



**JAPAN LESSONS-LEARNED DIVISION**

**REVISION TO 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**

**Interim Staff Guidance**

*Revision 1*



# U.S. NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

*Protecting People and the Environment*

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### REVISION TO JLD-ISG-2012-01

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### Interim Staff Guidance *Revision 1*

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**COMPLIANCE WITH ORDER EA-12-049,  
ORDER MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR  
MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS  
REVISION TO JLD-ISG-2012-01**

**PURPOSE**

The U.S. Nuclear Regulatory Commission (NRC) staff is providing this Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) to assist nuclear power reactor applicants and licensees with the identification of measures needed to comply with requirements to mitigate challenges to key safety functions. These requirements are contained in Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," [Reference 1] and Virgil C. Summer Nuclear Station (V.C. Summer), Unit 2 License, License No. NPF-93, Condition 2.D.(13) [Reference 2], V.C. Summer, Unit 3 License, License No. NPF-94, Condition 2.D.(13) [Reference 3], and Enrico Fermi Nuclear Plant, Unit 3 License, License No. NPF-95, Condition 2.D.(12)(g) [Reference 4]. This ISG is applicable to holders of, and applicants for, operating licenses (OLs) for nuclear power reactors issued under Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities," and the holders of, and applicants for, combined licenses (COLs) for nuclear power reactors issued under 10 CFR Part 52, "Licenses, Certifications and Approvals for Nuclear Power Plants." This ISG endorses, with exceptions, additions, and clarifications, the methodologies described in the industry guidance document, Nuclear Energy Institute (NEI) 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (NEI 12-06), Revision 2 [Reference 5]. This ISG provides one acceptable approach for satisfying those requirements. Holders of OLs or COLs for nuclear power reactors issued under 10 CFR Part 50 or Part 52 may use other methods for satisfying these requirements. The NRC staff will review such methods and determine their acceptability on a case-by-case basis.

**BACKGROUND**

Following the events at the Fukushima Dai-ichi nuclear power plant on March 11, 2011, the NRC established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF was tasked with conducting a systematic and methodical review of NRC regulations and processes and determining if the agency should make additional improvements to these programs in light of the events at Fukushima Dai-ichi. As a result of this review, the NTTF developed a comprehensive set of recommendations, documented in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 [Reference 6]. These recommendations were enhanced by NRC staff following interactions with stakeholders. Documentation of the staff's efforts is contained in SECY-11-0124, "Recommended Actions To Be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011 [Reference 7], and SECY-11-0137, "Prioritization of

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Recommended Actions To Be Taken in Response to Fukushima Lessons Learned,” dated October 3, 2011 [Reference 8].

As directed by the Commission’s staff requirements memorandum (SRM) for SECY-11-0093 [Reference 9], NRC staff reviewed the NTTF recommendations within the context of the NRC’s existing regulatory framework and considered the various regulatory vehicles available to the NRC to implement the recommendations. In SECY-11-0124 and SECY-11-0137, the staff established prioritization of the recommendations.

After receiving the Commission’s direction in SRM-SECY-11-0124 [Reference 10] and SRM-SECY-11-0137 [Reference 11], the NRC staff conducted public meetings to discuss enhanced mitigation strategies intended to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities following beyond-design-basis external events. At these meetings, the industry described its proposal for a Diverse and Flexible Mitigation Capability (FLEX), as documented in NEI’s letter dated December 16, 2011 [Reference 12]. FLEX is proposed as a strategy to fulfill the key safety functions of core cooling, containment integrity, and spent fuel cooling. Stakeholder input influenced the staff to pursue a more performance-based approach to improve the safety of operating power reactors than envisioned in NTTF Recommendation 4.2, SECY-11-0124, and SECY-11-0137.

On February 17, 2012, the NRC staff issued SECY-12-0025, “Proposed Orders and Requests for Information in Response to Lessons Learned from Japan’s March 11, 2011, Great Tohoku Earthquake and Tsunami” [Reference 13] to the Commission, including the proposed order to implement the enhanced mitigation strategies. As directed by SRM-SECY-12-0025 [Reference 14], the NRC staff issued Order EA-12-049 and, in parallel, issued as a Request for Information under 10 CFR 50.54(f) (hereafter referred to as the 50.54(f) letter) for a reevaluation of licensees’ flooding and seismic hazards [Reference 15]. On March 30, 2012, the Commission issued Memorandum and Order CLI-12-09, which includes the requirements for mitigation strategies as a license condition for V.C. Summer, Units 2 and 3.

Guidance and strategies required by the order would be available if a loss of power, motive force, and normal access to the ultimate heat sink to prevent fuel damage in the reactor and SFP affected all units at a site simultaneously. The order requires a three-phase approach for mitigating beyond-design-basis external events. The initial phase requires using installed equipment and resources to maintain or restore key safety functions including core cooling, containment, and SFP cooling. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely.

On May 4, 2012, NEI submitted NEI 12-06, Revision B [Reference 16], to provide specifications for an industry-developed methodology for the development, implementation, and maintenance of guidance and strategies in response to the mitigating strategies order. On May 13, 2012, NEI submitted NEI 12-06, Revision B1 [Reference 17]. The strategies and guidance described in NEI 12-06 expand on those that industry developed and implemented to address the limited set of beyond-design-basis external events that involve the loss of a large area of the plant due to explosions and fire required pursuant to paragraph (hh)(2) of 10 CFR 50.54, “Conditions of Licenses.”

On May 31, 2012, the NRC staff issued a draft version of this ISG [Reference 18] and published a notice of its availability for public comment in the *Federal Register* (77 FR 33779; June 7, 2012), with the comment period running through July 7, 2012 (30 days from its publication). The staff received seven comments during this time and addressed the comments as documented in “NRC Response to Public Comments, JLD-ISG-2012-01 (Docket ID NRC-2012-0068)” [Reference 19].

On July 3, 2012, NEI submitted Revision C to NEI 12-06 [Reference 20], incorporating many of the exceptions and clarifications included in the draft version of this ISG. On August 3, 2012, NEI submitted Draft Revision 0 to NEI 12-06 [Reference 21], incorporating many of the remaining exceptions and clarifications. On August 21, 2012, NEI submitted Revision 0 to NEI 12-06 [Reference 22], making various editorial corrections. The NRC reviewed the August 21, 2012, submittal of Revision 0 of NEI 12-06 and endorsed it as an approach the NRC considers acceptable for meeting the regulatory requirements with noted clarifications in Revision 0 of this ISG [Reference 23].

By February 2013, licensees of operating power reactors submitted their overall integrated plans (OIPs) under the mitigating strategies order describing the guidance and strategies to be developed and implemented. Because development and implementation of these mitigating strategies was to be accomplished in parallel with the reevaluation of the seismic and flooding hazards under the 50.54(f) letter issued subsequent to SECY-12-0025, the OIP submittals included in their key assumptions a statement that typically read, “[f]lood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012, are not completed and therefore not assumed in this submittal. As the reevaluations are completed, appropriate issues will be entered into the corrective action system and addressed on a schedule commensurate with other licensing bases changes.” (See, e.g., Vermont Yankee Nuclear Power Station’s OIP [Reference 24].)

To clarify the relationship between the mitigating strategies order and the hazard reevaluation, the NRC staff provided COMSECY-14-0037, “Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation (sic) of Flooding Hazards” [Reference 25] to the Commission on November 21, 2014, requesting that the Commission affirm that “[l]icensees for operating nuclear power plants need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events (Order EA-12-049 and related [mitigation of beyond-design-basis events] MBDDBE rulemaking).” In COMSECY-14-0037 the NRC staff further requested affirmation that “[l]icensees for operating nuclear power plants may need to address some specific flooding scenarios that could significantly damage the power plant site by developing targeted or scenario-specific mitigating strategies, possibly including unconventional measures, to prevent fuel damage in reactor cores or spent fuel pools.” In SRM-COMSECY-14-0037 [Reference 26], the Commission affirmed these two items and noted that “it is within the staff’s authority, and is the staff’s responsibility, to determine, on a plant-specific basis, whether targeted or scenario-specific mitigating strategies, possibly including unconventional measures, are acceptable.”

On August 25, 2015, NEI submitted Revision 1 to NEI 12-06 [Reference 27]. The purpose of this revision was to incorporate lessons learned in the implementation of Order EA-12-049, document alternative approaches taken by licensees for compliance to that order, and add

guidance for mitigating strategies assessments regarding reevaluated hazard information. After a public webinar discussion of potential exceptions and clarifications on September 21, 2015, NEI submitted Revision 1A to NEI 12-06 [Reference 28] to the NRC for endorsement.

On October 30, 2015, the NRC staff issued a draft revision to this ISG [Reference 29], and published a notice of its availability for public comment in the *Federal Register* (80 FR 69702; November 10, 2015), with the comment period running through December 10, 2015 (30 days from its publication). The staff received four comments during this time, which it addressed as documented in “NRC Response to Public Comments, Revision to JLD-ISG-2012-01 (Docket ID NRC-2012-0068” [Reference 30].

On December 10, 2015, NEI submitted Revision 2 to NEI 12-06, incorporating many of the clarifications and additions included in the draft version of the revision to this ISG.

## **RATIONALE**

1. Order EA-12-049 requires that licensees shall develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and SFP cooling capabilities following a beyond-design-basis external event. The three-phase approach described in the order is a conceptual framework built upon the need for a licensee to address challenges to the safety functions when they occur using installed structures, systems, and components for a coping period until portable mitigating equipment can be used to address those challenges. The finite level of resources on site makes the arrangement of offsite resources necessary to address potential widespread catastrophes, such as the occurrence at Fukushima, where restoration of offsite power is precluded by damage. Licensee’s emergency operating procedures will provide the command and control structure in response to beyond-design-basis external events. Additional guidance documents will be developed for deployment of the FLEX strategies in support of the emergency operating procedures.
2. The NRC has previously provided regulatory guidance for the development, implementation, and maintenance of guidance and strategies intended to maintain or restore core cooling, containment, and SFP cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire through the endorsement of NEI 06-12, “B.5.b Phase 2 & 3 Submittal Guideline,” Revision 2 [Reference 31], for holders of and applicants for operating licenses issued under 10 CFR Part 50, and Revision 3 [Reference 32], for holders of and applicants for combined licenses under 10 CFR Part 52. This regulatory guidance continues to provide an acceptable means of meeting the requirement to develop, implement and maintain the necessary guidance and strategies for the subset of beyond-design-basis external events addressed by 10 CFR 50.54(hh)(2).
3. The approach described in NEI 12-06, Revision 2, for development, implementation and maintenance of mitigating strategies for beyond-design-basis external events, provide a framework and methodology for such strategies to address those events that are not covered within the requirements of 10 CFR 50.54(hh)(2), subject to the exceptions, additions, and clarifications in the enclosure with this ISG.

4. The approach described in NEI 12-06, Revision 2, for the performance of assessments of the mitigating strategies under the reevaluated seismic and flooding hazards developed in response to the March 12, 2012, 50.54(f) letter, provide an appropriate methodology for licensees to address the reevaluated flooding hazards in a manner that aligns with the proposed MBDBE rulemaking.

## **APPLICABILITY**

This ISG shall remain in effect until it has been superseded, withdrawn, or incorporated into a regulatory guide or the Standard Review Plan (SRP).

## **GUIDANCE**

As discussed above, this ISG is applicable to holders of power reactor operating licenses, construction permits, or combined licenses.

The NRC staff considers that the development, implementation, and maintenance of strategies and guidance in conformance with the guidelines provided in NEI 12-06, Revision 2, are an acceptable means of meeting the requirements of Order EA-12-049, subject to the exceptions, additions, and clarifications in the enclosure with this ISG. However, NRC endorsement of NEI 12-06, Revision 2, does not imply NRC endorsement of references listed in NEI 12-06, Revision 2.

## **IMPLEMENTATION**

Except in those cases in which a licensee or construction permit (CP) holder proposes an acceptable alternative method for complying with Order EA-12-049, the NRC staff will use the methods described in this ISG to evaluate licensee and CP holder compliance as presented in submittals required in Order EA-12-049. The methods described in Revision 0 of JLD-ISG-2012-01, combined with plant-specific alternatives that have been previously approved by the NRC staff, remain an acceptable method of establishing compliance with Order EA-12-049.

## **BACKFITTING DISCUSSION**

Licensees and CP holders may use the guidance in this document to demonstrate compliance with Order EA-12-049. Accordingly, the NRC staff issuance of this ISG is not considered backfitting, as defined in 10 CFR 50.109(a)(1), nor is it deemed to be in conflict with any of the issue finality provisions in 10 CFR Part 52.

## **FINAL RESOLUTION**

The contents of this ISG may subsequently be incorporated into the SRP or other guidance documents, as appropriate.

## **ENCLOSURE**

1. Guidance for Developing, Implementing, and Maintaining Mitigation Strategies

## REFERENCES

1. U.S. Nuclear Regulatory Commission (NRC), Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML12054A736).
2. NRC, "Combined License, Virgil C. Summer Nuclear Station, Unit 2," License No. NPF-93, April 10, 2014 (ADAMS Accession No. ML14100A092).
3. NRC, "Combined License, Virgil C. Summer Nuclear Station Unit 3," License No. NPF-94, April 10, 2014 (ADAMS Accession No. ML14100A101).
4. NRC, "Combined License, Enrico Fermi Nuclear Plant Unit 3," License No. NPF-95, May 1, 2015 (ADAMS Accession No. ML15084A170).
5. Nuclear Energy Institute (NEI), "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision 2, December 2015 (ADAMS Accession No. ML16005A625).
6. NRC, "Recommendations for Enhancing Reactor Safety in the 21st Century, the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," SECY-11-0093, July 12, 2011 (ADAMS Accession No. ML11186A950).
7. NRC, "Recommended Actions To Be Taken without Delay from the Near-Term Task Force Report," SECY-11-0124, September 9, 2011 (ADAMS Package Accession No. ML11245A158).
8. NRC, "Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned," SECY-11-0137, October 3, 2011 (ADAMS Package Accession No. ML11272A111).
9. NRC, "Staff Requirements—SECY-11-0093—Near-Term Report and Recommendations for Agency Actions following the Events in Japan," SRM-SECY-11-0093, August 19, 2011 (ADAMS Accession No. ML112310021).
10. NRC, "Staff Requirements—SECY-11-0124—Recommended Actions To Be Taken without Delay from the Near-Term Task Force Report," SRM-SECY-11-0124, October 18, 2011 (ADAMS Accession No. ML112911571).
11. NRC, "Staff Requirements—SECY-11-0137—Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned," SRM-SECY-11-0137, December 15, 2011 (ADAMS Accession No. ML113490055).
12. Heymer, Adrian, NEI, letter to David L. Skeen, NRC, "An Integrated, Safety-Focused Approach to Expediting Implementation of Fukushima Dai-ichi Lessons Learned," December 16, 2011 (ADAMS Accession No. ML11353A008).

13. NRC, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," SECY-12-0025, February 17, 2012 (ADAMS Accession No. ML12039A103).
14. NRC, "Staff Requirements—SECY-12-0025—Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," SRM-SECY-12-0025, March 9, 2012 (ADAMS Accession No. ML120690347).
15. NRC, "Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," March 12, 2012, (ADAMS Accession No. ML12053A340).
16. NEI, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision B, May 4, 2012 (ADAMS Accession No. ML12144A419).
17. NEI, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision B1, May 13, 2012 (ADAMS Accession No. ML12143A232).
18. NRC, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Draft JLD-ISG-2012-01, May 31, 2012 (ADAMS Accession No. ML12146A014).
19. NRC, "NRC Response to Public Comments," JLD-ISG-2012-01, Docket ID NRC-2012-0068, August 29, 2012 (ADAMS Accession No. ML12229A253).
20. NEI, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision C, July 3, 2012 (ADAMS Accession No. ML121910390).
21. Bauer, Scott A., NEI, letter to Steven D. Bloom, NRC, "Transmittal of Draft Revision 0 of NEI 12-06, 'Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,'" Draft Revision 0, August 3, 2012 (ADAMS Accession No. ML12221A204).
22. NEI, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision 0, August 21, 2012 (ADAMS Accession No. ML12242A378).
23. NRC, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," JLD-ISG-2012-01, Draft Interim Staff Guidance, Revision 0, May 31, 2012 (ADAMS Accession No. ML12146A014).
24. Wamser, Christopher J., Entergy Nuclear Operations, letter to NRC, "Vermont Yankee Overall Integrated Plan in Response to March 12, 2012 Commission Order To Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," February 28, 2013 (ADAMS Accession No. ML13064A300).

25. NRC, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation (sic) of Flooding Hazards," COMSECY-14-0037, November 21, 2014 (ADAMS Accession No. ML14238A616).
26. NRC, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," SRM-COMSECY-14-0037, March 30, 2015, (ADAMS Accession No. ML15089A236).
27. NEI, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision 1, October 2015 (ADAMS Accession No. ML15244B006).
28. NEI, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision 1A, December 2015 (ADAMS Accession No. ML15279A426).
29. NRC, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," JLD-ISG-2012-01, Draft Revision 1, October 30, 2015 (ADAMS Accession No. ML15294A078).
30. NRC, "NRC Responses to Public Comments - Revision to Japan Lessons-Learned Division Interim Staff Guidance 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," Docket ID NRC-2012-0068, January 22, 2016 (ADAMS Accession No. ML15357A147).
31. NEI, "B.5.b Phase 2 & 3 Submittal Guideline," NEI 06-12, Revision 2, December 2006 (ADAMS Accession No. ML070090060).
32. NEI, "B.5.b Phase 2 & 3 Submittal Guideline," NEI 06-12, Revision 3, July 2009 (ADAMS Accession No. ML092120160) (Designated for Official Use Only – Security Related Information).

# **GUIDANCE FOR DEVELOPING, IMPLEMENTING, AND MAINTAINING MITIGATION STRATEGIES**

## **1. Development and Implementation Process**

U.S. Nuclear Regulatory Commission (NRC) Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" [Reference 1], requires that applicants or licensees develop and implement guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities following a beyond-design-basis external event (BDBEE). The guidance and strategies developed and implemented under Order EA-12-049 must be capable of being implemented sitewide and must include obtaining sufficient offsite resources to sustain the functions of core cooling, containment, and SFP cooling indefinitely.

### **1.1. Establishment of Baseline Coping Capability**

Section 1.3 of Nuclear Energy Institute (NEI) document NEI 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," [Reference 2] provides the objectives and guiding principles of the FLEX program that are responsive to Order EA-12-049 and provide that plant-specific analyses will determine the duration of each phase.

Section 2 of NEI 12-06, Revision 2, provides a high-level discussion of the site-specific nature of the actions required by each licensee to properly implement the performance-based requirements in Order EA-12-049. Sections 2.1 through 2.5 of NEI 12-06, Revision 2, discuss the coping capacities, types of external hazards, strategies, and controls each licensee should implement to meet the requirements of the order.

Section 3 of NEI 12-06, Revision 2, provides performance attributes, general criteria, and baseline assumptions for use in the development and implementation of the strategies and guidelines under Order EA-12-049. NEI 12-06, Revision 2, further provides that licensees should use these criteria and assumptions for analyses used to establish a baseline coping capability. The assumptions include the initial conditions listed in Section 3.2.1.3 that include a loss of offsite power affecting all units at a plant site and the specification that "[a]ll design-basis installed sources of emergency on-site ac [alternating current] power and SBO [station blackout] alternate ac power sources [as defined in 10 CFR 50.2 [Reference 3] are assumed to be not available and not imminently recoverable."

Section 3.2.1.7 of NEI 12-06, Revision 2, specifies that "[s]trategies that have a time constraint to be successful should be identified and a basis provided that the time can reasonably be met." Section 11.4.3 of NEI 12-06, Revision 2, specifies that FLEX support guidelines (FSGs) will be developed to provide guidance that can be employed for a variety of conditions and that the FSGs will be reviewed and validated to ensure

Enclosure

they are feasible. Appendix E to NEI 12-06, Revision 2, provides a method for validation of the FSGs.

Section 3.2.1.13 of NEI 12-06, Revision 2, specifies that best-estimate analyses are appropriate for the purpose of establishing the baseline coping capabilities.

Staff Position: Sections 1, 2, and 3, and Appendix E to NEI 12-06, Revision 2, provide an acceptable method for licensees to follow to develop a baseline coping capability for mitigating an extended loss of ac power (ELAP) concurrent with either a loss of normal access to the ultimate heat sink (LUHS) or, for a nuclear power plant with a passive reactor design, a loss of normal access to the normal heat sink, with the following clarifications and addition:

- a) An element of a set of strategies to maintain or restore core and SFP cooling and containment functions includes knowledge of the time a licensee or applicant can withstand challenges to these key safety functions using installed equipment during a BDBEE. This knowledge provides an input to the choice of storage locations and conditions of readiness of the equipment required for the follow-on phase. This duration is related to, but distinct from the specified duration for the requirements of 10 CFR 50.63, "Loss of All Alternating Current Power," [Reference 4] paragraph (a), because it represents the current capabilities of the licensee or applicant rather than a required capability and licensees and applicants should (1) account for the SFP cooling function, which is not addressed by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.63(a), and (2) assume the nonavailability of alternate ac sources, which may be included in meeting the specified durations of 10 CFR 50.63(a). This is implicit in the NEI 12-06, Revision 2 principles described in Section 3.2.1.7, Paragraph (6) and Section 3.2.2, Paragraph (1).
- b) The use of best-estimate analyses for establishing the baseline coping capabilities is appropriate in the context of the BDBEEs for Order EA-12-049. This includes the use of normal fluid levels for tanks that are maintained by procedure or administrative controls rather than the minimum levels allowed by Technical Specifications.
- c) Consistent with the goal of mitigation strategies for BDBEE, the validation method documented in Appendix E to NEI 12-06, Revision 2, is endorsed as a method to (1) assess whether it is feasible, considering design-basis or reevaluated hazard conditions determined under the 50.54(f) request for information letter issued on March 12, 2012 [Reference 5], (as applicable), to execute tasks, manual actions, and decisions (i.e., human actions) required by the mitigation strategies described in NEI 12-06, Revision 2; and (2) support a conclusion that the strategies mitigate, to the extent practical, the adverse effects of BDBEEs on the ability of personnel to perform the required human actions. However, NEI 12-06, Revision 2, Appendix E, neither proposes nor is endorsed as a method to assess whether required human actions are reliable.

1. Tasks, manual actions, or decisions performed greater than 24 hours after the initiation of the event that have time constraints may be validated using a Level A or Level B method that results in an estimate of the time required to complete the task or manual action or to make and communicate the decision in order to confirm that the time constraint can reasonably be met as specified in NEI 12-06, Revision 2, Section 3.2.1.7, Principle 6, which states that “[s]trategies that have a time constraint to be successful should be identified and a basis provided that the time can reasonably be met.”

d) Licensees should develop, implement and maintain a strategy for the maintenance or restoration of SFP cooling that meets the following criteria in addition to those included in NEI 12-06, Revision 2, Tables C-3 and D-3:

| Baseline Capability  | Purpose   | Performance Attributes   |
|--|---|--|
| <ul style="list-style-type: none"> <li>Spray capability via portable monitor nozzles from refueling floor using portable pump</li> </ul> | Provide spent fuel cooling when makeup rate is not sufficient | <ul style="list-style-type: none"> <li>Minimum of 200 [gallons per minute] gpm per unit to the pool or 250 gpm per unit if overspray occurs</li> <li>This capability is not required for plants that have SFPs that are below ground and cannot be drained as determined during the implementation of B.5.b/10 CFR 50.54(hh)(2)</li> <li>This capability is not required for plants that demonstrate spent fuel pool integrity by performing a seismic spent fuel pool integrity evaluation for their mitigating strategies seismic hazard determined under the March 12, 2012, requests for information under 10 CFR 50.54(f). The seismic spent fuel pool integrity evaluation should follow an NRC-endorsed process (e.g., EPRI 3002007148, <i>Seismic Evaluation</i>)</li> </ul> |

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|  |  | <i>Guidance: Spent Fuel Pool Integrity Evaluation, currently under development).</i> |
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**1.1.1. Phased Approach**

Order EA-12-049 requires a three-phase approach for mitigating BDBEEs. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment, and SFP cooling capabilities. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely. The NRC recognizes that for certain BDBEEs, the damage state could prevent maintenance of key safety functions using the equipment intended for particular phases. Under such circumstances, prompt initiation of the follow-on phases to restore core and SFP cooling and containment functions is appropriate.

Staff Position: NEI 12-06, Revision 2, provides an acceptable method for developing an approach to mitigate and cope with BDBEEs.

**1.1.1.1. Initial Response Phase**

The initial response phase will be accomplished using installed equipment. Licensees and applicants should establish and maintain current estimates of their capabilities to maintain core and SFP cooling and containment functions assuming a loss of all ac electric power to the essential and nonessential switchgear buses, except for those fed by station batteries through inverters. These estimates provide the time period in which the licensee should be able to initiate the transition phase and maintain or restore the key safety functions using portable onsite equipment. These estimates should be considered in selecting the storage locations for that equipment and the prioritization of resources to initiate their use.

Staff Position: NEI 12-06, Revision 2, Section 3.0, provides an acceptable method for determining the baseline coping capabilities for the initial response phase.

**1.1.1.2. Transition Phase**

The transition phase will be accomplished by supplementing installed equipment with portable equipment stored on site. The strategies for this phase must be capable of maintaining core cooling, containment, and SFP cooling capabilities (after their restoration, if applicable) from the time they are implemented until they can be supplemented by offsite resources in the final phase. The duration of the transition phase should provide sufficient overlap with both the initial and final phases to account for the time it takes to install equipment and for uncertainties.

Staff Position: NEI 12-06, Revision 2, Section 3.0, provides an acceptable method for determining the baseline coping capabilities for the transition phase.

### **1.1.1.3. Final Phase**

The final phase will be accomplished using the portable equipment stored on site, augmented with additional equipment and consumables obtained from off site, to sustain the functions of core cooling, containment, and SFP cooling indefinitely.

Staff Position: NEI 12-06, Revision 2, Section 3.0, provides an acceptable method for determining the baseline coping capabilities for the final phase. Section 12.2 of NEI 12-06, Revision 2, provides an acceptable method for establishing the capability to obtain offsite equipment and consumables until power, water, and coolant injection systems are restored or commissioned. This provides an acceptable method to sustain the listed functions indefinitely when coupled with the restoration or commissioning of power, water, and coolant injection systems.

## **1.2. Contingencies for Loss of All Alternating Current Power**

Section 1.3 of NEI 12-06, Revision 2, defines an ELAP as a “loss of off-site power, emergency diesel generators and any alternate ac source but not the loss of ac power from buses fed by station batteries through inverters.” (Footnote omitted.) Section 1.1 of this ISG discusses an acceptable approach to mitigate the effects of an ELAP. Order EA-12-049, Attachments 2 and 3, Item (2) require that the strategies developed and implemented in response to the order “be capable of mitigating a ... loss of all ac power ...” rather than an ELAP. The difference between an ELAP and a loss of all ac power condition is addressed as follows.

Section 3.2.2 of NEI 12-06, Revision 2, provides 17 guidelines for use in developing the guidance and strategies under Order EA-12-049. Guideline (2) of this section states:

Plant procedures/guidance should recognize the importance of AFW/HPCI/RCIC/IC during the early stages of the event and direct the operators to invest appropriate attention to assuring its initiation and continued, reliable operation throughout the transient since this ensures decay heat removal.

The risk of core damage due to ELAP can be significantly reduced by assuring the availability of auxiliary feedwater (AFW) (emergency feedwater (EFW) at some plants), high pressure core injection (HPCI), reactor core isolation cooling (RCIC), or isolation condensers (IC), particularly in the first 30 minutes to one hour of the event. Assuring that one of these systems has been initiated to provide early core heat removal, even if local initiation and control is required is an important initial action. A substantial portion of the decay and sensible reactor heat can be removed during this period. The availability of AFW/HPCI/RCIC/IC can be improved by providing a reliable supply of

water, monitoring turbine conditions (particularly lubricating oil flow and temperature), bypassing automatic trips, and maintaining nuclear boiler/steam generator water levels. These actions help ensure that the core remains adequately covered and cooled during an ELAP event.

Appendices C and D to NEI 12-06, Revision 2, contain summaries of performance attributes for boiling-water and pressurized-water reactors respectively, and address Guideline (2) of NEI 12-06, Revision 2, Section 3.2.2, by specifying that procedures/guidance will include local manual initiation of AFW/EFW/HPCI/RCIC/IC.

Section 5.3.3 of NEI 12-06, Revision 2, describes interface considerations for seismic events, expands on this contingency to specify that the strategies and guidelines should include:

...a reference source for the plant operators that provides approaches to obtaining necessary instrument readings to support the implementation of the coping strategy. Such a resource could be provided as an attachment to the plant procedures/guidance. Guidance should include critical actions to perform until alternate indications can be connected and on how to control critical equipment without associated control power.

This reference source should include control room and non-control room readouts and should also provide guidance on how and where to measure key instrument readings using a portable instrument (e.g., a Fluke meter) at a location that does not rely on the functioning of intervening electrical equipment (e.g. I/E convertors, analog to digital converters, relays, etc.) that could be adversely affected by BDB [beyond-design-basis] seismic events. An instrument reading should be obtained at the closest accessible termination point to the containment penetration or parameter of measurement, as practical.

Staff Position: NEI 12-06, Revision 2, Section 3.2.2, Guideline (2) and the provisions in NEI 12-06, Revision 2, Appendices C and D, for manual initiation of AFW/EFW/HPCI/RCIC/IC, coupled with the NEI 12-06, Revision 2, Section 5.3.3, provisions for the development of guidance on obtaining instrument readings and controlling critical equipment without the associated power, provide an acceptable method for licensees to develop the contingencies for the loss of all ac power, which are necessary to comply with the Order EA-12-049 requirement to mitigate an extended loss of all ac power. The need for the NEI 12-06, Revision 2, Section 5.3.3, contingencies to show compliance with the condition of loss of all ac power is not limited to seismically-induced events; it is a necessary element of compliance for that requirement regardless of the initiating event. Because NEI 12-06, Revision 2, Section 5, is applicable to all power reactor licensees, conformance to NEI 12-06, Revision 2, Section 5.3.3, can provide the capabilities necessary to meet that element regardless of the initiating event.

## 2. Equipment Capacity

Order EA-12-049 requires that the equipment relied upon for the mitigation strategies have sufficient capacity to simultaneously maintain or restore core cooling, containment, and SFP cooling capabilities for all the power reactor units on a site subject to the order.

Guideline (16) in Section 3.2.2 of NEI 12-06, Revision 2, provides guidance for the minimum number of sets of equipment a licensee should have in order to achieve reasonable assurance that the equipment will be available in sufficient quantity to have the capacity necessary to comply with the order. This includes guidance for the provision of spare hoses and cables in a quantity that is either (1) equivalent to 10 percent of the total length of each type of hose or cable necessary; or (2) of sufficient length and sizing to replace the single longest run needed to support any single strategy.

Sections 11.1 and 11.2 of NEI 12-06, Revision 2, provide guidance on the quality attributes and equipment design a licensee may use to achieve reasonable assurance that the individual pieces of equipment have the capability to perform the functions they are intended for in the FLEX strategies.

Staff Position: NEI 12-06, Revision 2, Section 3.2.2, Guideline (16) and Sections 11.1-2, provide an acceptable method to demonstrate compliance with Order EA-12-049.

## 3. Reasonable Protection

Order EA-12-049 requires licensees to provide reasonable protection for the equipment relied upon for the mitigation strategies required by the order from the external events.

Appendix A to NEI 12-06, Revision 2, defines reasonable protection as “[s]toring on-site FLEX equipment in configurations such that no one external event can reasonably fail the site FLEX capability (N) when the required FLEX equipment is available.”

Staff Position: NEI 12-06, Revision 2, provides an acceptable approach for reasonably protecting equipment from external events. This approach includes the following:

- identification of the natural phenomena for which reasonable protection is necessary,
- determination of the method of protection to be used,
- establishment of controls on unavailability of the equipment, and
- provision of a method of transporting the portable equipment from its storage location to the site in which it will be used.

Individual elements of reasonable protection are discussed below.

### **3.1. Evaluation of External Hazards**

Section 4 of NEI 12-06, Revision 2, discusses the overall methodology for identifying external hazards and evaluating their impact. Appendix B to NEI 12-06, Revision 2, discusses the identification of external hazards for which licensees should provide reasonable protection. Sections 5 through 9 of NEI 12-06, Revision 2, discuss the evaluation of the effects of natural phenomena to meet the baseline coping capability.

Staff Position: Sections 5 through 9 and Appendix B to NEI 12-06, Revision 2, provide an acceptable method for the evaluation and equipment considerations to address external events to satisfy that element of reasonable protection.

### **3.2. Protection from External Hazards**

Sections 5 through 9 of NEI 12-06, Revision 2, discuss methodologies for the protection of the equipment. The methods of protection comprise: (1) physical protection of the equipment; (2) protection by relocation of the equipment from a position in which a licensee may have indication of an impending hazard; and (3) provision of multiple, redundant pieces of equipment or methods to accomplish a function, stored in diverse locations to ensure that at least one method of accomplishing that function will survive an event of a localized nature such as a tornado missile impact.

Staff Position: Sections 5 through 9 and Appendix B to NEI 12-06, Revision 2, provide an acceptable method for protecting the equipment from external events to satisfy that element of reasonable protection.

### **3.3. Deployment of Equipment**

Sections 5 through 9 of NEI 12-06, Revision 2, discuss methods for transporting the equipment from its storage location to the location in which it would be used. These sections also discuss the connection of the equipment to structures, systems, and components (SSCs) necessary for completion of the deployment of the equipment from storage to a state in which it can supplement the functions of the installed SSCs.

Staff Position: Sections 5 through 9 and Appendix B to NEI 12-06, Revision 2, provide an acceptable method for deployment of the equipment in order to satisfy that element of reasonable protection.

### **3.4. Programmatic Controls for Unavailability**

Section 11.5.4 of NEI 12-06, Revision 2, discusses the programmatic controls for equipment and connections between that equipment and permanently installed SSCs. These controls include limited time periods in which the equipment and connection points may be unavailable for any reason, with the duration of the acceptable time period being based on the ability of the licensee to accomplish the intended function of the equipment by other means.

When a licensee cannot accomplish the intended function of the equipment by other means, unavailability durations are limited to periods comparable to those allowed by technical specifications for safety-related SSCs with similar functions (e.g., the completion times allowed for restoration of turbine-driven auxiliary feedwater trains in Limiting Condition for Operation 3.7.5, "Auxiliary Feedwater (AFW) System," of NUREG-1431, "Standard Technical Specifications—Westinghouse Plants," Revision 4.0, Volume 1, "Specifications," which range from 24 hours to 7 days. [Reference 8]).

When a licensee can accomplish the intended function of the equipment by other means (i.e., the equipment is spare equipment beyond the minimum necessary to accomplish the intended function), unavailability of the equipment is limited to 90 days based on a normal plant work cycle of 12 weeks to avoid displacing maintenance actions for other safety-significant equipment or SSCs.

When a licensee is able to accomplish the intended function of the equipment by other means, but that means is not protected from all possible effects of natural phenomena, unavailability of the equipment is limited to 45 days based on a short-cycle work period of 6 weeks in order to avoid displacing maintenance actions for other safety-significant equipment or SSCs.

Similar controls are applied to connection points for the equipment to installed SSCs.

Staff Position: Section 11.5.4 of NEI 12-06, Revision 2, provides an acceptable method for controlling unavailability of the equipment to satisfy that element of reasonable protection.

#### **4. Equipment Maintenance**

Order EA-12-049 requires that licensees maintain guidance and strategies to maintain or restore core cooling, containment, and SFP cooling capabilities. This necessitates that the equipment relied on for the mitigation strategies under Order EA-12-049 receive adequate maintenance such that it is capable of fulfilling its intended function.

Section 11.5 of NEI 12-06, Revision 2, discusses the maintenance and testing of the equipment. Section 3.2.1.13 discusses the Electric Power Research Institute (EPRI) program developed for maintenance of the equipment, which is documented in the EPRI Report 3002000623, "Applications Center: Preventive Maintenance Basis for FLEX Equipment—Project Overview Report" [Reference 9]. The EPRI Report 3002000623 was endorsed by NRC letter dated October 7, 2013 [Reference 10].

Staff Position: Sections 11.5 and 3.2.1.13 of NEI 12-06, Revision 2, provide an acceptable method for maintaining the equipment relied on for the mitigation strategies under Order EA-12-049.

## 5. Configuration Control

Order EA-12-049 requires licensees maintain the guidance and strategies to maintain or restore core cooling, containment, and SFP cooling capabilities.

Section 11.8 of NEI 12-06, Revision 2, discusses the configuration control of the guidance and strategies as well as the maintenance of an overall program document and record of changes. Section 11.8.3.a.iii of NEI 12-06, Revision 2, includes a wording that corresponds to that of proposed 10 CFR 50.155(f), "Change control," as published in the *Federal Register* (80 FR 70610, 70645, November 13, 2015, as modified by 80 FR 74717, November 30, 2015). Because that proposed change control provision has not been decided upon by the Commission, the NRC staff does not take a position on the acceptability of Section 11.8.3.a.iii.

Staff Position: Section 11.8 of NEI 12-06, Revision 2, provides an acceptable method for maintaining the guidance and strategies required under Order EA-12-049. As discussed above, the NRC staff does not take a position on the provisions of Section 11.8.3.a.iii.

## 6. Treatment of Reevaluated Hazards under the 50.54(f) Requests for Information of March 12, 2012

Order EA-12-049 requires licensees to provide reasonable protection for the equipment relied on for the mitigating strategies from external events. As a result of the reevaluations of flood and seismic hazards under the March 12, 2012, NRC letter issued under 10 CFR 50.54(f), some licensees have identified issues with the level of protection that would be considered reasonable. As affirmed by the Commission in SRM-COMSECY-14-0037 [Reference 11], "[l]icensees for operating nuclear power plants need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events (Order EA-12-049 and related MBDBE rulemaking)." Guidance in this section is intended to align with treatment under the MBDBE rulemaking.

### 6.1. Treatment of Reevaluated Seismic Hazards

Appendix H to NEI 12-06, Revision 2, discusses a method to assess the results of the seismic hazard reevaluations with respect to the guidance and strategies required by EA-12-049.

#### 6.1.1. (Modified) Mitigating Strategies

Sections H.4.1, H.4.2, and H.4.4 of Appendix H to NEI 12-06, Revision 2, discuss a method to assess or modify the mitigating strategies to show they provide reasonable protection from the new seismic hazard information, referred to as mitigating strategies seismic hazard information.

Staff Position: Sections H.4.1, H.4.2, and H.4.4 of Appendix H to NEI 12-06, Revision 2, provide appropriate methods to assess or modify the mitigating strategies to show that

they remain capable of mitigating the new seismic hazard information, referred to as mitigating strategies seismic hazard information, with the following clarification. In addition to the raceways (cable trays and conduit) and nuclear steam supply system components (piping and vessels) listed as classes of high capacity equipment and systems established in EPRI NP-6041 [Reference 12] as having sufficient seismic capacities relative to the Ground Motion Response Spectrum (GMRS) for Path 4 plants and therefore not requiring additional evaluations to demonstrate ruggedness, Table 2-4 of EPRI NP-6041 provides that buried tanks also have sufficient seismic capacity and limits evaluations of those tanks to evaluation of piping connections. The potential for misalignment of piping connections due to soil failures impacting buried tanks associated with the ESEP equipment list should be considered in Section H.4.4, Step 3, as a seismic failure mechanism that could potentially affect the FLEX strategies. Soil failure evaluations are not needed for structures that are considered inherently or sufficiently rugged relative to the GMRS levels for Path 4 plants.

Facilities for which the method described in Section H.4.4 is applicable:

- Those facilities for which Section H.4.3 is applicable as documented in Section 6.1.2 of this ISG
- Beaver Valley Power Station, Units 1 and 2, Renewed License Nos. DPR-66 and NPF-73
- Calvert Cliffs Nuclear Power Plant, Units 1 and 2, Renewed License Nos. DPR-53 and DPR-69
- Catawba Nuclear Station, Units 1 and 2, Renewed License Nos. NPF-35 and NPF-52
- Cooper Nuclear Station, Renewed License No. DPR-46
- Davis-Besse Nuclear Power Station, Unit 1, License No. NPF-3
- Donald C. Cook Nuclear Plant, Units 1 and 2, Renewed License Nos. DPR-58 and DPR-74
- Dresden Nuclear Power Station, Units 2 and 3, Renewed License Nos. DPR-19 and DPR-25
- Edwin I Hatch Nuclear Plant, Units 1 and 2, Renewed License Nos. DPR-57 and NPF-5
- Fermi, Unit 2, Facility Operating License No. NPF-43
- LaSalle County Station, Units 1 and 2, Facility Operating License Nos. NPF-11 and NPF-18

- McGuire Nuclear Station, Units 1 and 2, Renewed License Nos. NPF-9 and NPF-17
- Monticello Nuclear Generating Plant, Unit 1, License No. DPR-22
- Perry Nuclear Power Plant, Unit 1, License No. NPF-58
- Point Beach Nuclear Plant, Units 1 and 2, Renewed License Nos. DPR-24 and DPR-27
- Seabrook Station, Unit 1, Facility Operating License No. NPF-86
- Three Mile Island Nuclear Station, Unit 1, Renewed License No. DPR-50
- Watts Bar Nuclear Plant, Units 1 and 2, Facility Operating License Nos. NPF-90 and NPF-96
- Wolf Creek Generating Station, Unit 1, Renewed License No. NPF-42

#### **6.1.2. Alternate Mitigating Strategies**

Section H.4.3 of Appendix H to NEI 12-06, Revision 2, discusses a method to develop an alternate mitigating strategy (AMS) to address the mitigating strategies seismic hazard information. This includes a modification of the general criteria and baseline assumptions included in NEI 12-06, Section 3.2.1 to exclude consideration of losses such as an ELAP, loss of offsite power (LOOP) or LUHS unless caused by the seismic hazard.

Staff Position: The method described in Section H.4.3 of NEI 12-06, Revision 2, for development of an AMS that provides a capability to mitigate the BDBEE is an acceptable method of providing reasonable protection when the hazard level for the AMS is identified. The protection of onsite power sources and normal access to the ultimate heat sink (normal heat sink for an AP1000 or ESBWR licensee) from the seismic hazard is an acceptable method of mitigating a simultaneous loss of all ac power and loss of normal access to the ultimate (normal) heat sink

Section H.4.5 of Appendix H to NEI 12-06, Revision 2, discusses a methodology to develop an AMS that is under development. This methodology has not yet been reviewed by the NRC and is not yet endorsed for use.

#### Facilities for which the method described in Section H.4.3 is applicable:

- Arkansas Nuclear One, Units 1 and 2, Renewed License Nos. DPR-51 and NPF-6
- Brunswick Steam Electric Plant, Units 1 and 2, Renewed License Nos. DPR-71 and DPR-62

- Byron Station, Units 1 and 2, Renewed License Nos. NPF-37 and NPF-66
- Fort Calhoun Station, Unit 1, Renewed License No. DPR-40
- James A. FitzPatrick Nuclear Power Plant, Renewed License No. DPR-59
- Millstone Power Station, Units 2 and 3, Renewed License Nos. DPR-65 and NPF-49
- Salem Nuclear Generating Station, Units 1 and 2, Renewed License Nos. DPR-70 and DPR-75
- Susquehanna Steam Electric Station, Units 1 and 2, Renewed License Nos. NPF-14 and NPF-22

## **6.2. Treatment of Reevaluated Flooding Hazards**

Appendix G to NEI 12-06, Revision 2, discusses a method to assess the results of the flooding hazard reevaluations with respect to the guidance and strategies required by EA-12-049.

### **6.2.1. (Modified) Mitigating Strategies**

Sections G.4.1 and G.4.2 of Appendix G to NEI 12-06, Revision 2, discuss a method to assess or modify the mitigating strategies to show they provide reasonable protection from the new flooding hazard information, referred to as mitigating strategies flood hazard information.

Staff Position: Sections G.4.1 and G.4.2 of Appendix G to NEI 12-06, Revision 2, provide appropriate methods to assess or modify the mitigating strategies to show that they remain capable of mitigating the new flooding hazard information, referred to as mitigating strategies flood hazard information.

### **6.2.2. Alternate Mitigating Strategies**

Section G.4.3 of Appendix G to NEI 12-06, Revision 2, discusses a method to develop an AMS to address the mitigating strategies flood hazard information. This includes a modification of the general criteria and baseline assumptions included in NEI 12-06, Section 3.2.1, to exclude consideration of losses such as an ELAP, LOOP, or LUHS unless caused by the flood hazard.

Staff Position: The method described in Section G.4.3 of NEI 12-06, Revision 2, for development of an AMS that provides a capability to mitigate the BDBEE is an acceptable method of providing reasonable protection when the hazard level for the AMS is identified. The protection of onsite power sources and normal access to the ultimate heat sink (normal heat sink for an AP1000 or ESBWR licensee) from the flood

hazard is an acceptable method of mitigating a simultaneous loss of all ac power and loss of normal access to the ultimate (normal) heat sink.

### **6.2.3. Targeted Hazard Mitigating Strategies**

Section G.4.4 of Appendix G to NEI 12-06, Revision 2, discusses a method to develop targeted hazard mitigating strategies (THMS) to address the mitigating strategies flooding hazard information. This includes a modification of the general criteria and baseline assumptions included in NEI 12-06, Section 3.2.1, to exclude consideration of losses such as an ELAP, LOOP, or LUHS unless caused by the flood hazard.

Staff Position: The method described in Section G.4.4 of NEI 12-06, Revision 2, for development of a THMS that provides a capability to mitigate the BDBEE is an acceptable method of providing reasonable protection for the reevaluated flooding hazard when the hazard level for the THMS is identified. The protection of onsite power sources and normal access to the ultimate heat sink (normal heat sink for an AP1000 or ESBWR licensee) from the flood hazard is an acceptable method of mitigating a simultaneous loss of all ac power and loss of normal access to the ultimate (normal) heat sink.

## **7. Guidance for AP1000 Design**

Appendix F to NEI 12-06, Revision 2, provides specific guidance for licensees with reactors of the AP1000 design on how to satisfy provisions of Order EA-12-049, Attachment 3, for the final phase (for sufficient offsite resources to sustain functions indefinitely).

Staff Position: The guidance of NEI 12-06, Revision 2, Appendix F, provides an acceptable means to meet the requirements of Order EA-12-049 or license conditions imposing similar requirements.

## REFERENCES

1. U.S. Nuclear Regulatory Commission (NRC), Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A736).
2. Nuclear Energy Institute (NEI), "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," NEI 12-06, Revision 2, December 2015 (ADAMS Accession No. ML15348A015).
3. *U.S. Code of Federal Regulations*, "Domestic Licensing of Production and Utilization Facilities," Part 50, Section 50.2, "Definitions," Chapter 1, Title 10, "Energy" (10 CFR 50.2).
4. *U.S. Code of Federal Regulations*, "Domestic Licensing of Production and Utilization Facilities," Part 50, Section 50.63, "Loss of All Alternating Current Power," Chapter 1, Title 10, "Energy" (10 CFR 50.63).
5. NRC, "Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," March 12, 2012, (ADAMS Accession No. ML12053A340).
6. NEI, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communication Capabilities," NEI 12-01, Revision 0, May 2012 (ADAMS Accession No. ML12125A412).
7. Skeen, David L., NRC, to Susan Perkins-Grew, NEI, "U.S. Nuclear Regulatory Commission Review of NEI 12-01, 'Guideline for Assessing Beyond-Design-Basis Accident Response Staffing and Communication Capabilities,' Revision 0, dated May 2012" (ADAMS Accession No. ML12131A043).
8. NRC, "Standard Technical Specifications: Westinghouse Plants- Specifications" NUREG-1431, Volume 1, Revision 4, April 2012 (ADAMS Accession No. ML12100A222).
9. Electric Power Research Institute (EPRI), Report 3002000623, "Applications Center: Preventive Maintenance Basis for FLEX Equipment – Project Overview Report," Palo Alto, CA <sup>1</sup>, September 2013 (ADAMS Accession No. ML13276A573).

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<sup>1</sup> Copies of Electric Power Research Institute (EPRI) documents may be obtained by contacting the Electric Power Research Institute, 3420 Hillview Avenue, Palo Alto, CA 94304, Telephone: 650-855-2000 or online at <http://my.epri.com/portal/server.pt>.

10. Davis, Jack R., NRC, to Joseph E. Pollock, NEI, "Maintenance and Testing Endorsement Letter in Regards to Mitigation Strategies Order EA-12-049," October 7, 2013 (ADAMS Accession No. ML13276A224).
11. NRC, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," SRM-COMSECY-14-0037, March 30, 2015 (ADAMS Accession No. ML15089A236).
12. EPRI, "A Methodology for Assessment of Nuclear Plant Seismic Margin," Report NP-6041-SL, Revision 1, August 1, 1991, Palo-Alto, CA.  
<http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=NP-6041-SLR1>