



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
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Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 – DOCUMENTATION OF THE
COMPLETION OF REQUIRED ACTIONS TAKEN IN RESPONSE TO THE
LESSONS LEARNED FROM THE FUKUSHIMA DAI-ICHI ACCIDENT**

Dear Mr. Hanson:

The purpose of this letter is to acknowledge and document that actions required by the U.S. Nuclear Regulatory Commission (NRC) in orders issued following the accident at the Fukushima Dai-ichi Nuclear Power Station have been completed for Braidwood Station, Units 1 and 2 (Braidwood). In addition, this letter acknowledges and documents that Exelon Generation Company, LLC (Exelon, the licensee) has provided the information requested in the NRC's March 12, 2012, request for information under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), related to the lessons learned from that accident. Completing these actions and providing the requested information, in conjunction with the regulatory activities associated with the Mitigation of Beyond-Design-Basis Events (MBDBE) rulemaking, implements the safety enhancements mandated by the NRC based on the lessons learned from the accident. Relevant NRC, industry, and licensee documents are listed in the reference tables provided in the enclosure to this letter. The NRC will provide oversight of these safety enhancements through the Reactor Oversight Process (ROP).

BACKGROUND

In response to the events in Japan resulting from the Great Tōhoku Earthquake and subsequent tsunami on March 11, 2011, the NRC took immediate action to confirm the safety of U.S. nuclear power plants:

- On March 18, 2011, the NRC issued Information Notice 2011-05, "Tōhoku-Taiheiyou-Oki Earthquake Effects on Japanese Nuclear Power Plants" (Reference 1.1). The information notice was issued to inform U.S. operating power reactor licensees and applicants of the effects from the earthquake and tsunami. Recipients were expected to review the information for applicability to their facilities and consider actions, as appropriate. Suggestions contained in an information notice are not NRC requirements; therefore, no specific action or written response was required.
- On March 23, 2011, the NRC issued Temporary Instruction (TI) 2515/183, "Followup to the Fukushima Daiichi Fuel Damage Event." The purpose of TI 2515/183 was to provide NRC

inspectors with guidance on confirming the reliability of licensees' strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities following events that may exceed the design-basis for a plant. The results of the inspection for each licensee were documented in an inspection report (Reference 1.2).

- On March 23, 2011, the Commission provided staff requirements memorandum (SRM) COMGBJ-11-0002, "NRC Actions Following the Events in Japan." The tasking memorandum directed the Executive Director for Operations to establish a senior level agency task force, referred to as the Near-Term Task Force (NTTF), to conduct a methodical and systematic review of the NRC processes and regulations to determine whether the agency should make additional improvements to the regulatory system and make recommendations to the Commission within 90 days for its policy direction (Reference 1.3).
- On April 29, 2011, the NRC issued TI 2515/184, "Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)." The purpose of TI 2515/184 was to inspect the readiness of nuclear power plant operators to implement SAMGs. The results of the inspection were summarized and provided to the NTTF, as well as documented in a 2011 quarterly integrated inspection report for each licensee (Reference 1.4).
- On May 11, 2011, the NRC issued Bulletin (BL) 2011-01, "Mitigating Strategies." BL 2011-01 required licensees to provide a comprehensive verification of their compliance with the regulatory requirements of 10 CFR 50.54(hh)(2), as well as provide information associated with the licensee's mitigation strategies under that section. In 10 CFR 50.54(hh)(2), it states, in part: "Each licensee shall develop and implement guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire..." BL 2011-01 required a written response from each licensee (Reference 1.5).
- On July 21, 2011, the NRC staff provided the NTTF report, "Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident" to the Commission in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan" (Reference 1.6).
- On October 3, 2011, the staff prioritized the NTTF recommendations into three tiers in SECY-11-0137, "Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned." The Commission approved the staff's prioritization, with comment, in the SRM to SECY-11-0137 (Reference 1.7).

A complete discussion of the prioritization of the recommendations from the NTTF report, additional issues that were addressed subsequent to the NTTF report, and the disposition of the issues that were prioritized as Tier 2 or Tier 3 is provided in SECY-17-0016, "Status of Implementation of Lessons Learned from Japan's March 11, 2011, Great Tōhoku Earthquake and Subsequent Tsunami" (Reference 12.10). A listing of the previous Commission status reports, which were provided semiannually, can be found in Table 12 in the enclosure to this letter.

The NRC undertook the following regulatory activities to address the majority of the Tier 1 recommendations:

- On March 12, 2012, the NRC issued Orders EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," EA-12-050, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents," and EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," and a request for information under 10 CFR 50.54(f) (hereafter referred to as the 50.54(f) letter) to licensees (References 1.8, 1.9, 1.10, and 1.11, respectively).
- On June 6, 2013, the NRC issued Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions" (Reference 1.12), which superseded Order EA-12-050, replacing its requirements with modified requirements.
- In addition to the three orders and the 50.54(f) letter, the NRC is considering a new regulation (10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events"). The draft final rule and supporting documentation were provided to the Commission for approval in SECY-16-0142, "Draft Final Rule – Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)" (Reference 1.13). The MBDBE rulemaking would consolidate several of the recommendations from the NTTF report. The draft final rule, as provided to the Commission, contains provisions that make generically applicable the requirements imposed by Orders EA-12-049 and EA-12-051 and supporting requirements for the integrated response capability that includes staffing, communications, training, drills or exercises, and documentation of changes. The draft final rule also contains requirements for licensees to consider the effects of the reevaluated seismic and flooding hazard information identified in response to Enclosures 1 and 2 of the 50.54(f) letter. Three proposed regulatory guides (References 1.14, 1.15, and 1.16) were included to provide methods and procedures that the NRC staff considers acceptable for licensees to demonstrate compliance with the MBDBE rule, if approved by the Commission.

This letter acknowledges and documents that the actions required by the NRC in response to the orders, as well as the information provided in response to the March 12, 2012, 50.54(f) letter, have been completed for Braidwood. However, the staff is not determining whether the licensee complies with the draft final MBDBE rule. Oversight of compliance with the draft final MBDBE rule at Braidwood will be conducted through the ROP, if the Commission approves the rule.

DISCUSSION

Mitigation Strategies Order

Order EA-12-049, which applies to Braidwood, requires licensees to implement a three-phase approach for mitigation of beyond-design-basis external events (BDBEE). It requires licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a BDBEE that results in a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink (LUHS). Phases 1 and 2 of the order use onsite equipment, while Phase 3 requires obtaining sufficient offsite resources to sustain those functions indefinitely.

In August 2012, the Nuclear Energy Institute (NEI) issued industry guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," as guidance to comply with the order. The NRC endorsed the guidance in Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) document JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (Reference 2.1). Licensees were required to provide an overall integrated plan (OIP) to describe how they would comply with the order, along with status reports every 6 months until compliance was achieved (Reference 2.2). The NRC staff provided an interim staff evaluation (ISE) related to the OIP (Reference 2.3). The NRC concluded in the ISE that the licensee provided sufficient information to determine that there is reasonable assurance that the plan, when properly implemented, including satisfactory resolution of the open and confirmatory items, would meet the requirements of Order EA-12-049 at Braidwood. The NRC staff also conducted a regulatory audit of the licensee's strategies and issued a report which documented the results of the audit activities (Reference 2.4). Upon reaching compliance with the order requirements, the licensee submitted a compliance letter and a final integrated plan (FIP) to the NRC (Reference 2.5). The FIP describes how the licensee is complying with the order at Braidwood.

The NRC staff completed a safety evaluation (SE) of the licensee's FIP (Reference 2.6). The SE informed the licensee that its integrated plan, if implemented as described, provided a reasonable path for compliance with Order EA-12-049 at Braidwood. The staff then evaluated the implementation of the plans through inspection, using TI 2515/191, "Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communications/Staffing/Multi-Unit Dose Assessment Plans." An inspection report was issued to document the results of the TI 2515/191 inspection (Reference 2.7). The NRC will oversee implementation of the mitigation strategies requirements under the proposed MBDBE rule requirements, if approved by the Commission, through the ROP.

Phase 3 of Order EA-12-049 required licensees to obtain sufficient offsite resources to sustain the required functions indefinitely. There are two redundant National Strategic Alliance for FLEX Emergency Response (SAFER) Response Centers (NSRCs), one located in Memphis, Tennessee, and the other in Phoenix, Arizona, which have the procedures and plans in place to maintain and deliver the equipment needed for Phase 3 from either NSRC to any participating U.S. nuclear power plant when requested (Reference 2.8). The NRC staff evaluated and inspected the NSRCs and the SAFER program, plans, and procedures (References 2.9 and 2.10). The NRC concluded that licensees may reference the SAFER program and implement their SAFER response plans to meet the Phase 3 requirements of the order. The licensee's FIP (Reference 2.5) includes the plans for utilizing the NSRC equipment at Braidwood. In its SE (Reference 2.6), the NRC staff concluded that the licensee has developed guidance that, if implemented appropriately, should allow utilization of offsite resources following a BDBEE consistent with NEI 12-06 guidance and should adequately address the requirements of the order.

Spent Fuel Pool Instrumentation Order

Order EA-12-051, which applies to Braidwood, required licensees to install reliable SFP level instrumentation with a primary channel and a backup channel, independent of each other, and with the capability to be powered independent of the plant's power distribution systems. The NEI issued NEI 12-02, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,'" as guidance to be used by licensees to comply with the order. The NRC endorsed this guidance in

JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation" (Reference 3.1). Licensees were required to provide an OIP to describe how they would comply with the order, along with status reports every 6 months until compliance was achieved (Reference 3.2). The NRC issued an ISE, providing feedback on the OIP (Reference 3.3). The NRC staff conducted a regulatory audit of the licensee's strategies and issued a report that documented the results of the audit activities (Reference 3.4). Upon reaching compliance with the order requirements, the licensee submitted a compliance letter to the NRC (Reference 3.5), describing how the licensee complied with the order at Braidwood.

The NRC staff completed an SE of the actions taken by the licensee in response to the order (Reference 3.6). The SE informed the licensee that its integrated plan, if implemented as described, provided a reasonable path for compliance with Order EA-12-051 at Braidwood. The staff then evaluated the implementation of the plan through inspection, using TI 2515/191. An inspection report was issued to document the results of the TI 2515/191 inspection (Reference 3.7). The NRC will oversee implementation of the SFP instrumentation requirements under the proposed MBDBE rule requirements, if approved by the Commission, through the ROP.

Reliable Hardened Containment Vent Order

Order EA-13-109 is only applicable to operating boiling-water reactors (BWRs) with Mark I and Mark II containments. Because the reactors at Braidwood are pressurized water reactors with large, dry, ambient pressure containments, this order is not applicable to Braidwood.

Request for Information Under 10 CFR 50.54(f)

The 50.54(f) letter requested operating power reactor licensees to:

- reevaluate the seismic and flooding hazard at their sites using present-day NRC requirements and guidance, and identify actions that are planned to address plant-specific vulnerabilities associated with the reevaluated seismic and flooding hazard;
- perform seismic and flooding walkdowns to verify compliance with the current licensing basis; verify the adequacy of current strategies and maintenance plans; and identify degraded, nonconforming, or unanalyzed conditions related to seismic and flooding protection; and
- provide an assessment of their current emergency communications and staffing capabilities to determine if any enhancements are needed to respond to a large-scale natural emergency event that results in an extended loss of ac power to all reactors at the site, and/or impeded access to the site.

In COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards" (Reference 6.13), the NRC staff described issues related to the implementation of Order EA-12-049 and the related MBDBE rulemaking, and the completion of flooding reevaluations and assessments. In the SRM to COMSECY-14-0037 (Reference 6.14), the Commission directed the NRC staff to ensure that licensees of operating nuclear power plants address the reevaluated hazard within their mitigation strategies for BDBEE. The SRM also directed the NRC staff to provide a plan for achieving closure of the flooding hazard assessments to the Commission for review and

approval. The NRC staff provided this plan in COMSECY-15-0019, "Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants" (Reference 6.16), which the Commission approved in the SRM to COMSECY-15-0019 (Reference 6.17).

Hazard Reevaluations (Enclosures 1 and 2 of the 50.54(f) letter)

Each licensee followed a similar two-phase process to respond to the hazard reevaluations requested by the 50.54(f) letter. In Phase 1, licensees submitted hazard reevaluation reports using NRC-endorsed, industry-developed guidance. The guidance specified that a licensee should determine if interim protection measures were needed while a longer-term evaluation of the impacts of the hazard was completed. The NRC staff reviewed the reevaluated hazard information. Using the reevaluated hazard information and a graded approach, the NRC identified the need for, and prioritization and scope of, plant-specific assessments. For those plants that were required to perform a flooding integrated assessment or a seismic probabilistic risk assessment (SPRA), Phase 2 decisionmaking (as described in a letter dated September 16, 2016 (Reference 5.17)) would determine whether additional plant-specific regulatory actions were necessary. In addition, as discussed in COMSECY-15-0019 and the draft final MBDDBE rule, each licensee performed a mitigating strategies assessment (MSA) to confirm that the licensee had adequately addressed the reevaluated hazards within their mitigation strategies developed for BDBEEs.

Seismic Hazard Reevaluation (Enclosure 1 of the 50.54(f) letter)

Enclosure 1 of the 50.54(f) letter requested each operating power reactor licensee to complete a reevaluation of the seismic hazard that could affect their sites using updated seismic hazard information and present-day regulatory guidance and methodologies to develop a ground motion response spectrum (GMRS). The licensee was asked to compare their results to the safe-shutdown earthquake (SSE) ground motion and then report to the NRC in a seismic hazard screening report. To provide a uniform and acceptable industry response, the Electric Power Research Institute (EPRI) developed a technical report, EPRI 1025287, "Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," and the NRC endorsed the guidance in a letter dated February 15, 2013 (Reference 5.1). From November 2012 to May 2014, the NRC and the industry provided guidance for the performance of the reevaluated hazard reviews (References 5.2-5.7). The licensee provided a seismic hazard screening report for Braidwood (Reference 5.8).

If the new GMRS was not bound by the current design basis (CDB) SSE, Enclosure 1 of the 50.54(f) letter requested more detailed evaluations of the impact from the hazard. Also, the licensee was asked to evaluate whether interim protection measures were needed while the more detailed evaluation was completed. By letter dated May 7, 2013, the NRC endorsed industry-developed guidance, a proposed path forward, and schedules, which were provided in a letter from NEI dated April 9, 2013. Attachment 1 of the NEI letter contains EPRI report 300200704, "Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," to provide the guidance needed to perform an evaluation of any needed interim protective measures (Reference 5.3). This expedited seismic evaluation process (ESEP) is a screening, evaluation, and equipment modification process performed by licensees to provide additional seismic margin and expedite plant safety enhancements for certain core cooling and containment components while the more detailed and comprehensive plant seismic risk evaluations are being performed. Braidwood was not

required to perform an ESEP since the SSE bounds the reevaluated GMRS in the 1 to 10 Hertz (Hz) region as noted in Reference 5.10.

By letter dated May 9, 2014 (Reference 5.10), the NRC informed licensees of the initial screening and prioritization results based on a review of the licensees' seismic hazard screening reports. The NRC updated the screening and prioritization in a letter dated October 3, 2014 (Reference 5.11). The NRC provided the final determination of required seismic evaluations in a letter dated October 27, 2015 (Reference 5.18). These evaluations could consist of an SPRA (Reference 5.1, SPID, Section 6.1.1), limited scope evaluations (High Frequency (Reference 5.14) and/or SFP (Reference 5.15)), or a relay chatter evaluation (Reference 5.4). If an SPRA was required, then additional Phase 2 regulatory decisionmaking was required (References 5.16 and 5.17).

The NRC staff completed and documented its review of the licensee's reevaluated seismic hazard in a staff assessment (Reference 5.9). In order to complete its response to the 50.54(f) letter, the licensee submitted a high frequency confirmation report for Braidwood (Reference 5.19). The NRC reviewed the high frequency confirmation submittal, confirmed that Braidwood met the limited high frequency criteria (Reference 5.21), and that no additional evaluations were needed.

The NRC staff reviewed the information provided and, as documented in the staff assessments (References 5.9 and 5.21), determined that the licensee provided sufficient information in response to Enclosure 1 of the 50.54(f) letter. The staff acknowledges that all seismic hazard reevaluation activities requested by Enclosure 1 of the 50.54(f) letter have been completed for Braidwood. No further information related to the reevaluated seismic hazard is required.

Flooding Hazard Reevaluation (Enclosure 2 of the 50.54(f) letter)

Enclosure 2 of the 50.54(f) letter requested each operating power reactor licensee to complete a reevaluation of applicable flood-causing mechanisms at their site using updated flooding hazard information and present-day regulatory guidance and methodologies. Licensees were asked to compare their results to the CDB for protection and mitigation from external flood events. The NRC developed guidance to conduct the reevaluations (References 6.1 through 6.6). The licensee submitted a flood hazard reevaluation report (FHRR) for Braidwood (Reference 6.7) to the NRC as requested by the 50.54(f) letter. The FHRR submittal contained a limited integrated assessment (IA). The limited IA described flood protection at the Braidwood site that is permanently installed and passive. Thus, interim actions to protect against the reevaluated flood hazard were not needed. The NRC staff reviewed the limited IA and confirmed the licensee's conclusions that Braidwood has adequate protection, reliability, and margin against potential flood water infiltration. The NRC inspected the flood protection features actions 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" and documented the results in a quarterly integrated inspection report (Reference 6.9). A regulatory audit to support the review of the FHRR was not required. The NRC staff reviewed the FHRR and provided an interim hazard letter (Reference 6.10) to provide feedback on the staff's review of the flooding hazard reevaluations. The interim hazard letter was used by the licensee to complete the flood hazard MSA and other flood hazard evaluations. Separately, the NRC staff documented the technical bases for its conclusions in the interim hazard letters by issuing a staff assessment (Reference 6.11).

In COMSECY-14-0037 (Reference 6.13), the NRC staff requested Commission direction to more clearly define the relationship between Order EA-12-049, the related MBDBE rulemaking, and the flood hazard reevaluations and assessments. Because the NRC was reevaluating its approach to the flooding evaluations, the NRC provided an extension of the due dates for any integrated assessments in a letter dated November 21, 2014 (Reference 6.12). In the SRM to COMSECY-14-0037 (Reference 6.14), the Commission affirmed that licensees of operating nuclear power plants need to address the reevaluated flooding hazard within their mitigation strategies. The Commission also directed the NRC 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 May 26, 2015, the NRC deferred, until further notice, the date for submitting the integrated assessment reports (Reference 6.15). On June 30, 2015, the NRC staff provided a plan to the Commission in COMSECY-15-0019 (Reference 6.16). On July 28, 2015, the Commission approved the plan in the SRM to COMSECY-15-0019 (Reference 6.17). On September 29, 2015, the NRC issued a letter to licensees to describe the graded approach to the flood hazard reevaluations approved by the Commission (Reference 6.18).

The COMSECY-15-0019 action plan required the NRC staff to 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 NRC staff's graded approach enabled a site with hazard exceedance above its CDB to demonstrate the site's ability to cope with the reevaluated hazard through appropriate protection or mitigation measures which are timely, effective, and reasonable. Integrated assessments were focused on sites with the greatest potential for additional safety enhancements. New guidance for performing the integrated assessments and focused evaluations was developed for this graded approach. The guidance also provided schedule information for submission of any required integrated assessment. On July 18, 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" (Reference 6.19). The ISG provided the guidance for Phase 1 flooding assessments, as described in COMSECY-15-0019, and endorsed industry guidance provided in NEI 16-05, "External Flooding Integrated Assessment Guidelines" (Reference 6.19). If an integrated assessment was necessary, then Phase 2 regulatory decisionmaking was required (References 6.23 and 6.24).

As noted in the interim hazard response letter (Reference 6.10), the reevaluated streams and rivers flood hazard for Braidwood is not bound by the CDB. Therefore, the NRC staff reviewed the portion of the Braidwood FHRR that contains the limited IA for streams and rivers and verified that the site contains permanent and passive flood protection for this hazard mechanism. The NRC staff completed its review of the limited IA and concluded in the staff assessment (Reference 6.21) that the licensee provided sufficient information in response to the 50.54(f) letter. No further regulatory actions are required related to the flood hazard reevaluations.

The NRC staff reviewed the information provided by the licensee and has concluded that sufficient information was provided to be responsive to Enclosure 2 of the 50.54(f) letter. The staff acknowledges that all flooding hazard reevaluation activities requested by Enclosure 2 of the 50.54(f) letter have been completed for Braidwood. No further information related to the reevaluated flood hazard is required.

Mitigating Strategies Assessment

In addition to the closure plan for NTF Recommendation 2.1, the action plan approved by the Commission in the SRM to COMSECY-15-0019 (Reference 7.4) identified the staff efforts to ensure licensees would address the reevaluated hazard information in their mitigation strategies. Performance of the MSA is necessary to support compliance with the final MBDDBE rule, if approved by the Commission.

The objective of the MSA is to determine whether the mitigation strategies developed for Order EA-12-049 can still be implemented given the reevaluated hazard levels. If it was determined that the mitigation strategies could not be implemented for the reevaluated hazard levels, the MSA could provide other options such as performing additional evaluations, modifying existing mitigation strategies, or developing alternate mitigation strategies or targeted mitigation strategies to address the reevaluated hazard levels. In Revision 1 to JLD-ISG-2012-01, the NRC endorsed industry-developed guidance contained in Appendices G and H of NEI 12-06 (Reference 7.5) for completing the MSAs.

The licensee completed both a flood hazard MSA (Reference 7.6) and a seismic hazard MSA (Reference 7.8) for Braidwood. A regulatory audit was not required (Reference 7.10). The NRC staff reviewed the MSA submittals, and issued staff assessments (References 7.7 and 7.9) documenting its review. The NRC staff concluded that the licensee has demonstrated that the mitigation strategies appropriately address the reevaluated hazard conditions. Oversight of any changes to existing mitigation strategies, or new strategies, resulting from the MSAs will be included in the longer-term oversight of mitigation strategies through the ROP.

Walkdowns (Enclosures 3 and 4 of the 50.54(f) letter)

Enclosures 3 and 4 of the 50.54(f) letter requested that licensees perform plant walkdowns to verify compliance with the current licensing basis as it pertains to seismic and flood protection. By letter dated May 31, 2012 (Reference 8.2), the NRC endorsed industry-developed guidance contained in Technical Report EPRI 1025286, "Seismic Walkdown Guidance" (Reference 8.1), for the performance of the seismic walkdowns. By letter dated May 31, 2012 (Reference 9.2), the NRC endorsed industry-developed guidance contained in NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features" (Reference 9.1), for performance of the flooding walkdowns. The licensee provided a report for both the seismic and flooding walkdowns at Braidwood (References 8.3 and 9.3). The NRC performed onsite inspections per TI 2515/188, "Inspection of Near-Term Task Force Recommendation 2.3 Seismic Walkdowns" and TI 2515/187, "Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns," and documented the inspection results in a quarterly integrated inspection report (References 8.4 and 9.4). The NRC staff issued staff assessments for both the seismic and flooding walkdowns (References 8.6 and 9.5). Because there were inaccessible items identified during the initial licensee seismic walkdowns, the licensee submitted subsequent seismic walkdown reports after accessing the areas (Reference 8.5). The NRC documented its review of the subsequent seismic walkdown reports in the staff assessment (Reference 8.6).

The NRC staff reviewed the information provided by the licensee and determined that sufficient information was provided to be responsive to Enclosures 3 and 4 of the 50.54(f) letter. The staff acknowledges that all seismic and flooding walkdown activities requested by the 50.54(f) letter have been completed for Braidwood.

Communications and Staffing (Enclosure 5 of the 50.54(f) letter)

Enclosure 5 of the 50.54(f) letter requested licensees to assess their means to power equipment needed to communicate onsite and offsite during a prolonged station blackout event and to identify and implement enhancements to ensure that communications can be maintained during such an event. Also, licensees were requested to assess the staffing required to fill all necessary positions to respond to a multi-unit event with impeded access to the site, or to an extended loss of all ac power for single unit sites. Licensees were requested to submit a written response to the information requests within 90 days, or provide a response within 60 days and describe an alternative course of action and estimated completion dates. The licensee proposed an alternative course of action and schedule for Braidwood (Reference 10.2), which included a 90-day partial response (Reference 10.3). The NRC acknowledged the schedule changes in a letter dated July 26, 2012 (Reference 10.4).

By letter dated May 15, 2012, the NRC endorsed industry-developed guidance contained in NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities" (Reference 10.1), for the performance of the communications and staffing assessments. The licensee provided the communications assessment and implementation schedule for their fleet, including Braidwood (Reference 10.5), and the NRC completed a staff assessment of the licensee's communications assessment (Reference 10.6).

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 were based on the existing station blackout coping strategies with an assumption of all reactors at the site being affected concurrently. The Phase 1 staffing assessment is required for multiunit sites and was completed for Braidwood (Reference 10.7). In Phase 2, all licensees assessed the staffing necessary to carry out the mitigation strategies (Reference 10.9). The NRC staff issued staffing assessment response letters (References 10.8 and 10.10) for each submittal. The NRC performed an onsite inspection using TI 2515/191 to verify that the emergency communications and staffing plans at Braidwood have been implemented as described by the licensee (Reference 10.11).

The draft final MBDBE rule would make generically applicable the staffing and communications requirements to support the mitigation strategies. Regulatory Guide 1.228 (Reference 1.16) is expected to endorse, with clarifications, NEI 12-01, NEI 13-06, "Enhancements to Emergency Response Capabilities for Beyond-Design-Basis Events and Severe Accidents" (Reference 11.17), and NEI 14-01, "Emergency Response Procedures and Guidelines for Beyond-Design-Basis Events and Severe Accidents" (Reference 11.7), to provide acceptable methods for implementing the MBDBE rule requirements, if approved. The NRC will oversee the communications and staffing requirements, and a periodic drill or exercise, under the proposed MBDBE rule requirements, if approved by the Commission, through the ROP.

The NRC staff reviewed the information provided by the licensee and determined that sufficient information was provided to be responsive to Enclosure 5 of the 50.54(f) letter. The staff acknowledges that all emergency preparedness communications and staffing activities requested by Enclosure 5 of the 50.54(f) letter have been completed for Braidwood. No further information related to the communications and staffing assessments is required.

Additional Industry Commitments

Update and Maintain Severe Accident Management Guidelines

The NRC 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)" (Reference 11.1) and the Commission issued the SRM to SECY-15-0065 on August 27, 2015 (Reference 11.2). The Commission approved publication of the proposed rule subject to removal of the proposed requirements pertaining to the SAMGs. The Commission also directed the staff to update the ROP to explicitly provide periodic oversight of industry's implementation of the SAMGs. By letter dated October 26, 2015 (Reference 11.3), NEI described the industry initiative, approved by the Nuclear Strategic Issues Advisory Committee as mandatory for all NEI members, to update and maintain the SAMGs. Specifically, each licensee will perform timely updates of their site-specific SAMGs based on revisions to generic severe accident technical guidelines. Licensees will also ensure that SAMGs are considered within plant configuration management processes. As noted in the NEI letter, the licensee provided a letter (Reference 11.4) to establish a site-specific regulatory commitment for Braidwood.

In a letter to NEI dated February 23, 2016 (Reference 11.5), 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 long-term changes to the ROP, consistent with the Commission direction and the licensees' near-term and long-term SAMG commitments. The staff then revised Inspection Procedure 71111.18, "Plant Modifications" (Reference 11.6), to provide oversight of the initial inclusion of SAMGs within the plant configuration management processes to ensure that the SAMGs reflect changes to the facility over time.

Multiunit/Multisource Dose Assessments

In COMSECY-13-0010, "Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned," dated March 27, 2013 (Reference 11.13), the NRC staff requested Commission approval to implement the NTTF recommendation concerning multiunit/multisource dose assessments by having licensees document their commitment to obtain multiunit/multisource dose assessment capability by the end of 2014, rather than by issuing an order. Multiunit dose assessment capabilities would be made generically applicable through subsequent rulemaking. The Commission approved the staff's requests in the SRM to COMSECY-13-0010, dated April 30, 2013 (Reference 11.14). The licensee commitments are documented in References 11.8 through 11.11.

The NRC staff included the multiunit/multisource dose assessment requirement in the proposed MBDBE rulemaking (Reference 11.1). However, in response to a public comment concerning the 10 CFR 50.109 backfitting justification for the proposed multiple source term dose assessment requirements, the staff determined that this requirement did not meet the criteria for imposition under 10 CFR 50.109(a)(4)(ii). The NRC staff also concluded that this could not be justified as a compliance backfit or as a substantial safety improvement whose costs, both direct and indirect, would be justified in light of the potential safety gain. Therefore, these requirements were removed from the draft final rule (Reference 11.16).

The licensee provided the requested information and stated that Braidwood will have multiunit/multisource dose assessment capabilities (Reference 11.11) by December 31, 2014.

The NRC acknowledged the licensee's submittal (Reference 11.12), verified the implementation of these dose assessment capabilities through inspection per TI 2515/191, and issued an inspection report (Reference 11.15).

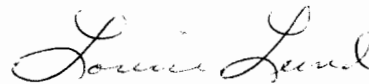
CONCLUSION

The NRC staff concludes that Exelon, the licensee, has implemented the NRC-mandated safety enhancements resulting from the lessons learned from the Fukushima Dai-ichi accident through its implementation of Orders EA-12-049, EA-12-051, and its response to the 50.54(f) letter at Braidwood. No further regulatory decisionmaking is required for Braidwood related to the Fukushima lessons-learned.

A listing of the applicable correspondence related to the Fukushima lessons-learned activities for Braidwood is included as an enclosure to this letter.

If you have any questions, please contact Robert Bernardo of my staff at 301-415-2621 or by e-mail at Robert.Bernardo@nrc.gov.

Sincerely,

A handwritten signature in cursive script, appearing to read "Louise Lund".

Louise Lund, Director
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket Nos. 50-456 and 50-457

Enclosure:
Documents Related to Required
Response

cc w/encl: Distribution via Listserv

Reference Documents Related to Required Response to the Lessons Learned from the Fukushima Dai-ichi Accident

| TABLE 1 Initial Actions in Response to the Events in Japan Caused by the Great Tōhoku Earthquake and Subsequent Tsunami | | | |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------------|
| Ref | Document | Date | ADAMS¹ Accession No. |
| 1.1 | NRC Information Notice 2011-05 | March 18, 2011 | ML110760432 |
| 1.2 | NRC Follow-up to the Fukushima Dai-ichi Fuel Damage Event | | |
| | Temporary Instruction (TI) 2515/183 | March 23, 2011 | ML11077A007 |
| | NRC TI 2515/183 Inspection Report 2011-011 | May 13, 2011 | ML111320261 |
| | Summary of Observations – TI-183 | November 28, 2011 | ML11325A020 |
| 1.3 | NRC Tasking Memorandum, Staff Requirements Memorandum (SRM) to COMGBJ-11-0002 | March 23, 2011 | ML110820875 |
| 1.4 | NRC Availability and Readiness Inspection of SAMG | | |
| | NRC Availability and Readiness Inspection of SAMG - TI 2515/184 | April 29, 2011 | ML11115A053 |
| | NRC Integrated Inspection Report 2011-003 (TI 2515/184 inspection results) | August 9, 2011 | ML112210292 |
| | NRC TI 2515/184 Inspection Results, Region 3 Summary | June 1, 2011 | ML111520396 |
| | NRC Summary of TI 2515/184 Results | June 6, 2011 | ML11154A109 |
| 1.5 | NRC Bulletin 2011-01, "Mitigating Strategies" | | |
| | NRC Bulletin 2011-01 | May 11, 2011 | ML111250360 |
| | Licensee 30 day response to BL 2011-01 | June 8, 2011 | ML111600096 |
| | Licensee 60 day response to BL 2011-01 | July 8, 2011 | ML111920162 |
| | NRC Request for Additional Information (RAI) regarding Licensee 60 day response to BL 2011-01 | November 22, 2011 | ML113120057 |
| | Licensee response to RAI | December 20, 2011 | ML113550139 |
| | NRC Closeout of BL 2011-01 for Exelon | August 2, 2012 | ML12178A215 |
| 1.6 | NRC NTTF Report (SECY-11-0093) | July 21, 2011 | ML11186A950 |
| 1.7 | NRC SECY-11-0137, Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned | | |
| | NRC SECY-11-0137 | October 3, 2011 | ML11272A111 |
| | SRM-SECY-11-0137 | December 15, 2011 | ML113490055 |
| 1.8 | NRC Order EA-12-049 | March 12, 2012 | ML12054A735 |
| 1.9 | NRC Order EA-12-050 | March 12, 2012 | ML12054A694 |

¹ Agencywide Documents Access and Management System (ADAMS)

| TABLE 1 Initial Actions in Response to the Events in Japan Caused by the Great Tōhoku Earthquake and Subsequent Tsunami | | | |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------|
| Ref | Document | Date | ADAMS¹ Accession No. |
| 1.10 | NRC Order EA-12-051 | March 12, 2012 | ML12054A679 |
| 1.11 | NRC Request for Information Under 10 CFR 50.54(f) (the 50.54(f) letter) | March 12, 2012 | ML12053A340 |
| 1.12 | NRC Order EA-13-109 | June 6, 2013 | ML13143A321 |
| 1.13 | NRC SECY-16-0142, "Draft Final Rule: Mitigation of Beyond-Design-Basis Events" | December 15, 2016 | ML16301A005 |
| 1.14 | Regulatory Guide 1.226, Flexible Mitigation Strategies for Beyond-Design-Basis Events (Draft Final Version) | November 2016 | ML16301A128 |
| 1.15 | Regulatory Guide 1.227, Wide Range Spent Fuel Pool Level Instrumentation (Draft Final Version) | November 2016 | ML16211A167 |
| 1.16 | Regulatory Guide 1.228 - Integrated Response Capabilities for Beyond-Design-Basis Events (Draft Final Version) | November 2016 | ML16218A236 |

TABLE 2
Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for
Beyond-Design-Basis External Events – EA-12-049

| Ref | Document | Date | ADAMS Accession No. |
|-----|-----------------------------------------------------------------------------------------------------------|--------------------|------------------------|
| 2.1 | Guidance for Compliance with EA-12-049 - Diverse and Flexible Coping Strategies (FLEX) | | |
| | Industry Guidance on Diverse and Flexible Coping Strategies (FLEX) NEI 12-06, Revision 0 | August 21, 2012 | ML12242A378 |
| | NRC endorsement of NEI 12-06, Revision 0 - JLD-ISG-2012-01, Revision 0 | August 29, 2012 | ML12229A174 |
| 2.2 | Licensee Overall Integrated Plan (OIP) | | |
| | Licensee OIP submittal | February 28, 2013 | ML13060A362 |
| | OIP 1st six month status report | August 28, 2013 | ML13241A286 |
| | OIP 2nd six month status report | February 28, 2014 | ML14059A353 |
| | OIP 3rd six month status report | August 28, 2014 | ML14248A223 |
| | OIP 4th six month status report | February 27, 2015 | ML15058A420 |
| | OIP 5th six month status report | August 28, 2015 | ML15246A081 |
| | OIP 6th six month status report (Unit 1) | February 26, 2016 | ML16057A208 |
| | OIP 7th six month status report (Unit 1) | August 26, 2016 | ML16239A321 |
| 2.3 | NRC Interim Staff Evaluation of OIP | December 17, 2013 | ML13225A592 |
| 2.4 | NRC audit of EA-12-049 OIP | | |
| | NRC Notification of Audit of EA-12-049 | August 28, 2013 | ML13234A503 |
| | NRC Site Specific Audit Plan | December 30, 2014 | ML14356A004 |
| | NRC Audit Report | May 27, 2015 | ML15134A459 |
| 2.5 | Licensee Compliance Letter for EA-12-049 and Final Integrated Plan (FIP) | | |
| | Licensee Compliance Letter for EA-12-049 for Braidwood Unit 2 | December 16, 2015 | ML15350A414 |
| | Licensee Compliance Letter for EA-12-049 for Braidwood Unit 1 and Final Integrated Plan for Units 1 and 2 | December 7, 2016 | ML16348A053 |
| 2.6 | NRC Safety Evaluation of Implementation of EA-12-049 | May 10, 2017 | ML17103A345 |
| 2.7 | NRC Inspection of Licensee Responses to EA-12-049, EA-12-051, and Emergency Preparedness Information | | |
| | NRC Temporary Instruction 2515/191 | December 23, 2015 | ML15257A188 |
| | NRC TI 2515/191 Inspection Report 2018-011 | February 2, 2018 | ML18033A711 |
| 2.8 | Industry White Paper – National SAFER Response Centers (NSRC) | September 11, 2014 | ML14259A221 |
| 2.9 | NRC Staff Assessment of NSRCs | September 26, 2014 | ML14265A107 |

| TABLE 2 Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events – EA-12-049 | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 2.10 | NRC Inspection of Implementation of EA-12-049 Regarding the use of NSRC | | |
| | NRC Inspection Procedure (IP) 43006 | September 30, 2016 | ML16273A318 |
| | NRC Vendor Inspection of the Phoenix NSRC Report No. 99901013/2016-201 | January 12, 2017 | ML17012A186 |
| | NRC Vendor Inspection of the Memphis NSRC Report No. 99901013/2017-201 | May 5, 2017 | ML17117A576 |
| NA | NRC approval of relaxation of the schedule requirements for Order EA-12-049 for Braidwood Unit 1 from completion of the spring 2015 refueling outage until completion of the fall 2016 refueling outage | April 15, 2015 | ML15068A215 |

| TABLE 3 Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation – EA-12-051 | | | |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------|----------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 3.1 | Guidance for Compliance with EA-12-051 – Spent Fuel Pool Instrumentation | | |
| | Industry Guidance for Compliance with EA-12-051 – NEI 12-02, Revision 1 | August 2012 | ML12240A307 |
| | NRC endorsement of NEI 12-02, Revision 1 - JLD-ISG-2012-03, Revision 0 | August 29, 2012 | ML12221A339 |
| 3.2 | Licensee Overall Integrated Plan (OIP) | | |
| | Licensee OIP | February 28, 2013 | ML13059A265 |
| | OIP 1st six month status report | August 28, 2013 | ML13241A240 |
| | OIP 2nd six month status report | February 28, 2014 | ML14062A056 |
| | OIP 3rd six month status report | August 28, 2014 | ML14248A208 |
| | OIP 4th six month status report | February 27, 2015 | ML15058A555 |
| 3.3 | NRC Interim Staff Evaluation of OIP | November 4, 2013 | ML13280A566 |
| 3.4 | NRC Audit of EA-12-051 | | |
| | NRC Notification of Audit of EA-12-051 | March 26, 2014 | ML14083A620 |
| | NRC Audit Report of Westinghouse SFPI design specifications | August 18, 2014 | ML14211A346 |
| | NRC Site Specific Audit Plan | December 30, 2014 | ML14356A004 |
| | NRC Audit Report | May 27, 2015 | ML15134A459 |
| 3.5 | Licensee Compliance Letter for EA-12-051 | June 9, 2015 | ML15160A351 |
| 3.6 | NRC Safety Evaluation of Implementation of EA-12-051 | May 10, 2017 | ML17103A345 |
| 3.7 | NRC Inspection of Licensee Responses to EA-12-049, EA-12-051, and Emergency Preparedness Information | | |
| | NRC Temporary Instruction 2515/191 | December 23, 2015 | ML15257A188 |
| | NRC TI 2515/191 Inspection Report 2018-011 | February 2, 2018 | ML18033A711 |

Note: Table 4 relates to the Hardened Containment Vent System and is not applicable to Braidwood.

| TABLE 5 Request for Information under Title 10 of the Code of Federal Regulations, Section 50.54(f), Enclosure 1: Recommendation 2.1 Seismic Hazard Reevaluation | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| Guidance Documents | | | |
| 5.1 | Screening, Prioritization and Implementation Details (SPID) | | |
| | Industry Guidance (SPID) – EPRI 1025287 | November 2012 | ML12333A170 |
| | NRC letter endorsing SPID | February 15, 2013 | ML12319A074 |
| 5.2 | NRC guidance for performing a Seismic Margin Assessment (SMA) – JLD-ISG-2012-04 | November 16, 2012 | ML12286A029 |
| 5.3 | Expedited Seismic Evaluation Process (ESEP) | | |
| | Industry Letter – Proposed path forward for NTTF Recommendation 2.1: Seismic | April 9, 2013 | ML13101A345 |
| | Industry Guidance – Expedited Seismic Evaluation Process (ESEP) - EPRI 3002000704 | April 2013 | ML13102A142 |
| | NRC letter endorsing the ESEP approach. Extension of ESEP due date to 3/31/14 for Central and Eastern U.S. (CEUS) sites | May 7, 2013 | ML13106A331 |
| 5.4 | Industry letter on relay chatter review | October 3, 2013 | ML13281A308 |
| 5.5 | NRC letter with guidance on the content of seismic reevaluation submittals (includes operability and reportability discussions) | February 20, 2014 | ML14030A046 |
| 5.6 | Industry letter on seismic risk evaluations for CEUS plants | March 12, 2014 | ML14083A596 |
| 5.7 | NRC background paper - Probabilistic seismic hazard analysis | May 20, 2014 | ML14140A648 |
| Seismic Hazard Screening Report | | | |
| 5.8 | Licensee Seismic Hazard Screening Report | March 31, 2014 | ML14091A243 |
| 5.9 | NRC Staff Assessment of Reevaluated Seismic Hazard Information | January 22, 2016 | ML16014A188 |
| Screening and Prioritization Results | | | |
| 5.10 | NRC Letter - Seismic screening and prioritization results for CEUS plants | May 9, 2014 | ML14111A147 |
| 5.11 | NRC Letter – Updated seismic screening and prioritization results | October 3, 2014 | ML14258A043 |
| 5.12 | NRC letter regarding development of Seismic Risk Evaluations – suitability of updated seismic hazard information for further assessments | December 10, 2014 | ML14307B707 |
| 5.13 | ESEP Submittal and Evaluation | Not Required | Not Required |

| TABLE 5 Request for Information under Title 10 of the Code of Federal Regulations, Section 50.54(f), Enclosure 1: Recommendation 2.1 Seismic Hazard Reevaluation | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| Additional Guidance Documents | | | |
| 5.14 | High Frequency Program Application Guidance | | |
| | Industry High Frequency Application Guidance - EPRI 3002004396 | July 30, 2015 | ML15223A095 |
| | NRC letter endorsing High Frequency Application Guidance | September 17, 2015 | ML15218A569 |
| 5.15 | Spent Fuel Pool Evaluation Guidance | | |
| | Industry SFP evaluation guidance – EPRI 3002007148 | February 23, 2016 | ML16055A017 |
| | NRC letter endorsing SFP evaluation guidance | March 17, 2016 | ML15350A158 |
| 5.16 | NRC Letter - Treatment of Seismic and Flooding Hazard Reevaluations in the Design and Licensing Basis | September 29, 2015 | ML15127A401 |
| 5.17 | NRC Guidance for Regulatory Decisionmaking of reevaluated flooding and seismic hazards | September 21, 2016 | ML16237A103 |
| Final Determinations of Required Seismic Evaluations | | | |
| 5.18 | NRC Final Determination of Required Seismic Evaluations | October 27, 2015 | ML15194A015 |
| 5.19 | Licensee Required Seismic Evaluation Submittals | | |
| | High Frequency Confirmation | November 3, 2016 | ML16308A295 |
| 5.20 | Audit plan of seismic evaluations submittals | July 6, 2017 | ML17177A446 |
| 5.21 | NRC Staff Assessment of Seismic Evaluations | | |
| | High Frequency Confirmation | January 30, 2017 | ML17023A179 |

| TABLE 6 Request for Information under Title 10 of the Code of Federal Regulations, Section 50.54(f), Enclosure 2: Recommendation 2.1 Flooding Hazard Reevaluation | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| Initial Guidance Documents | | | |
| 6.1 | NRC prioritization of plants for completing flood hazard reevaluations | May 11, 2012 | ML12097A509 |
| 6.2 | NRC-issued guidance for performing an integrated assessment for external flooding (JLD-ISG-2012-05) | November 30, 2012 | ML12311A214 |
| 6.3 | NRC letter to industry describing when an integrated assessment is expected | December 3, 2012 | ML12326A912 |
| 6.4 | NRC-issued guidance for performing a tsunami, surge, or seiche hazard assessment (JLD-ISG-2012-06) | January 4, 2013 | ML12314A412 |
| 6.5 | NRC letter to industry with guidance on the content of flooding reevaluation submittals | March 1, 2013 | ML13044A561 |
| 6.6 | NRC-issued guidance for assessing flooding hazards due to dam failure (JLD-ISG-2013-01) | July 29, 2013 | ML13151A153 |
| Flood Hazard Reevaluation Report | | | |
| 6.7 | Licensee FHRR Submittal Package | March 12, 2014 | ML14079A418 |
| 6.8 | FHRR Regulatory Audit | Not Required | Not Required |
| 6.9 | NRC Inspection of licensee interim actions (if applicable) | | |
| | NRC TI 2515/190 - Inspection of proposed interim actions as a result of FHRR | August 30, 2013 | ML13217A436 |
| | NRC TI 2515/190 inspection report 2014-005 | February 10, 2015 | ML15041A728 |
| 6.10 | NRC Interim Staff Response to Reevaluated Flood Hazards | September 3, 2015 | ML15211A363 |
| 6.11 | NRC Staff Assessment of FHRR | November 28, 2016 | ML16308A161 |
| Modified Approach to Flood Hazard Reevaluations | | | |
| 6.12 | NRC extension of due dates for Integrated Assessment reports | November 21, 2014 | ML14303A465 |
| 6.13 | NRC COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards" | November 21, 2014 | ML14309A256 |
| 6.14 | NRC SRM for COMSECY-14-0037 | March 30, 2015 | ML15089A236 |
| 6.15 | NRC letter on second extension of due date for flooding integrated assessment reports | May 26, 2015 | ML15112A051 |
| 6.16 | NRC COMSECY-15-0019 "Closure Plan for the Reevaluation of Flooding Hazards" | June 30, 2015 | ML15153A104 |
| 6.17 | NRC SRM-COMSECY-15-0019 | July 28, 2015 | ML15209A682 |
| 6.18 | NRC letter describing the graded approach to flood hazard reevaluation directed by SRM-COMSECY-14-0037 | September 1, 2015 | ML15174A257 |

| TABLE 6 Request for Information under Title 10 of the Code of Federal Regulations, Section 50.54(f), Enclosure 2: Recommendation 2.1 Flooding Hazard Reevaluation | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 6.19 | Flooding Assessment Guidance | | |
| | NEI 16-05, "External Flooding Assessment Guidelines" | April 2016 | ML16165A178 |
| | NRC endorsement of NEI 16-05 - JLD-ISG-2016-01 | July 11, 2016 | ML16162A301 |
| 6.20 | Licensee Required Evaluations | | |
| | A limited Integrated Assessment was provided in the FHRR | March 12, 2014 | ML14079A418 |
| 6.21 | NRC Staff Assessment of limited Integrated Assessment | November 1, 2016 | ML16265A214 |
| 6.22 | NRC Generic FE and IA Regulatory Audit Plan | July 18, 2017 | ML17192A452 |
| 6.23 | NRC Letter - Treatment of Seismic and Flooding Hazard Reevaluations in the Design and Licensing Basis | September 29, 2015 | ML15127A401 |
| 6.24 | NRC Guidance for Regulatory Decisionmaking of reevaluated flooding and seismic hazards | September 21, 2016 | ML16237A103 |

| TABLE 7 Mitigating Strategies Assessments (MSA) | | | |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 7.1 | NRC COMSECY-14-0037, Integration of Mitigating Strategies with Hazard Reevaluations | November 21, 2014 | ML14309A256 |
| 7.2 | NRC SRM-COMSECY-14-0037 | March 30, 2015 | ML15089A236 |
| 7.3 | NRC COMSECY-15-0019, Closure Plan for Flooding Hazard Reevaluations | June 30, 2015 | ML15153A104 |
| 7.4 | NRC SRM-COMSECY-15-0019 | July 28, 2015 | ML15209A682 |
| 7.5 | Process for Mitigating Strategies Assessments (MSA) | | |
| | Industry Guidance for performing MSAs - NEI 12-06, Revision 2, including Appendices E, G, & H | December 2015 | ML16005A625 |
| | NRC endorsement of NEI 12-06, Revision 2 - JLD-ISG-2012-01, Revision 1 | January 22, 2016 | ML15357A163 |
| 7.6 | Licensee's MSA submittal - Flooding | June 30, 2016 | ML16182A378 |
| 7.7 | NRC Staff Assessment of MSA - Flooding | November 28, 2016 | ML16302A459 |
| 7.8 | Licensee's MSA submittal - Seismic | November 2, 2016 | ML16307A294 |
| 7.9 | NRC Staff Assessment of MSA - Seismic | March 29, 2017 | ML17083A048 |
| 7.10 | NRC MSA Audit Plan | December 5, 2016 | ML16259A189 |

| TABLE 8 Request for Information under Title 10 of the Code of Federal Regulations, Section 50.54(f), Enclosure 3: Recommendation 2.3 Seismic Walkdown | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 8.1 | Industry Seismic Walkdown Guidance with NRC endorsement letter - EPRI 1025286 | May 31, 2012 | ML12188A031 |
| 8.2 | NRC letter endorsing EPRI 1025286 | May 31, 2012 | ML12145A529 |
| 8.3 | Licensee Seismic Hazard Walkdown Report | | |
| | Licensee Seismic Hazard Walkdown Report Package | November 27, 2012 | ML123390284 |
| | Licensee Seismic Hazard Walkdown Report – Response to RAIs | November 27, 2013 | ML13331B501 |
| 8.4 | NRC Inspection of Seismic Walkdowns | | |
| | NRC TI 2515/188 | July 6, 2012 | ML12156A052 |
| | NRC Integrated Inspection Report 2012-005 (TI 2515/188 inspection results) | February 7, 2013 | ML13038A635 |
| 8.5 | Licensee subsequent seismic walkdown report | | |
| | Licensee subsequent seismic walkdown report | January 6, 2014 | ML14016A021 |
| | Licensee subsequent seismic walkdown report – Supplement | March 31, 2014 | ML14119A375 |
| 8.6 | NRC Staff Assessment of Seismic Walkdown Report | | |
| | Seismic walkdown report staff assessment, Unit 1 | June 4, 2014 | ML14101A352 |
| | Seismic walkdown report staff assessment, Unit 2 | June 4, 2014 | ML14101A445 |

| TABLE 9 Request for Information under Title 10 of the Code of Federal Regulations, Section 50.54(f), Enclosure 4: Recommendation 2.3 Flooding Walkdown | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 9.1 | Industry Flooding Walkdown Guidance - NEI 12-07 | May 31, 2012 | ML12173A215 |
| 9.2 | NRC letter endorsing NEI 12-07 | May 31, 2012 | ML12144A142 |
| 9.3 | Licensee Flooding Hazard Walkdown Report | | |
| | Flooding Hazard Walkdown Report | November 27, 2012 | ML14141A133 |
| | Flooding Hazard Walkdown Report Supplement – Fuel Handling Building | May 21, 2013 | ML13142A443 |
| | Flooding Hazard Walkdown Report Supplement – Restricted Access Components | January 13, 2014 | ML14013A356 |
| | Update to Flooding Hazard Walkdown Report – APM Assessment | January 31, 2014 | ML14031A443 |
| 9.4 | NRC Inspection of Flooding Walkdowns | | |
| | NRC TI 2515/187 | June 27, 2012 | ML12129A108 |
| | NRC Integrated Inspection Report 2013-002 (TI 2515/187 inspection results) | May 9, 2013 | ML13129A179 |
| 9.5 | NRC Staff Assessment of Flooding Walkdown Report | June 30, 2014 | ML14141A133 |

| TABLE 10 Request for Information under Title 10 of the Code of Federal Regulations, Section 50.54(f), Enclosure 5: Recommendation 9.3 Emergency Preparedness Communications and Staffing | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------|---------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 10.1 | Guidance Documents | | |
| | Industry Guidance for Emergency Preparedness staffing and communications - NEI 12-01 | May 2012 | ML12125A412 |
| | NRC letter endorsing NEI 12-01 | May 15, 2012 | ML12131A043 |
| 10.2 | Exelon 60 day response and proposed alternative course of action | May 10, 2012 | ML12135A391 |
| 10.3 | Exelon 90 day response to communications and staffing information requests | June 11, 2012 | ML12164A572 |
| 10.4 | NRC letter – status of 90-day response | July 26, 2012 | ML12200A106 |
| 10.5 | Licensee communications assessment and implementation schedule | | |
| | Licensee communications assessment and implementation schedule | October 31, 2012 | ML12306A199 |
| | Licensee supplemental information | February 22, 2013 | ML13056A135 |
| 10.6 | NRC staff assessment of licensee's communications assessment | July 12, 2013 | ML13114A067 |
| 10.7 | Licensee Phase 1 staffing assessment | April 30, 2013 | ML13121A082 |
| 10.8 | NRC Phase 1 staffing assessment response | October 23, 2013 | ML13233A183 |
| 10.9 | Licensee Phase 2 staffing assessment response | | |
| | Licensee Phase 2 staffing assessment for functions related to mitigation strategies | November 26, 2014 | ML14330A262 |
| | Licensee response to RAI | April 13, 2015 | ML15103A499 |
| 10.10 | NRC Phase 2 staff assessment response | June 11, 2015 | ML15156B260 |
| 10.11 | NRC Inspection of Licensee Responses to EA-12-049, EA-12-051, and Emergency Preparedness Information | | |
| | NRC TI 2515/191 | December 23, 2015 | ML15257A188 |
| | NRC TI 2515/191 Inspection Report 2018-011 | February 2, 2018 | ML18033A711 |

| TABLE 11 Additional Licensee Commitments – SAMGs and Multisource Dose Assessments | | | |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------|----------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| Update and Maintain SAMGs | | | |
| 11.1 | SECY-15-0065: Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49) | April 30, 2015 | ML15049A201 |
| 11.2 | SRM-SECY-15-0065 | August 27, 2015 | ML15239A767 |
| 11.3 | NEI Letter describing industry initiative to update and maintain SAMGs | October 26, 2015 | ML15335A442 |
| 11.4 | Site Commitment to Maintain SAMGs | December 4, 2015 | ML15338A125 |
| 11.5 | NRC letter to NEI describing approach to SAMG oversight | February 23, 2016 | ML16032A029 |
| 11.6 | NRC Inspection Procedure 71111.18, "Plant Modifications" | November 17, 2016 | ML16306A185 |
| 11.7 | NEI 14-01, "Emergency Response Procedures and Guidelines for Extreme Events and Severe Accidents, Rev 1 | February 2016 | ML16224A619 |
| Multisource Dose Assessments | | | |
| 11.8 | NEI Letter: Industry survey and plan for multiunit dose assessments | January 28, 2013 | ML13028A200 |
| 11.9 | NRC Letter to request additional information from NEI on multiunit dose assessment capability | February 27, 2013 | ML13029A632 |
| 11.10 | NEI Letter: Commitment for Implementation of Multiunit Dose Assessment Capability | March 14, 2013 | ML13073A522 |
| 11.11 | Licensee Response Regarding the Capability to Perform Multisource Offsite Dose Assessments | June 27, 2013 | ML13179A098 |
| 11.12 | NRC Acknowledgement of Licensee Dose Assessment Submittals | January 29, 2014 | ML13233A205 |
| 11.13 | COMSECY-13-0010 | March 27, 2013 | ML12339A262 |
| 11.14 | SRM-COMSECY-13-0010 | April 30, 2013 | ML13120A339 |
| 11.15 | NRC Inspection of Licensee Responses to EA-12-049, EA-12-051, and Emergency Preparedness Information | | |
| | NRC TI 2515/191 | December 23, 2015 | ML15257A188 |
| | NRC TI 2515/191 Inspection Report 2018-011 | February 2, 2018 | ML18033A711 |
| 11.16 | Draft Final Rule: Mitigation of Beyond-Design-Basis Events NRC SECY-16-0142, Package | December 15, 2016 | ML16301A005 |
| 11.17 | NEI 13-06, "Enhancements to Emergency Responses Capabilities for Beyond Design Basis Accidents, Rev. 1 | February 2016 | ML16224A618 |

| TABLE 12 NRC Semi-Annual Status Reports to the Commission | | | |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|
| Ref | Document | Date | ADAMS Accession No. |
| 12.1 | SECY-12-0025, Enclosure 8, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tōhoku Earthquake and Tsunami" | February 17, 2012 | ML12039A103 |
| 12.2 | SECY-12-0095 - Enclosure 1: Six-Month Status Update On Charter Activities - February 2012 - July 2012 | July 13, 2012 | ML12165A092 |
| 12.3 | SECY-13-0020 - Third 6-Month Status Update On Response To Lessons Learned From Japan's March 11, 2011, Great Tohoku Earthquake And Subsequent Tsunami | February 14, 2013 | ML13031A512 |
| 12.4 | SECY-13-0095 - Fourth 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami | September 6, 2013 | ML13213A304 |
| 12.5 | 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 | April 17, 2014 | ML14064A520 |
| 12.6 | SECY-14-0114 - Sixth 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami | October 21, 2014 | ML14234A498 |
| 12.7 | SECY-15-0059 - Seventh 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami | April 9, 2015 | ML15069A444 |
| 12.8 | SECY-15-0128: Eighth 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami | October 14, 2015 | ML15245A473 |
| 12.9 | SECY-16-0043: Ninth 6 Month Status Update on Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami | April 5, 2016 | ML16054A255 |
| 12.10 | SECY-17-0016: Status of Implementation of Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami | January 30, 2017 | ML16356A084 |

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 – DOCUMENTATION OF THE COMPLETION OF REQUIRED ACTIONS TAKEN IN RESPONSE TO THE LESSONS LEARNED FROM THE FUKUSHIMA DAI-ICHI ACCIDENT DATED May 1, 2018

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|--------|-----------------|-----------------|--------------------|--------------------|
| NAME | RBernardo | SLent | TBrown* | EBowman* |
| DATE | 4/2/18 | 4/4/18 | 4/11/18 | 4/23/18 |
| OFFICE | NRR/DLP/D | | | |
| NAME | LLund | | | |
| DATE | 5/1/18 | | | |

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