satisfy the requirements of the order to mitigate challenges to key safety functions resulting from beyond-design-basis natural phenomena hazards.

Orders

On March 12, 2012, the NRC issued three immediately effective orders. The first two orders were issued to all power reactor licensees, including holders of construction permits and combined licenses. The third order was issued to licensees operating boiling water reactors (BWRs) with Mark I and Mark II containment designs. The following is a summary of each of the orders:

1. Licensees are ordered to develop strategies to mitigate the effects of beyond-design-basis natural phenomena that address both multiunit events and reasonable protection of equipment identified to implement such strategies.

This order requires development of strategies to deal with beyond-design-basis external events resulting in simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink. The strategies and guidance developed and implemented by licensees in response to the requirements imposed by this order will provide the necessary capabilities to supplement those of the permanently installed plant structures, systems, and components that could be unavailable following beyond-design-basis external events. These strategies and guidance will enhance the safety and preparedness capabilities established following

the events of September 11, 2001, and codified in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(hh)(2). To address the potential for more widespread effects of beyond-design-basis external events, this order requires licensees to have increased capabilities to implement multiple strategies concurrently at multiple units on a site. The strategies shall be developed to add multiple ways to maintain or restore core cooling, containment and spent fuel pool (SFP) cooling capabilities in order to improve the defense in depth of licensed nuclear power reactors. The order also requires that the equipment needed to implement the strategies be reasonably protected.

2. Licensees are ordered to install enhanced SFP instrumentation.

This order requires enhanced, reliable SFP instrumentation. During the events at Fukushima, responders were without reliable instrumentation to determine the water level in the SFP. This caused concerns that the pool may have boiled dry, resulting in fuel damage, but in fact the spent fuel had remained covered at all times. Fukushima demonstrated that confusion and misapplication of resources may result from beyond-design-basis external events when adequate instrumentation is not available. The instrumentation installed at U.S. nuclear power plants is typically only for a narrow range of SFP level and, therefore, only capable of monitoring normal and slightly off-normal conditions in the pool. Although the likelihood of a catastrophic event affecting U.S. nuclear power plants and their associated SFPs remains very low, beyond-design-basis external events could challenge the ability of existing SFP instrumentation to provide emergency responders with reliable information on the condition of SFPs. Reliable and available indication is essential to ensure that plant personnel can effectively prioritize emergency actions.

3. Licensees with BWR Mark I and Mark II containments are ordered to have reliable, hardened vents.

This order requires reliable, hardened vents in BWR Mark I and Mark II containments. At Fukushima, limitations in time and the unpredictable conditions associated with the accident significantly challenged the attempts by responders to preclude core damage and containment failure. In particular, the operators were unable to successfully operate the containment venting system. The inability to reduce containment pressure inhibited efforts to cool the reactor core. Had additional backup or alternate sources of power been available to operate the containment venting system remotely, or had certain valves been more accessible to allow manual operation, the operators at Fukushima might have been able to depressurize the containment earlier. This, in turn, could have allowed operators to implement strategies using low-pressure water sources. Thus, the events at Fukushima demonstrate that reliable hardened vents at BWR facilities with Mark I and Mark II containment designs are important to maintain core and containment cooling.

The NRC has concluded that the orders on mitigation strategies and reliable, hardened vents are necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii). The NRC has concluded that the order on SFP instrumentation represents a significant enhancement to the protection of public health and

safety and is an appropriate response to the insights from the Fukushima Dai-ichi accident. The NRC believes that continued operation under existing regulations does not pose an imminent threat to public health and safety but that the events at Fukushima highlighted the need for these additional capabilities to mitigate the effects of beyond-design-basis external events.

The NRC plans to prepare guidance for implementation of the technical requirements of the orders by August 2012. Licensees will then be required, by February 28, 2013, to submit to the Commission an integrated plan including a description of how compliance with the orders will be achieved. After reviewing the licensee submittals, the NRC plans to issue facility-specific orders, as necessary, imposing license conditions that address the requirements of the orders. Each licensee will be required to achieve full compliance within two refueling outages after submittal of its integrated plan, or by December 31, 2016, whichever comes first.

Request for Information

On March 12, 2012, the NRC issued a request for information to power reactor licensees pursuant to 10 CFR 50.54(f), which requires a written response. The request for information asked licensees to do the following:

- Reevaluate seismic and flooding hazards at each site using present-day information, guidance, and methodologies.¹
- Perform seismic and flooding walkdowns to identify and address plant-specific degraded, nonconforming, or unanalyzed conditions.
- Assess current communication systems and equipment under conditions of onsite and offsite damage and prolonged station blackout (SBO).²
- Perform a staffing study to determine the number and qualifications of staff required to fill all necessary positions to respond to a multiunit event.²

Protection from natural phenomena is critical for continued safe operation of nuclear power plants. Given that new information has been developed on natural phenomena hazards since the licensing basis of currently operating plants was established, the NRC found it necessary to confirm the adequacy of the hazard assumptions for U.S. plants, and their ability to protect against them. These hazards include earthquakes, local intense precipitation, floods of streams and rivers, storm surges, seiches, tsunamis, and dam failures. Further, the NRC found that the accident at Fukushima highlighted a need to verify the adequacy of emergency planning, including communications infrastructure and staffing levels of response personnel, to address a prolonged SBO and multiunit event.

The NRC will evaluate each licensee's response to the request for information and take additional regulatory action, if necessary.

IV Status of Other NTF Recommendations and Additional Issues

¹ Pursuant to Sections 161.c and 182.a of the Atomic Energy Act, holders of construction permits will be required to respond to this portion of the information request.

² Holders of construction permits and combined licenses will be required to respond to this portion of the information request.

The NRC staff's October 3, 2011, paper included two Tier 1 recommendations that were not addressed by the orders or request for information. One was a recommendation to enhance SBO mitigation capability, and the other was to strengthen and integrate onsite emergency response procedures, training, and exercises. Both of these recommendations remain Tier 1 priority issues and are being actively implemented through the NRC's rulemaking process. The NRC expects to complete the SBO rule in 2014 and the emergency response enhancements rule in 2016. The NRC will publish an advance notice of its proposed rulemaking on SBO in March 2012.

The Conference Report on the Consolidated Appropriations Act, 2012 (P.L. 112-74), stated in part:

The conferees direct the Commission to maintain an implementation schedule such that the remaining recommendations (not identified as Tier I priorities) will be evaluated and acted upon as expeditiously as practicable.

The NRC will address Tier 2 recommendations consistent with the milestone schedule set forth in its October 3, 2011, paper. The NRC staff is developing a Commission paper, currently scheduled for July 2012, where it will propose schedules and milestones for Tier 3 recommendations. Furthermore, the NRC has established a process to assess additional issues as they are identified, applying the same three-tiered prioritization process used for the NTTF recommendations. In its October 3, 2011, paper, the NRC staff identified six additional issues with a clear connection to the Fukushima event that may warrant regulatory action but were not included with the original NTTF recommendations. The detailed assessment can be found in Enclosure 2 to SECY-12-0025 (ADAMS Accession No. ML12039A118).

In accordance with Section 402 of the Consolidated Appropriations Act, 2012, the NRC will also consider external natural phenomena hazards. The request for information issued on March 12, 2012, addresses seismic, tsunami, and flooding hazards, which the NRC believes will encompass the dominant, albeit low, risks to operating plants. The NRC intends to address other external hazards, such as wind and missile loads from tornadoes and hurricanes, and snow and ice loads from winter weather, as a Tier 2 activity that will be initiated as soon as sufficient resources become available.

On October 13, 2011, and on November 8, 2011, the ACRS provided recommendations to the Commission based on its review of the NRC staff's prioritization of the NTTF recommendations (ADAMS Accession Nos. ML11284A136 and ML11311A264, respectively). The NRC staff's evaluation of the ACRS recommendations can be found in Enclosure 3 to SECY-12-0025 (ADAMS Accession No. ML12039A121). By letter dated February 15, 2012, the ACRS provided a third letter (ADAMS Accession No. ML12046A145).

The NRC staff continues to evaluate ongoing stakeholder recommendations, and it plans to make the results available on the NRC's public website.

V Conclusion

The NRC's October 3, 2011, paper provided a three-tiered prioritization of actions to address the lessons learned from the accident at Fukushima. Within one year of the event, the NRC has taken action to implement all of the Tier 1 (highest priority) items. These actions include issuance of three orders, a request for information, and initiation of the rulemaking process.

The Tier 2 and Tier 3 items will be undertaken consistent with the schedule and prioritization scheme outlined in the October 3, 2011, paper or, pending Commission approval, the planned July 2012 paper. Furthermore, the NRC has established a process to prioritize additional issues for action as they are identified. The events at Fukushima highlighted the possibility that extreme natural phenomena could challenge the prevention, mitigation, and emergency preparedness defense-in-depth layers at nuclear power plants, and the NRC is using these insights to ensure reactor safety in the United States and ensure protection of the health and safety of the American people.