

Status Update on Tier 1 Activities

This enclosure provides a synopsis of the progress in implementing the post-Fukushima Tier 1 recommendations, which were those recommendations found to be of the highest priority. These recommendations were identified by the U.S. Nuclear Regulatory Commission's (NRC's) Near-Term Task Force (NTTF), the staff, and other stakeholders, and they were prioritized in SECY-11-0137, "Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11272A111).

Mitigation Strategies Order (EA-12-049)

On March 12, 2012, the NRC issued Order EA-12-049, "Issuance of Order To Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). The order addressed and expanded on Recommendation 4.2 of the NTTF report, which was provided to the Commission in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 (ADAMS Accession No. ML11186A950). The order requires a three-phased approach for mitigating beyond-design-basis external events to prevent core damage. The initial phase requires licensees to use installed equipment and resources to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling. In the transition phase, licensees must provide sufficient portable onsite equipment and consumables to maintain or restore these functions until they can be maintained with offsite equipment and support. The final phase requires licensees to obtain sufficient offsite resources to sustain those functions indefinitely. Licensees must notify the NRC when they achieve full compliance with the order.

The order established a schedule for all licensees to achieve full compliance within two refueling outages after submittal of their integrated plans and no later than December 2016. Except for a small number of sites described below, all operating reactor sites are in full compliance with the mitigating strategies order.

Licensees for 13 units at 8 sites—boiling-water reactors (BWRs) with Mark I and II containment designs—have asked for, and been granted, schedule relaxation to align with the schedule requirements of Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," dated June 6, 2013 (ADAMS Accession No. ML13130A067). For most BWRs with Mark I and II containments, mitigation strategies rely on the installation of containment vents to remove heat from the containment and maintain the function of equipment used for the initial phase of the order. These 13 units needed schedule relaxation because they will not complete the final installation of the vents per Order EA-13-109 before December 2016. Although this schedule relaxation will extend the full compliance date for these sites past December 2016, these licensees have all other aspects of Order EA-12-049 in place, including having all needed Phase 2 (transition phase) equipment on site.

Two additional licensees have asked for, and been granted, schedule relaxation beyond December 31, 2016:

- Fort Calhoun Station submitted its certification of cessation of power operations under Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.82(a)(1) on November 13, 2016 (ADAMS Accession No. ML16319A254). Based on the permanent shutdown of the plant in October 2016, the licensee for Fort Calhoun Station asked for schedule relaxation until August 31, 2017. This additional time will allow the licensee to perform the evaluations needed to support a rescission request, to submit it, and to have the NRC review it.
- Based on the proposed sale of the James A. FitzPatrick Nuclear Power Plant (FitzPatrick) from Entergy Nuclear Operations, Inc. (Entergy), to Exelon Generation Company, LLC (Exelon), Entergy requested a schedule relaxation for FitzPatrick until June 30, 2017. In light of changes to the licensee's previous plans to permanently shutdown FitzPatrick in early 2017, the additional time is needed to complete the remaining engineering and design activities, plant modifications, and procedure and training activities to fully implement the order.

The staff has been preparing safety evaluations (SEs) to document the acceptability of licensees' approaches to complying with the order. The staff is also inspecting for compliance with the order using Temporary Instruction (TI) 2515/191, "Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," dated October 6, 2014 (ADAMS Accession No. ML14273A444). As of the end of January 2017 the staff has completed 32 of 61 SEs and 16 of 61 TI 2515/191 inspections. The NRC expects to complete the inspections for each site within approximately 1 year of final site compliance.

Spent Fuel Pool Instrumentation Order (EA-12-051)

On March 12, 2012, the NRC issued Order EA-12-051, "Issuance of Order To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (ADAMS Accession No. ML12054A679), requiring all U.S. nuclear power plants to install reliable water-level measurement instrumentation in their SFPs to support prioritization of response activities between the reactor and the SFP in the event of an accident. The order addresses and expands on Recommendation 7.1 of the NTTF report. The instrumentation must remotely monitor at least three distinct SFP water levels:

- (1) normal level;
- (2) low level but still high enough to shield workers above the pools from radiation; and
- (3) a very low level near the top of the spent fuel rods (indicating that more water should be added without delay).

The order established a schedule for all licensees to achieve full compliance within two refueling outages after submittal of their integrated plans and no later than December 2016. Licensees must notify the NRC when they achieve full compliance. With the exception of FitzPatrick, all operating reactor sites are in full compliance with the SFP instrumentation order.

As discussed above, FitzPatrick has asked for, and has been granted, schedule relaxation until June 30, 2017. Entergy, the licensee for FitzPatrick, revised its previous plans to permanently shutdown the plant in early 2017, as described above, and requires additional time to complete the remaining engineering and design activities, plant modifications, and procedure and training activities to fully implement the order.

The staff will continue to issue SEs and will inspect for compliance with the order using TI 2515/191. As of the end of January 2017 the staff has completed 32 of 61 SEs and 16 of 61 TI 2515/191 inspections. The NRC expects to complete the inspections for each site within approximately 1 year of final site compliance.

Flooding and Seismic Hazard Walkdowns

On March 12, 2012, the staff issued a request for information under 10 CFR 50.54(f) (hereafter referred to as the 50.54(f) letter) asking licensees, in part, to walk down their installed flooding-protection, seismic-protection, and flooding and seismic hazard-mitigation features and review associated manual actions. This portion of the 50.54(f) letter addresses and expands on Recommendation 2.3 of the NTTF report.

The licensees of operating reactors completed the plant walkdowns and submitted their walkdown reports. The staff assessments determined that the plant walkdowns consistently followed the intent of the NRC-endorsed guidance, thereby verifying that the walkdowns met the objectives of the 50.54(f) letter. Therefore, all actions to address NTTF Recommendation 2.3 are complete.

Flooding Hazard Reevaluations

The NRC's 50.54(f) letter asked licensees to use current regulatory guidance and methods to reevaluate the flooding hazards that could affect their sites. This portion of the 50.54(f) letter addresses and expands on the flood reevaluations discussed in Recommendation 2.1 of the NTTF report.

All licensees have submitted their flooding hazard reevaluation reports. The staff is reviewing the reports and issuing staff assessments. For eight sites, the staff has completed its assessment and closed out NTTF Recommendation 2.1 as it relates to flooding hazard reevaluations. For the remaining sites, additional actions are necessary.

For those sites where the reevaluated flooding hazard exceeds the design basis, licensees will perform additional assessments to evaluate the capability of the plant to withstand the reevaluated hazard. In addition, licensees were requested to submit interim actions, planned or taken, to address the reevaluated hazard and provide assurance of the licensee's ability to maintain the plant in a safe condition under the reevaluated flooding conditions during the longer-term performance and evaluation of the additional assessments. The interim actions are verified through inspection using TI 2515/190, "Inspection of Licensee's Proposed Interim Actions as a Result of the Near-Term Task Force Recommendation 2.1 Flooding Evaluation" (ADAMS Accession No. ML15176A790).

In COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond Design-Basis External Events and the Reevaluation of Flooding Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256), the staff requested Commission direction to more clearly define the relationship between Order EA-12-049, the related Mitigation of Beyond-Design-Basis

Events (MBDBE) rulemaking, and the flooding hazard reevaluations. In the staff requirements memorandum (SRM) to COMSECY-14-0037 dated March 30, 2015 (ADAMS Accession No. ML15089A236), the Commission affirmed that licensees for operating nuclear power plants need to address the reevaluated flooding hazards within their mitigating strategies. The Commission also directed the staff to provide a plan for achieving closure of the flooding portion of NTTF Recommendation 2.1 to the Commission for its review and approval. On June 30, 2015, the staff provided its plan to the Commission in COMSECY-15-0019, "Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants" (ADAMS Accession No. ML15153A104). On July 28, 2015, the Commission approved the plan in the SRM to COMSECY-15-0019 (ADAMS Accession No. ML15209A682).

The action plan identifies two primary activities that define the response to flooding issues:

- (1) Ensure licensees put into effect mitigating strategies to address reevaluated flooding hazards.
- (2) Develop a graded approach to identify the need for, and prioritization and scope of, plant-specific integrated assessments and evaluation of plant-specific regulatory actions.

The staff is implementing the plan for ensuring that licensees address the reevaluated flooding hazards within mitigating strategies, as described in COMSECY-15-0019:

- On January 22, 2016, the NRC's Japan Lessons-Learned Division (JLD) issued interim staff guidance (ISG) JLD-ISG-2012-01, Revision 1 (ADAMS Accession No. ML15357A163). This ISG endorses the Nuclear Energy Institute (NEI) guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 2, issued December 2015 (ADAMS Accession No. ML16005A625). The revision reflects lessons learned and acceptable alternatives to the original guidance for implementation of Order EA-12-049. Revision 2 includes Appendix G, which provides guidance for licensees to assess their mitigating strategies against the reevaluated flooding hazards (referred to as mitigating strategies assessments or MSAs).
- The staff has issued 59 of 61 interim hazard letters to licensees providing feedback on the staff's review of the licensees' flooding hazard reevaluations. These letters are used by licensees to complete the MSAs and any other flooding hazard evaluations needed to complete their response to the 50.54(f) letter. Separately, the staff is documenting the technical bases for its conclusions in those letters in staff assessments. To date, the staff has issued 33 of 61 staff assessments.
- The remaining two interim hazard letters (Beaver Valley Power Station and Brunswick Steam Electric Plant) are delayed beyond the December 2016 target for issuance because of site-specific technical challenges. The staff and the licensees continue to evaluate individual approaches and assess options for addressing these challenges. The staff is focused on resolving these technical challenges in a manner that allows licensees to proceed expeditiously with completing their MSAs.
- If necessary, licensees are modifying or upgrading their mitigating strategies to ensure they can be implemented under the reevaluated flooding hazard conditions. Most licensees submitted their MSAs by December 2016. Many sites' reevaluated flooding

hazards were less than or equal to those used in developing the current mitigating strategies, or only procedural modifications were required to address the hazard.

In addition to discussing its plans for completing the MSAs, the staff also described the plans for closing NTTF Recommendation 2.1 in COMSECY-15-0019. The staff is addressing the issues associated with the flooding hazard reevaluations (referred to as Phase 1) and related regulatory decisionmaking (referred to as Phase 2) of NTTF Recommendation 2.1 by using a graded approach to narrow the list of potential plants that need to conduct an integrated assessment.

Key elements of the plan include the following:

- The staff revised the guidance for performing the integrated assessments for external flooding to provide a graded approach. On July 11, 2016, the staff issued JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flooding Hazard Reevaluation; Focused Evaluation and Integrated Assessment" (ADAMS Accession No. ML16162A301). The ISG contains guidance for Phase 1 flooding assessments, as described in COMSECY-15-0019, and endorses industry guidance provided in NEI 16-05, "External Flooding Integrated Assessment Guidelines (June 2016)" (ADAMS Accession No. ML16165A178), with clarifications and exceptions, as appropriate.
- The NRC expects that most sites with reevaluated flooding hazards that exceed the design basis will not need to conduct integrated assessments and will perform focused evaluations to ensure appropriate actions are identified and taken to protect the plant from the reevaluated flooding hazard, and that these actions will be reasonable, effective, and implemented in a timely manner.
- Licensees will submit their focused evaluations by June 2017. Licensees for the limited number of plants needing to complete an integrated assessment will submit those assessments by December 2018. Completion of these evaluations and assessments represents the end of Phase 1.
- The staff will evaluate the integrated assessments and determine whether there is a need for further regulatory action. The staff provided guidance for this Phase 2 evaluation in a memorandum dated September 21, 2016 (ADAMS Accession No. ML16237A103). The Phase 2 guidance addresses the additional regulatory decisionmaking associated with the flooding and seismic reevaluations. The guidance describes how the NRC will use the results of the Phase 1 hazard reevaluation and assessments to determine if additional regulatory actions are needed to address the reevaluated seismic or flooding hazard. As discussed in the enclosure to the memorandum, the staff will make regulatory decisions using existing guidance for risk-informed decisionmaking and for evaluating plant-specific backfits.

Seismic Hazard Reevaluations

As with the flooding hazard reevaluations discussed above, the NRC's 50.54(f) letter also asked licensees to reevaluate the seismic hazards that could affect their sites using present-day

regulatory guidance and methods. This portion of the 50.54(f) letter addresses and expands on the seismic reevaluations discussed in Recommendation 2.1 of the NTTF report.

All licensees have submitted their seismic hazard reports. The staff has reviewed the reports and issued staff assessments for all operating U.S. reactor sites. For 20 sites, the staff has completed its review and closed out NTTF Recommendation 2.1 as it relates to seismic hazard reevaluations. For the remaining sites, additional actions are necessary.

The Expedited Seismic Evaluation Process (ESEP) is a screening, evaluation, and equipment modification process that was conducted by licensees to provide additional seismic margin and expedite plant safety enhancements for certain containment and core cooling components while the more detailed and comprehensive plant seismic risk evaluations are being performed. The staff completed the technical review of the ESEP reports and documented its review in response letters. Thirteen licensees have committed to making limited plant modifications (e.g., replacement of relays, strengthening of anchorages for components, or removal of structural interference around valves and conduits) as part of the ESEP. These licensees have completed all modifications not requiring an outage, and the staff expects any outage-related modifications will be completed within two refueling outages, but no later than December 2018.

On October 27, 2015, the staff issued a letter providing its final determination of which licensees need to perform a seismic risk evaluation or other seismic evaluations (ADAMS Accession No. ML15194A015). The letter discusses the rationale for the staff's decision that a seismic probabilistic risk assessment (SPRA) is not necessary for 13 sites that were originally considered to need to perform an SPRA. Based on the October 27, 2015, letter, 20 sites were expected to perform an SPRA. Subsequent to that letter, Duke Energy Carolinas, LLC (Duke), submitted additional justification and asked for relief from the need to perform an SPRA for two sites, Catawba and McGuire Nuclear Stations. In a letter dated December 22, 2016 (ADAMS Accession No. ML16344A313), the NRC approved Duke's request.

The October 27, 2015, letter also replaced the due dates for SPRAs previously established in letters dated May 9, 2014 (ADAMS Accession No. ML14111A147), for central and eastern U.S. plants, and May 13, 2015 (ADAMS Accession No. ML15113B344), for western U.S. plants, with a staggered submittal schedule. This schedule accelerated certain key milestones by 3 months to 1 year and better addressed resource challenges in the area of seismic risk assessments for both the staff and industry. The first SPRA is due to the NRC in March 2017 and all SPRAs are expected by December 2019. Of the remaining sites, 32 (including the two Duke sites discussed above) will perform limited-scope evaluations (i.e., a high-frequency evaluation, low-frequency evaluation, SFP evaluation, or a combination thereof). The NRC expects that licensees will submit these limited-scope evaluations by December 2017. Eleven sites do not need to perform any further seismic evaluation based on the reevaluated seismic hazard.

As discussed above, on January 22, 2016, JLD issued JLD-ISG-2012-01, Revision 1. This ISG endorses NEI 12-06, Revision 2. The revision reflects lessons learned and acceptable alternatives to the original guidance for Order EA-12-049. Revision 2 includes Appendix H, which contains guidance for licensees to assess their mitigating strategies against the reevaluated seismic hazards (i.e., conduct MSAs), as discussed in COMSECY-15-0019:

- If necessary, licensees are modifying or upgrading their mitigating strategies to ensure they can be implemented under the reevaluated seismic hazard conditions. Many sites' reevaluated seismic hazards are less than or equal to the level used in developing the current mitigating strategies or will be addressed through procedural modifications.
- The majority of sites who are not developing SPRAs have submitted their seismic MSAs, with the remainder expected by September 2017.
- For those sites that need to perform an SPRA, the final seismic MSA submittal depends on the completion of the SPRA. As discussed previously, licensees are submitting SPRAs on a staggered schedule, beginning in March 2017 and ending by December 2019.

The staff will evaluate the results of the SPRAs to assess the need for further regulatory actions, beyond the completion of the seismic MSA and any related modifications, as part of the Phase 2 decisionmaking process for the seismic hazard reevaluations. As discussed above, the staff issued Phase 2 guidance in a memorandum dated September 21, 2016.

Emergency Preparedness Staffing and Communications

The NRC's 50.54(f) letter requested that licensees assess their means to power the equipment needed to communicate on site and off site during a prolonged station blackout (SBO) event and to identify and implement enhancements to ensure that communications can be maintained during such an event. The letter also asked licensees to assess the staffing required to fill all necessary positions to respond to an extended loss of all alternating current power that affects all units at the site. This portion of the 50.54(f) letter addresses and expands on the emergency preparedness staffing and communication items discussed in Recommendation 9.3 of the NTTF report.

All licensees submitted their communication assessments, and the staff issued safety assessments documenting each review.

Licensees responded to the staffing portion of the 50.54(f) letter in two phases to account for the implementation of mitigation strategies. Phase 1 staffing assessments, which are only applicable to multiunit sites, are based on existing SBO coping strategies with an assumption of multiple reactors being affected concurrently. In Phase 2, which is applicable to all sites, licensees were asked to assess the staffing necessary to carry out the mitigating strategies developed in response to Order EA-12-049. Licensees conducted their Phase 2 staffing assessments in conjunction with the implementation of Order EA-12-049 and submitted their Phase 2 assessments approximately 4 months before the required Order EA-12-049 compliance date. All licensees have submitted their Phase 1 (if required) and Phase 2 staffing assessments (with one exception, discussed below). The staff has issued response letters for both Phase 1 and Phase 2 assessments.

One licensee will submit its Phase 2 staffing assessment after December 31, 2016. As discussed above, the licensee for FitzPatrick revised its previous plan to permanently shutdown the plant in early 2017 based on the sale of the site from Entergy to Exelon, necessitating additional time to complete the remaining engineering and design activities, plant modifications, and procedure and training activities to fully implement Order EA-12-049. The NRC approved a relaxation of the order compliance date until June 30, 2017, and based on the expectation that licensees will submit their Phase 2 staffing assessment 4 months before the compliance date in Order EA-12-049, FitzPatrick is expected to submit its Phase 2 assessment by February 28, 2017.

The staff will use TI 2515/191 to inspect activities completed in this area, in conjunction with the inspections for Orders EA-12-049 and EA-12-051.

Mitigation of Beyond-Design-Basis Events Rulemaking

In the SRM to SECY-11-0137, "Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned," dated December 15, 2011 (ADAMS Accession No. ML113490055), the Commission approved the staff's proposed prioritization of the NTTF recommendations, which included several rulemaking activities. On January 25, 2013, the staff submitted COMSECY-13-0002, "Consolidation of Japan Lessons Learned Near-Term Task Force Recommendations 4 and 7 Regulatory Activities" (ADAMS Accession No. ML13011A034), to engage the Commission in several aspects of the rulemaking, which included combining NTTF Recommendations 4 and 7 and revising the rulemaking schedule to accommodate Commission direction to incorporate the lessons learned from implementation of Order EA-12-049. On March 4, 2013, the Commission approved the staff's proposal in the SRM to COMSECY-13-0002 (ADAMS Accession No. ML13063A548). This combined rulemaking activity was called the Station Blackout Mitigation Strategies rulemaking.

In COMSECY-13-0010, "Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons-Learned," dated March 27, 2013 (ADAMS Accession No. ML12339A262), the staff requested Commission approval to forego issuing an order to implement the Tier 2 NTTF Recommendation 9.3 emergency preparedness items. Specifically, the staff found that Order EA-12-049 adequately addressed the Tier 2 emergency preparedness items related to periodic training and exercises for multiunit and prolonged SBO and emergency preparedness equipment and facilities. On April 30, 2013, the Commission approved the staff's recommendation in the SRM to COMSECY-13-0010 (ADAMS Accession No. ML13120A339).

In Enclosure 6 to SECY-14-0046, "Fifth 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami," dated April 17, 2014 (ADAMS Accession No. ML14064A544), the staff proposed consolidating, into a single rulemaking activity (called the MBDBE rulemaking), the Station Blackout Mitigation Strategies rulemaking, the Onsite Emergency Response Capabilities rulemaking (NTTF Recommendation 8), and the portions of NTTF Recommendations 9, 10, and 11 that were already being addressed as part of Order EA-12-049. The Commission approved this

consolidation in the related SRM dated July 9, 2014 (ADAMS Accession No. ML14218A703). The NTTF recommendations included in the MBDBE rulemaking include:

- NTTF Recommendation 4: strengthen SBO mitigation capability at all operating and new reactors for design-basis and beyond-design-basis external events;
- NTTF Recommendation 7: enhance SFP makeup capability and instrumentation for the SFP;
- NTTF Recommendation 8: strengthen and integrate onsite emergency response capabilities such as emergency operating procedures, severe accident management guidelines (SAMGs), and extensive damage mitigation guidelines;
- NTTF Recommendation 9: require that facility emergency plans address staffing, dose assessment capability, communications, training and exercises, and equipment and facilities for multi-unit events and prolonged SBO;
- NTTF Recommendation 10: pursue additional emergency preparedness topics related to multi-unit events and prolonged SBO, including command and control structure and the qualifications of decision makers; and
- NTTF Recommendation 11: pursue emergency management topics related to decision making, radiation monitoring, and public education, including the ability to deliver equipment to the site with degraded offsite infrastructure.

This combined MBDBE rulemaking activity would do the following:

- make Orders EA-12-049 and EA-12-051 generically applicable;
- establish requirements for an integrated response capability;
- establish new requirements for actions related to onsite emergency response; and
- address a number of petitions for rulemaking submitted to the NRC following the March 11, 2011, Fukushima Dai-ichi event.

The staff provided the proposed MBDBE rule to the Commission on April 30, 2015, in SECY-15-0065, "Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)" (ADAMS Accession No. ML15049A201). The staff subsequently briefed the Commission on July 9, 2015, and the Commission issued the SRM to SECY-15-0065 on August 27, 2015 (ADAMS Accession No. ML15239A767). The staff revised the proposed rule, including its supporting guidance, to reflect the Commission direction. The revised proposed rule was published in Volume 80, page 70,609, of the *Federal Register* (80 FR 70609) for a 90-day public comment period on November 13, 2015. The proposed rule public comment period closed on February 11, 2016. The NRC received 20 comment letters. The staff considered the public comments, as well as two non-concurrence documents from staff, and revised the rulemaking package as needed.

On November 30, 2016, the staff met with the Advisory Committee for Reactor Safeguards (ACRS) Full Committee to discuss the draft final MBDBE rule and the associated guidance.

The ACRS's conclusions and recommendations are discussed in a December 6, 2016, letter to Chairman Stephen G. Burns (ADAMS Accession No. ML16341B371).

The staff provided the draft final MBDBE rule and associated guidance to the Commission on December 15, 2016, in SECY-16-0142, "Final Rule: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)," (ADAMS Accession No. ML16291A186). The staff's response to the ACRS's letter is provided as Enclosure 8 to SECY-16-0142.

In the SRM to SECY-15-0065, the Commission also directed the staff to "update the Reactor Oversight Process (ROP) to explicitly provide periodic oversight of industry's implementation of the SAMGs." NEI submitted a letter dated October 26, 2015 (ADAMS Accession No. ML15335A442), describing the industry initiative to update and maintain the SAMGs. The industry's Nuclear Strategic Issues Advisory Committee approved this initiative. As specified in the letter, all operating plant licensees have submitted site-specific regulatory commitments on the docket. These commitments ensure the following:

- maintenance of SAMG strategies;
- integration with emergency operating procedures and other guideline sets;
- timely incorporation of owners' group revisions; and
- establishment of configuration controls.

In a letter to NEI dated February 23, 2016 (ADAMS Accession No. ML16032A029), the staff outlined its approach for making changes to the ROP in accordance with the Commission direction. The staff engaged NEI and other stakeholders to identify the near-term and longer-term changes to the ROP, consistent with the Commission direction and the licensees' near-term and longer-term SAMG commitments. The staff has revised Inspection Procedure 71111.18, "Plant Modifications" (ADAMS Accession No. ML16306A185), to incorporate oversight of the industry's SAMG commitments associated with the plant configuration management processes. The revision became effective on January 1, 2017.

Reliable Hardened Containment Vents for Boiling-Water Reactors with Mark I and II Designs (Orders EA-12-050 and EA-13-109)

On March 12, 2012, the NRC issued Order EA-12-050, "Issuance of Order To Modify Licenses with Regard to Reliable Hardened Containment Vents" (ADAMS Accession No. ML12054A696), requiring all licensees of operating BWRs with Mark I and II containments to install a reliable hardened vent. Subsequently, the staff considered the possibility of venting after reactor core damage occurs and provided its recommendation to the Commission in SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling-Water Reactors with Mark I and Mark II Containments," dated November 26, 2012 (ADAMS Accession No. ML12345A030). In the SRM to SECY-12-0157, dated March 19, 2013 (ADAMS Accession No. ML13078A017), the Commission directed the staff to require licensees with Mark I and II containments to "upgrade or replace the reliable hardened vents required by Order EA-12-050, with a containment venting system designed and installed to remain functional during severe accident conditions." The staff issued Order EA-13-109 to ensure that those vents will remain functional under the conditions that could exist in the event of reactor core damage.

Order EA-13-109 supersedes Order EA-12-050 and addresses and expands on Recommendation 5.1 of the NTTF report.

Order EA-13-109 contains two distinct phases of implementation. Phase 1 requires affected licensees to upgrade the venting capabilities from the containment wetwell to provide a reliable hardened vent to help prevent core damage. The vent must also remain functional during severe accident conditions. Phase 2 requires affected licensees to do one of the following:

- increase protection for severe accident conditions through the installation of a reliable severe-accident-capable drywell vent system; or
- develop a reliable containment venting strategy that makes it unlikely that there would be the need to vent from the containment drywell during severe accident conditions.

For both phases, licensees have submitted overall integrated plans. The staff conducted any necessary audits and has issued all Phase 1 and Phase 2 interim staff evaluations.

Order EA-13-109 established a schedule for applicable licensees to achieve full compliance with Phase 1 by June 30, 2018, and full compliance with Phase 2 by June 30, 2019. With the exception of a small number of licensees described below, the staff expects that all applicable licensees will meet the compliance dates specified in the order.

The staff is reviewing requested schedule relaxations for Oyster Creek Nuclear Generating Station, Pilgrim Nuclear Power Station, and Quad Cities Nuclear Power Station, Units 1 and 2. These relaxation requests are based on announced plans to permanently shut these facilities down within the next few years.¹

The staff has approved a schedule relaxation for FitzPatrick in a letter dated December 2, 2017 (ADAMS Accession No. ML16173A342). Based on the timelines specified in the order, Entergy was required to implement Phase 1 of the order by startup from a late 2016 or early 2017 refueling outage, or by June 30, 2018, whichever is earlier. In a letter dated September 8, 2016 (ADAMS Accession No. ML16252A482), Entergy indicated that based on the revised plans to continue operating FitzPatrick (discussed above), additional time is needed to complete the remaining engineering and design activities, plant modifications, and procedural and training activities required to fully implement Phase 1 of the order. Thus, Entergy asked for, and was granted, an extension to comply with Phase 1 until June 30, 2018. Entergy has stated that it does not require an extension to comply with Phase 2.

In accordance with the requirements of the order, licensees will notify the NRC when they have achieved full compliance with Phases 1 and 2. Once all units at a site are in compliance, the staff will issue a final SE and will inspect compliance with the order.

Containment Protection and Release Reduction Rulemaking

In the SRM to SECY-12-0157, the Commission approved the development of the technical and regulatory basis and the recommendation to proceed with a rulemaking for filtering strategies

¹ By letter dated December 14, 2016 (ADAMS Accession No. ML16349A311), the licensee for Quad Cities withdrew its certification of permanent cessation of operations, reversing the decision to permanently shut down the facility.

with drywell filtration and severe accident management of BWRs with Mark I and II containments. This expanded on Recommendation 5.1 of the NTTF report.

The staff provided the draft Containment Protection and Release Reduction (CPRR) rulemaking regulatory basis to the Commission for information on June 18, 2015, in SECY-15-0085, "Evaluation of the Containment Protection and Release Reduction for Mark I and Mark II Boiling Water Reactors Rulemaking Activities (10 CFR Part 50) (RIN-3150-AJ26)" (ADAMS Accession No. ML15022A218). The Commission subsequently converted this document into a notation vote paper. In the SRM to SECY-15-0085, dated August 19, 2015 (ADAMS Accession No. ML15231A471), the Commission approved Alternative 1, which discontinued rulemaking activities, left Order EA-13-109 in place without additional regulatory actions, and disapproved issuing a *Federal Register* notice requesting public comment on the draft regulatory basis. The NRC's Office of Nuclear Regulatory Research has prepared NUREG-2206, "Technical Basis for the Containment Protection and Release Reduction Rulemaking for Boiling Water Reactors with Mark I and II Containments," to document the technical analysis, including a risk evaluation, accident progression and source term calculations, and offsite consequence calculations. This report is currently being finalized and is expected to be published in the spring of 2017.

Consideration of Filtered Containment Vents and Loss of Ultimate Heat Sink

As directed by the SRM to SECY-11-0137, the staff reviewed the additional issues identified in SECY-11-0137 within the context of the NRC's existing regulatory framework and considered whether to recommend any additional regulatory action. A team consisting of NRC senior management representatives and technical experts conducted this review. The staff used the same prioritization process that was used in SECY-11-0137. The staff's prioritization and assessment process generally prioritized the additional issues into either Tier 1 or Tier 3, as defined in SECY-11-0137. The prioritization appears in Enclosure 2 to SECY-12-0025, "Staff Assessment and Prioritization of Additional Issues Identified in SECY-11-0137," dated February 17, 2012 (ADAMS Accession No. ML12039A118).

The staff prioritized as Tier 1 the following two additional issues that it determined should be started without unnecessary delay and for which there is sufficient resource flexibility, including the availability of critical skill sets:

- (1) filtration of containment vents; and
- (2) loss of ultimate heat sink (UHS).

In the SRM to SECY-12-0157, the Commission directed the staff to include the consideration of filtered vents into the CPRR rulemaking activities, which were later terminated as described above.

The staff's assessment and basis for prioritization of the loss of UHS issue is discussed in Enclosure 2 to SECY-12-0025. In that paper, the staff described that the loss of UHS issue is being addressed in the following Fukushima lessons-learned activities:

- UHS systems were included in the reevaluation and walkdowns of site-specific seismic and flooding hazards in conjunction with the resolution of NTTF Recommendations 2.1 and 2.3;
- consideration of the loss of UHS was included in the resolution of SBO rulemaking activities in conjunction with the resolution of NTTF Recommendation 4.1;
- loss of normal access to the UHS was included as an initial condition in the development of mitigating strategies for beyond-design-basis external events as part of the resolution of NTTF Recommendation 4.2; and
- UHS systems were considered in the reevaluation of site-specific natural external hazards in conjunction with the resolution of the Tier 2 recommendation associated with the assessment of natural hazards other than seismic and flooding.

The staff concluded that these activities addressed the UHS issue identified in SECY-11-0137, and that no additional actions were necessary.

Enhancements to the Capability to Prevent or Mitigate Seismically-Induced Fires and Floods

This lessons-learned activity originated from NTTF Recommendation 3 and was intended to evaluate potential enhancements to the capability to prevent or mitigate seismically-induced fires and floods (SIFFs). In the SRM to SECY-11-0137, the Commission directed the staff, as part of Tier 1 activities, to start the development of probabilistic risk analysis (PRA) methods to evaluate potential enhancements to plants' capabilities to prevent or mitigate SIFFs. However, to be consistent with the program plan for NTTF Recommendation 3 in Enclosure 3 to SECY-12-0095, "Tier 3 Program Plans and 6-Month Status Update in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami," dated July 13, 2012 (ADAMS Accession No. ML12208A210), and as directed by the Commission, carrying out the broader evaluation (i.e., beyond the PRA methods) of potential enhancements to the capability to prevent or mitigate SIFFs remained a longer-term Tier 3 activity.

The staff provided its evaluation and closeout plan for this recommendation in Enclosure 3 of SECY-15-0137, "Proposed Plans for Resolving Open Fukushima Tier 2 and 3 Recommendations," dated October 29, 2015 (ADAMS Accession No. ML15254A013). With respect to the Tier 1 portion of this recommendation, the staff contracted with Brookhaven National Laboratory (BNL) to conduct a feasibility study on the development of a PRA methodology for SIFFs. The BNL report, "Scoping Study for a PRA Method for Seismically Induced Fires and Floods," issued December 2015 (ADAMS Accession No. ML16004A250), documents the final feasibility study. The BNL report identified a number of key issues associated with the development of qualitative or quantitative PRA methods for SIFFs. Through the workshops and expert consultation, the staff identified several technical issues that would need further evaluation to develop a fully-useable PRA methodology. As discussed in SECY-15-0137, the staff determined that the potential benefits of fully developing and piloting a PRA approach for SIFFs did not justify the costs of continuing this effort. The Commission

approved the staff's proposal to close this recommendation in the SRM to SECY-15-0137, dated February 8, 2016 (ADAMS Accession No. ML16039A175).

Emergency Response Data System Modernization Initiative

On September 9, 2011, in SECY-11-0124, "Recommended Actions To Be Taken Without Delay from the Near-Term Task Force Report" (ADAMS Accession No. ML11245A127), the staff discussed NTTF Recommendation 9.4 on modernizing the Emergency Response Data System (ERDS). This discussion provided a status of ongoing industry actions in this area. The staff concluded that additional regulatory action was not necessary to ensure implementation of the ERDS modernization. The voluntary ERDS modernization initiative was completed in June 2012 as planned. The staff evaluated further ERDS enhancements as Tier 3 items in SECY-15-0137 and concluded that additional enhancements were not warranted.