

POLICY ISSUE
(Information)

April 5, 2016

SECY-16-0043

FOR: The Commissioners

FROM: Victor M. McCree
Executive Director for Operations

SUBJECT: NINTH 6-MONTH STATUS UPDATE ON RESPONSE TO LESSONS
LEARNED FROM JAPAN'S MARCH 11, 2011, GREAT TŌHOKU
EARTHQUAKE AND SUBSEQUENT TSUNAMI

PURPOSE:

The purpose of this paper is to provide a status update on the U.S. Nuclear Regulatory Commission (NRC) staff's activities related to lessons learned from the March 2011 accident at Japan's Fukushima Dai-ichi facility. This paper does not address any new commitments or resource implications.

SUMMARY:

This SECY paper provides the NRC staff's ninth 6-month status update on the activities conducted under the charter for the NRC's review of lessons learned from the March 2011 accident at Japan's Fukushima Dai-ichi nuclear power plant. The NRC and the industry have made substantial progress in addressing the lessons learned from the accident, and all of the related lessons learned activities are on or ahead of established schedules. Highlights of the work accomplished in the previous 6 months, as well as a summary of significant activities anticipated to be completed before the NRC staff's next 6-month update, are enclosed.

CONTACT: Robert J. Bernardo, NRR/JLD
301-415-2621

Enclosure 1 contains a detailed status update on each of the Tier 1 activities and Enclosure 2 contains updates on the NRC staff's activities related to resolution of the remaining Tier 2 and 3 recommendations. The NRC staff's final assessments of the Group 2 items from SECY-15-0137, "Proposed Plans for Resolving Open Fukushima Tier 2 and 3 Recommendations," dated October 29, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15254A008), were discussed in SECY-16-0041 "Closure of Fukushima Tier 3 Recommendations Related to Containment Vents, Hydrogen Control, and Enhanced Instrumentation" (ADAMS Accession No. ML16049A079), and are not included in this paper.

BACKGROUND:

In the staff requirements memorandum (SRM) to SECY-11-0117, "Proposed Charter for the Longer-Term Review of Lessons Learned from the March 11, 2011, Japanese Earthquake and Tsunami," dated October 19, 2011, (ADAMS Accession No. ML112920034), the Commission approved a charter that established the structure, scope, and expectations for the NRC's longer-term review of the events in Japan. The charter required, among other things, status updates every 6 months—for 2 years—on the work carried out under the charter.

In the SRM to SECY-13-0095, "Fourth 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tōhoku Earthquake and Subsequent Tsunami," dated November 13, 2013 (ADAMS Accession No. ML13317A271), the Commission directed the NRC staff to continue to update the Commission in a status report every 6 months until completion of the implementation of Tier 1 actions.

In SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 (ADAMS Accession No. ML11269A204), the NRC staff prioritized into three tiers the Near-Term Task Force (NTTF) recommendations from SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 (ADAMS Accession No. ML11186A950).

SECY-11-0137 also provided the NRC staff's assessment of the Tier 1 and Tier 2 items, including recommendations for regulatory action on the Tier 1 recommendations. 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. ML12208A208), provided assessments and program plans for the Tier 3 recommendations, along with six other recommendations listed in SECY-11-0137.

On March 12, 2012, the NRC issued the following orders:

- 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)
- EA-12-050, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents" (ADAMS Accession No. ML12054A694)

- EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (ADAMS Accession No. ML12054A679)

On the same date, the NRC also issued a request for information to licensees under Title 10 of the *Code of Federal Regulations*, Section 50.54(f), hereafter referred to as the 50.54(f) letter (ADAMS Accession No. ML12053A340).

On June 6, 2013, the NRC issued Order EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions" (ADAMS Accession No. ML13143A321), which modified and superseded Order EA-12-050.

These regulatory actions addressed most of the Tier 1 recommendations. Implementing these regulatory actions, along with the related rulemaking activities, has continued to be the primary focus of the staff's effort since the last 6-month update.

In light of the safety benefit that will be achieved through the Tier 1 recommendations and insights from related Commission decisions, the NRC staff provided updated resolution plans for the Tier 2 and Tier 3 items in SECY-15-0137. The NRC staff has continued the activities specified in SECY-15-0137 to complete its review of the remaining Tier 2 and Tier 3 items, including the aforementioned SECY-16-0041 on closure of the group 2 items.

DISCUSSION:

This provides the latest 6-month status update on the NRC staff's activities related to lessons learned from the March 2011 accident at Japan's Fukushima Dai-ichi facility. A detailed status update on each Tier 1 recommendation is contained in Enclosure 1 and a status report on the closeout activities for the remaining open Tier 2 and 3 recommendations is contained in Enclosure 2.

The NRC and the industry have made substantial progress in addressing the lessons learned from the accident, and all of the lessons learned activities are on or ahead of established schedules. Highlights of the progress made to date include the following:

- For both the mitigation strategies order (Order EA-12-049) and spent fuel pool instrumentation order (Order EA-12-050), NRC staff is conducting audits of plant documentation and onsite activities to review the closeout of items identified in the interim staff evaluations. As of the end of this reporting period, the NRC staff has completed audits at 55 sites out of a total of 61. The NRC staff expects to complete the remaining audits by June 2016.
- There are 50 of 100 units that have fully implemented the requirements of the mitigation strategies order. All operating reactor units are expected to fully implement the requirements of the order by the end of 2016, with the exception of 13 units which have been granted schedule relaxation (to either spring 2017 or spring 2018) to align with the schedule requirements of Order EA-13-109. Although the full implementation date for these units will extend past December 2016 with this schedule relaxation, all other aspects of Order EA-12-049 will be in place by December 2016.

- There are 83 out of 100 units that have fully implemented the requirements of the spent fuel pool instrumentation order. All 100 units are expected to fully implement the requirements of the order by the end of 2016.
- The NRC staff has issued 52 out of 61 Phase 2 emergency preparedness staffing assessment letters. These letters document the NRC staff's conclusion that the Phase 2 staffing submittals adequately address the strategies needed to respond to a beyond-design-basis event. The NRC staff expects to issue the remaining nine response letters by the end of 2016.
- The NRC staff completed a pilot post-compliance inspection of the mitigation strategies and spent fuel pool instrumentation orders, along with emergency preparedness staffing and communication enhancements, at the Watts Bar site in April 2015. The NRC staff will be conducting post-compliance inspections per 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" (ADAMS Accession No. ML14273A444), starting with the North Anna Power Station inspection conducted the week of February 22, 2016.
- The three Western U.S. (WUS) sites were informed of the results of the NRC staff review of their reevaluated seismic hazard information. Columbia Generating Station and Diablo Canyon Power Plant, Units 1 and 2, have been informed that their reevaluated seismic hazard information is suitable for use in the development of a seismic probabilistic risk assessment (SPRA). Palo Verde Nuclear Generating Station, Units 1, 2, and 3, screened out from additional seismic evaluations.
- The NRC staff completed the review of all the interim seismic evaluation (expedited seismic evaluation process) reports for the Central and Eastern U.S. (CEUS) sites and issued response letters to all 33 licensees documenting its review.
- The NRC staff has issued 58 of 58 staff assessments for the CEUS sites. The staff assessments support the completion of remaining Recommendation 2.1 seismic activities, including SPRAs, high frequency evaluations, and spent fuel pool evaluations.
- The NRC staff established the final list of operating reactor sites that will be required to perform a full SPRA. There are 20 sites that will be required to perform an SPRA.
- The NRC staff has completed the Phase 2 assessment and closed out the seismic portion of Recommendation 2.1 for 16 sites. The reevaluated seismic hazards for these sites was either bounded by the site's current design basis or had a limited high frequency exceedance.
- The proposed Mitigation of Beyond-Design-Basis Events (MBDBE) rule, revised to reflect the Commission direction provided in the SRM to SECY-15-0065 (ADAMS Accession No. ML15239A767), was published in the *Federal Register* (80 FR 70609) on November 13, 2015, along with the associated draft guidance. The public comment period closed on February 11, 2016. Twenty comment letters were received. The NRC

staff is reviewing the public comments and will update the draft final rule as necessary to address the comments.

- Licensees are assessing and modifying or upgrading their mitigating strategies, if necessary, to ensure they can be implemented under the reevaluated flood and seismic hazard conditions. The NRC has issued letters to the majority of licensees on the acceptability of the reevaluated flood hazard for the evaluation of the mitigation strategies. The NRC staff has issued 49 of 61 letters as of the end of March 2016. In addition, the NRC has issued 14 of 61 flood hazard staff assessments. Some sites have requested assistance from the U.S. Army Corps of Engineers for dam failure assessments or are finalizing calculations because of licensee analysis changes or site layout changes. The NRC staff expects letters will be issued to the majority of these licensees by the end of calendar year 2016, except for those sites that submit their flood hazard reevaluation report in late 2016.
- All overall integrated plans (OIPs) for implementation of Phase 2 requirements of Order EA-13-109 were received by December 31, 2015, except for Oyster Creek Nuclear Generating Station's (Oyster Creek). Exelon Generating Company, LLC, (Exelon), the licensee for Oyster Creek, submitted a request for an extension to comply with both phases of Order EA-13-109 until January 31, 2020. Oyster Creek is expected to be permanently shut down at that time. On November 16, 2015, the NRC staff issued a letter (ADAMS Accession No. ML15092A159) approving Exelon's requested schedule relaxation from Phase 1 of the order at Oyster Creek. Exelon submitted additional information regarding the Phase 2 relaxation request on February 15, 2016 (ADAMS Accession No. ML16047A094). Exelon's request for relaxation from Phase 2 of the order remains under review.
- The NRC staff completed the assessments and final evaluation of the Group 2 items from SECY-15-0137. The results have been documented in SECY-16-0041, dated March 31, 2016. The additional interactions conducted since the completion of SECY-15-0137 did not change the NRC staff's initial conclusions and recommendations, and the NRC staff determined that no additional regulatory action is warranted for these recommendations.
- The Nuclear Energy Institute (NEI) submitted NEI 16-05, "External Flooding Assessment Guidelines," as draft guidance on the focused evaluation and revised integrated assessment for flooding. If appropriate, the NRC staff will endorse the industry guidance by means of new interim staff guidance, with any necessary exceptions and clarifications.
- The NRC staff issued a revision to interim staff guidance JLD-ISG-2012-01 to endorse NEI guidance document NEI 12-06, Revision 2. Revision 2 includes Appendix E, Appendix G, and Appendix H, which contain guidance needed to ensure the mitigating strategies address reevaluated flooding and seismic hazards, along with other changes to reflect lessons-learned from prior versions.

- The NRC staff endorsed the Electric Power Research Institute guidance for the seismic evaluation of spent fuel pools. This guidance supports the sites expected to submit spent fuel pool seismic evaluations by December 2016.

The NRC staff anticipates the following significant activities to occur during, or be ongoing over, the next several months:

- The NRC expects to issue two of the three staff assessments for the WUS sites by September 2016, and the final staff assessment by December 2016.
- The NRC staff expects to complete the remaining audits to review the closeout of open and confirmatory items identified in the interim staff evaluations of licensees' implementation of the mitigation strategies and spent fuel pool instrumentation orders by June 2016.
- The NRC staff anticipates that the National Academy of Science will release the second phase of their study entitled "Lessons Learned from the Fukushima Accident for Improving Safety and Security of U.S. Nuclear Plants," in May 2016. This phase of the study is focused on spent fuel safety and security. The NRC staff will provide an assessment of this study to the Commission in fall 2016.
- The NRC staff will be completing safety evaluations within approximately 6 months of licensees notifying the NRC that they have fully implemented the requirements of the mitigation strategies and spent fuel pool instrumentation orders.
- The NRC staff will be conducting post-compliance inspections per TI 2515/191. The inspections will be completed within approximately 1 year of licensees notifying the NRC that they are in compliance with the mitigation strategies and spent fuel pool instrumentation orders.
- Licensees are assessing and modifying or upgrading their mitigating strategies, if necessary, to ensure they can be implemented under the reevaluated flood and seismic hazard conditions. The NRC staff expects that most licensees will complete their mitigating strategies assessment by December 2016 and pursue related actions, if needed.
- The NRC staff will issue response letters within approximately 4 months of receiving the remaining emergency preparedness Phase 2 staffing assessments. The NRC staff expects to issue the final Phase 2 staffing assessment letters by December 2016.
- The NRC staff will inspect activities related to emergency preparedness staffing and communications in conjunction with the inspections for the mitigation strategies and spent fuel pool instrumentation orders as discussed above.
- The NRC staff will review the Phase 2 OIPs related to Order EA-13-109, conduct audits (if necessary) of licensee progress toward full implementation of Phase 2, and then issue an interim staff evaluation. Staff plans to complete the interim staff evaluation review in

two groups. The first group of interim staff evaluations, for 12 sites, is expected to be completed by June 30, 2016. The second group, for the remaining seven sites, is expected to be completed by December 31, 2016.

Activities Associated with Flood Hazard Reevaluations

In the SRM to COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," dated March 30, 2015 (ADAMS Accession No. ML15089A236), the Commission directed the NRC staff to provide it with more detailed information on the status of flood hazard reevaluations, integrated assessments, and related guidance development in its periodic updates.

The Commission also directed the NRC staff to develop a plan for achieving closure of NTF Recommendation 2.1 for flooding and provide that plan to the Commission for review and approval. On June 30, 2015, the NRC staff provided a 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 NRC staff has taken a number of actions to implement the plan and continues efforts to complete the flooding hazard reevaluations and plant response assessments on the established schedules.

The closure plan identifies two primary activities that define the response to flooding issues. These are:

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

The NRC staff and licensees are taking action to ensure mitigating strategies will be able to address the reevaluated flooding hazards. Revision 2 to NEI 12-06, which incorporates guidance for performing mitigating strategies assessments that address the reevaluated flooding hazards (Appendix G) and guidance for FLEX validation (Appendix E), was released in December 2015. The NRC staff endorsed the industry guidance, with exceptions and clarifications, in a revision to JLD-ISG-2012-01, and will include it in a regulatory guide being prepared for the proposed MBDBE rule. The NRC staff expects that most licensees will complete their mitigating strategies assessment and pursue any necessary upgrades to those strategies by December 2016.

To support licensees in completing the mitigation strategies assessments by December 2016, the NRC staff recognized the need to provide expedited feedback to licensees regarding the acceptability of their reevaluated flood hazards for use in conjunction with their mitigating strategies assessments. Therefore, the NRC staff developed an expedited review process in which staff assessed the flood hazard information submitted by licensees, augmented by a series of audits, to determine whether the results provide a reasonable evaluation of site

flooding hazards. The NRC staff then issued interim staff response letters documenting the results of the flood hazard review to support the mitigating strategies assessment. As of March 31, 2016, 49 of 61 letters have been issued.

In 2016 and 2017, the NRC staff will document the technical bases for its conclusions by continuing to issue staff assessments. To date, staff has completed 14 of 61 staff assessments.

This series of staff technical reviews represents the most comprehensive evaluation of site flooding hazards since the plants were licensed. These current reviews have used present-day guidance, data, and methods (including state-of-the-science computer models). The NRC staff subject matter experts in meteorology, hydrology, oceanography, and related fields have used these present-day tools to review a variety of flooding phenomena, including local intense precipitation, river flooding, and dam failures, as well as storm surge and tsunamis.

In addition to supporting the mitigating strategies assessments associated with Order EA-12-049 and the associated proposed MBD BE rule, the reevaluated flood hazard information will be used, where appropriate, in conjunction with flood-specific plant response assessments to inform regulatory decisions associated with the March 12, 2012, 50.54(f) letter. In response to Commission direction, the NRC staff has developed a framework for a graded approach for the plant response assessments. The graded approach developed by the NRC staff uses focused evaluations, when possible, to ensure plants are appropriately protected against the reevaluated flooding hazards. When necessary, the graded approach includes revised integrated assessments at those sites for which there is the greatest potential for additional safety enhancements.

To support the graded approach, the NRC staff is undertaking a series of activities, including the following:

- On March 9, 2016, NEI submitted NEI 16-05, "External Flooding Assessment Guidelines," as draft guidance on the focused evaluation and revised integrated assessment for flooding. The NRC staff will complete review of the industry guidance document and inform the Commission by May 29, 2016. If appropriate, the NRC staff will endorse the industry guidance by means of new interim staff guidance, with any necessary exceptions and clarifications.
- It is expected that most sites will screen out from the integrated assessments, and licensees will instead perform focused evaluations to ensure appropriate actions are identified and taken to protect the plant from the reevaluated flood hazard, and that these actions are reasonable, effective, and implemented in a timely manner. These focused evaluations will be submitted by June 2017.
- A limited number of plants will submit integrated assessments by December 2018.
- The NRC staff will evaluate the integrated assessments and determine the need for further regulatory action. The final plan for the decisionmaking criteria as part of Phase 2 will be established following development of guidance and further stakeholder interactions. The NRC staff plans to complete the Phase 2 guidance and inform the Commission by September 30, 2016.

Other Significant Activities

The NRC staff continues to be involved in other activities that support the implementation of lessons learned from the Fukushima Dai-ichi accident. These activities include the following:

- The NRC staff has been coordinating with the National Academy of Science as it completes the second phase of its study entitled “Lessons Learned from the Fukushima Accident for Improving Safety and Security of U.S. Nuclear Plants.” This phase of the study is focused on spent fuel safety and security. The NRC staff anticipates that the National Academy of Science will issue the report to the public in May 2016. The NRC staff will consider the study’s recommendations for appropriate action. In accordance with the tasking in the SRM to COMSECY-13-0030, “Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel,” dated May 23, 2014 (ADAMS Accession No. ML14143A360), the NRC staff plans to provide an assessment of this report to the Commission in fall 2016.
- The NRC staff continues to be engaged in various international activities related to the evaluation and response to lessons learned from the Fukushima Dai-ichi accident. For example, the NRC staff is participating in several working groups within the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) on efforts to better understand the accident and develop strategies to ensure nuclear power plants can more effectively cope with severe natural events. Bilateral exchanges have continued to include Fukushima lessons learned as a topic of discussion.
- The IAEA Director General’s comprehensive “Report on the Fukushima Dai-ichi Accident” was publicly released on August 31, 2015. The NRC staff reviewed the observations and lessons identified in the Director General’s report and concluded that they do not introduce issues that have not been considered by the NRC and the U.S. nuclear industry. The NRC staff’s review is provided in “NRC Staff Review of the IAEA Director General’s Report ‘The Fukushima Daiichi Accident’” (ADAMS Accession No. ML16054A158).
- Members of the NRC staff and the NEA collaborated on an international report entitled “Five Years after the Fukushima Daiichi Accident.” NEA publicly released this report on February 29, 2016. The actions taken by the NRC and U.S. nuclear industry in response to the Fukushima accident are consistent with the observations and conclusions in the NEA report.
- The Japan Lessons-Learned Strategic Communication team continues to meet periodically to evaluate ways to communicate the key messages of the NRC’s post-Fukushima activities to both internal and external stakeholders. The communications team will continue to examine communication needs and develop relevant tools with a focus on upcoming events and milestones.

As appropriate, the NRC staff will engage the Commission if any significant new information is developed in any of the above topic areas.

Transition to Long-Term Oversight

On June 15, 2014, the Office of Nuclear Reactor Regulation (NRR) centralized the day-to-day Fukushima Dai-ichi lessons-learned activities. The functions of the Japan Lessons-Learned Directorate and the Mitigating Strategies Directorate were incorporated into the Japan Lessons-Learned Division (JLD).

The JLD is tasked with executing the NTF recommendations, as approved by the Commission, by providing management oversight to support these high-priority activities and promoting the flexible use of agency resources to most efficiently accomplish specific key milestones. The JLD provides a baseline capability on Tier 1 activities and other Fukushima support activities to accomplish its day-to-day mission and reaches out to other divisions as additional resources are needed to handle workload peaks.

As lessons learned activities transition from implementation to longer-term oversight, the JLD organization will be reduced accordingly. For example, the JLD organization was recently streamlined, eliminating two associate director positions and one branch chief position. As work on specific technical issues associated with Japan lessons learned activities are completed, JLD staff members will be reassigned elsewhere to support work in other areas. NRR is currently evaluating potential organizational changes in light of Project AIM activities and other workload changes. These may impact current plans that would have JLD becoming a directorate in fiscal year (FY) 2018 and transitioning to a single branch in FY 2019.

The NRC staff recognizes that Fukushima-related inspection and oversight activities will increase going forward. The NRC staff has developed a plan to ensure consistent implementation with predictable outcomes; for example, development of a cross-regional panel to review inspection findings, increased knowledge transfer opportunities, and development of knowledge management tools. The transition plans are also being discussed in various public forums, such as the January 2016 public meeting between the NRC's Japan Lessons-Learned Steering Committee and the industry's counterpart steering committee and the March 2016 Regulatory Information Conference.

The Commissioners

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COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

/RA/

Victor M. McCree
Executive Director
for Operations

Enclosures:

1. Update on Tier 1 Activities
2. Summary of Closed Tier 2
and Tier 3 Items and Updates
on Ongoing Work

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

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NRR 201100250
NRR 201300052
NSIR 201300092

ADAMS Accession Nos.: Package ML16054A255; SECY ML16054A296; Enclosure 1 ML16054A454; Enclosure 2 ML16054A483 *via e-mail

OFFICE	NRR/JLD/LA	QTE	NRR/JLD/JHMB/PM	NRR/JLD/JOMB/BC
NAME	SLent*	JDougherty*	RBernardo	GBowman
DATE	2/2/16	2/9/2016	2/10/2016	2/19/2016
OFFICE	NRR/JLD/JHMB/BC	RES/DRA/D*	NSIR/DPR/DD*	NRO/DSEA/D*
NAME	MShams	RCorreia	SCoffin	SFlanders
DATE	2/19/2016	2/25/2016	2/29/2016	3/2/2016
OFFICE	NRR/DPR/D*	NRR/JLD/D	OGC* (NLO)	NRR/D
NAME	LKokajko	JDavis	SClark	WDean
DATE	3/2/2016	3/10/2016	3/22/2016	3/28/2016
OFFICE	EDO			
NAME	VMcCree			
DATE	04/05/16			

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