

NUCLEAR REGULATORY COMMISSION

[NRC-2012-0068]

Mitigation Strategies for Beyond-Design-Basis External Events

AGENCY: Nuclear Regulatory Commission.

ACTION: Draft interim staff guidance; request for comment.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is soliciting public comment on its draft Japan Lessons-Learned Division Interim Staff Guidance (JLD-ISG), JLD-ISG-2012-01, Draft Revision 2, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events." This draft JLD-ISG revision provides further guidance and clarification 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.

DATES: Submit comments by December 12, 2016. Comments received after this date will be considered if it is practical to do so, but the Commission is able to ensure consideration only for comments received before this date.

ADDRESSES: You may submit comments by any of the following methods (unless this document describes a different method for submitting comments on a specific subject):

- **Federal Rulemaking Web Site:** Go to <http://www.regulations.gov> and search for Docket ID **NRC-2012-0068**. Address questions about NRC dockets to Carol Gallagher;

telephone: 301-415-3463; e-mail: Carol.Gallagher@nrc.gov. For technical questions, contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.

- **Mail comments to:** Cindy Bladey, Office of Administration, Mail Stop: OWFN-12-H08, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

For additional direction on obtaining information and submitting comments, see “Obtaining Information and Submitting Comments” in the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: Eric Bowman, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-2963; e-mail: Eric.Bowman@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Obtaining Information and Submitting Comments

A. Obtaining Information

Please refer to Docket ID **NRC-2012-0068** when contacting the NRC about the availability of information for this action. You may obtain publicly-available information related to this action by any of the following methods:

- **Federal Rulemaking Web Site:** Go to <http://www.regulations.gov> and search for Docket ID **NRC-2012-0068**.

- **NRC’s Agencywide Documents Access and Management System (ADAMS):**
You may obtain publicly-available documents online in the ADAMS Public Documents collection

at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select “[ADAMS Public Documents](#)” and then select “[Begin Web-based ADAMS Search](#).” For problems with ADAMS, please contact the NRC’s Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov. In addition, for the convenience of the reader, the ADAMS accession numbers are provided in a table in Section IV of this notice entitled, Availability of Documents.

- **NRC’s PDR:** You may examine and purchase copies of public documents at the NRC’s PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

B. Submitting Comments

Please include Docket ID **NRC-2012-0068** in your comment submission.

The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. The NRC posts all comment submissions at <http://www.regulations.gov> as well as entering the comment submissions into ADAMS. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions available to the public or entering the comment submissions into ADAMS.

II. Background

The NRC staff issued JLD-ISG-2012-01 Revision 0 on August 29, 2012 and JLD-ISG-2012-01 Revision 1 on January 22, 2016. The NRC staff developed JLD-ISG-2012-01 Draft Revision 2 to provide further guidance and clarification primarily to assist nuclear power reactor applicants and licensees when assessing the results of seismic hazard reevaluations with respect to the guidance and strategies required by Order EA-12-049. JLD-ISG-2012-01 provides guidance and clarification 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. In addition, these requirements are included in the following license conditions: Virgil C. Summer Nuclear Station, Unit 2, License No. NPF-93, Condition 2.D.(13), V.C. Summer Nuclear Station, Unit 3, License No. NPF-94, Condition 2.D.(13), and Enrico Fermi Nuclear Plant, Unit 3, License No. NPF-95, Condition 2.D.(12)(g). The draft ISG is not a substitute for the requirements in Order EA-12-049, and compliance with the ISG is not required. This ISG revision is being issued in draft form for public comment to involve the public in development of the implementation guidance.

Following the March 11, 2011, accident at the Fukushima Dai-ichi nuclear power plant, the NRC established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF conducted a systematic and methodical review of the NRC regulations and processes to determine whether the agency should make additional improvements in NRC regulations or processes 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, dated July 12, 2011. These recommendations were enhanced by the NRC staff following interactions with stakeholders. Documentation of the staff's efforts is contained in SECY-11-0124, dated September 9, 2011, and SECY-11-0137, dated October 3, 2011.

As directed by the Commission's staff requirements memorandum (SRM) for SECY-11-0093, the 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. SECY-11-0124 and SECY-11-0137 established the staff's prioritization of the recommendations.

After receiving the Commission's direction in SRM-SECY-11-0124 and SRM-SECY-11-0137, 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 the Nuclear Energy Institute's (NEI) letter, dated December 16, 2011. The FLEX is proposed as a strategy to fulfill the key safety functions of core cooling, containment integrity, and spent fuel cooling. Stakeholder input led the staff to pursue a more performance-based approach to improve the safety of operating power reactors than was originally envisioned in NTTF Recommendation 4.2, SECY-11-0124, and SECY-11-0137.

On February 17, 2012, the NRC staff provided SECY-12-0025 to the Commission, including the proposed order to implement the enhanced mitigation strategies. As directed by SRM-SECY-12-0025, the NRC staff issued Order EA-12-049 and, in parallel, issued as a Request for Information under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(f) for a reevaluation of licensees' flooding and seismic hazards.

Guidance and strategies required by the order would be available if the 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 the use of

installed equipment and resources to maintain or restore 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 off site. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely.

On May 4, 2012, NEI submitted document NEI 12-06, Revision B, and on May 13, 2012, Revision B1, to provide specifications for an industry-developed methodology for the development, implementation, and maintenance of guidance and strategies in response to Order EA-12-049. The strategies and guidance described in NEI 12-06 expand on the strategies the 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(f), "Conditions of licenses."

On May 31, 2012, the NRC staff issued a draft version of JLD-ISG-2012-01, Revision 0, and published a notice of its availability for public comment in the *Federal Register* (FR) on June 7, 2012 (77 FR 33779), with the comment period running through July 7, 2012, 30 days after its publication. The staff received seven comments during this time, addressing the comments, as documented in "NRC Response to Public Comments, JLD-ISG-2012-01 (Docket ID **NRC-2012-0068**)."

On July 3, 2012, NEI submitted Revision C to NEI 12-06, incorporating many of the exceptions and clarifications included in the draft version of JLD-ISG-2012-01, Revision 0. On August 3, 2012, NEI submitted NEI 12-06, Draft Revision 0, incorporating many of the remaining exceptions and clarifications. On August 21, 2012, NEI submitted NEI 12-06, Revision 0, making various editorial corrections. The NRC reviewed the August 21, 2012, submittal of

Revision 0 of NEI 12-06 and endorsed it as a process the NRC considers acceptable for meeting the regulatory requirements with noted clarifications in Revision 0 of JLD-ISG-2012-01.

By February 2013, licensees of operating power reactors submitted their overall integrated plans (OIPs) under Order EA-12-049 describing the guidance and strategies to be developed and implemented. Because this development and implementation was to be accomplished in parallel with the reevaluation of the seismic and flooding hazards under the 10 CFR 50.54(f) letter issued subsequent to SECY-12-0025, these 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)

In order to clarify the relationship between Order EA-12-049 and the hazard reevaluation, the NRC staff provided COMSECY-14-0037 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] MBDBE rulemaking).” COMSECY-14-0037 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, 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, incorporating lessons learned in the implementation of Order EA-12-049 and alternative approaches taken by licensees for compliance to that order. Following a public webinar discussion of potential exceptions and clarifications that took place on September 21, 2015, NEI submitted Revision 1A to NEI 12-06 on October 5, 2015.

On October 30, 2015, the NRC staff issued a draft version of JLD-ISG-2012-01, Revision 1, and published a notice of its availability for public comment in the FR on November 10, 2015 (80 FR 69702), with the comment period running through December 10, 2015, 30 days from its publication. The staff received four comments during this time, addressing the comments, as documented in “NRC Response to Public Comments, JLD-ISG-2012-01 (Docket ID **NRC-2012-0068**).”

On December 10, 2015, NEI submitted Revision 2 to NEI 12-06, incorporating many of the exceptions and clarifications included in the draft version of JLD-ISG-2012-01, Revision 1. The NRC reviewed Revision 2 to NEI 12-06 and endorsed it as a process the NRC considers acceptable for meeting the regulatory requirements with noted clarifications in JLD-ISG-2012-01, Revision 1.

On September 7, 2016, NEI submitted a draft revision of Appendix H to NEI 12-06 to support a public meeting held on September 8, 2016, incorporating additional guidance for licensees when addressing the reevaluated seismic hazards for compliance with Order EA-12-049. Specifically, Section H.4.5 (“Path 5”) is intended to address Mitigation Strategies Assessments for plants with reevaluated seismic hazard information that includes a ground motion response spectrum that has spectral ordinates more than 2 times the Safe Shutdown

Earthquake anywhere in the 1 to 10 hertz frequency range. Such guidance includes deterministic and risk-informed approaches that can be used to assess the impact of the reevaluated hazard information on mitigation strategies. Following the public meeting held on September 8, 2016, NEI submitted Revision 3 to NEI 12-06 on September 22, 2016. NEI 12-06, Revision 3 also addresses certain lessons learned in the implementation of Order EA-12-049.

III. Specific Request for Comment

The NRC is seeking advice and recommendations from the public on the revision to this interim staff guidance document. We are particularly interested in comments and supporting rationale from the public on the following:

1. In NEI 12-06, Revision 3, Section 11.5.4.f, NEI proposes to modify the time limits for initiation of actions to restore a site's capability to mitigate a beyond-design-basis external event and implementation of compensatory measures. Section 11.5.4.f of NEI 12-06, Revision 0 and Revision 2, states these time limits as 24 hours to initiate actions and 72 hours to implement compensatory measures. In NEI 12-06, Revision 3, Section 11.5.4.f, these time limits are extended to 72 hours for initiation of actions and 7 days for implementation of compensatory measures. The former time limits were previously endorsed as an element of an acceptable method of meeting the Order EA-12-049 requirements for maintaining the strategies and guidelines to mitigate a beyond-design-basis external event in JLD-ISG-2012-01, Revision 0 and Revision 1. The NRC staff seeks input on potential justifications for this extension of the allowable outage times for a licensee's capability to mitigate a beyond-design-basis external event. Input is specifically requested on the potential benefits of extending these time limits, operating experience on time frames actually necessary to implement compensatory measures

for the unavailability of similar equipment, and any potential unintended consequences of extending these time limits.

2. In JLD-ISG-2012-01, Revision 1, the NRC staff endorsed the NEI 12-06, Revision 2, Section 11.5.4.b 45-day time limit for having an available but unprotected set of equipment as part of the site's capability to mitigate a beyond-design-basis external event. The 45-day time limit aligned with the standard 6-week short work cycle period and allowed sufficient time for the pre-staging of one set of equipment in a location that is not entirely protected from all external hazards for the purpose of shutdown risk management during outages, which typically have durations less than 45 days. In NEI 12-06, Revision 3, Section 11.5.4.g, this time period is reduced to 14 days, which could conflict with the pre-staging of equipment for risk management during outages. The NRC staff seeks input on appropriate methods of control of pre-staging of equipment for shutdown risk management.

3. In NEI 12-06, Revision 3, Sections H.4.5.3, H.4.5.4, and H.4.5.5, NEI proposes to allow the use of risk insights from the seismic probabilistic risk assessments (SPRAs), being completed by some licensees in response to the NRC's March 12, 2012, 10 CFR 50.54(f) letter, to assess the mitigating strategies developed in response to Order EA-12-049 against the reevaluated seismic hazard information. The purpose of these mitigating strategies assessments is to determine if changes to the mitigating strategies are needed to account for the reevaluated seismic hazard. The NRC staff seeks input on specific aspects of NEI's proposals in light of issues discussed in NCP-2016-014, a non-concurrence submitted by two NRC staff members regarding certain aspects of NEI 12-06, Revision 3. First, NCP-2016-014 raised concerns associated with NEI's proposed use of risk screening criteria. For example, in Section H.4.5.3, NEI proposes to establish screening criteria based on the overall seismic core damage frequency and seismic large early release frequency identified through the SPRA. If

these screening criteria are met, licensees' FLEX mitigating strategies or alternate mitigating strategies would be considered sufficient to address the effects of the reevaluated seismic hazard information without the need for modification. The NRC staff seeks input on the appropriateness of the approach proposed by NEI in light of the concerns raised by NCP-2016-014. Second, in Sections H.4.5.4 and H.4.5.5, NEI describes proposed iterative processes that evaluate the benefit of enhancing the seismic capacity of certain mitigating strategies structures, systems, and components (SSCs). As part of these processes, licensees would enhance such SSCs until the risk benefit of further enhancements is sufficiently small based on criteria established in each section. In Section H.4.5.4 the approach focuses on the benefit in terms of reduction in overall seismic core damage frequency and seismic large early release frequency. The approach described in Section H.4.5.5 focuses on the benefit in terms of reduction in risk from sequences in the SPRAs involving mitigating strategies SSCs. The NRC staff seeks input on these approaches in light of the concerns raised by NCP-2016-014 regarding the use of risk-based screening values and risk partitioning. Finally, NCP-2016-014 identified two alternate approaches that could be used to conduct seismic mitigating strategies assessments. The NRC staff seeks input on these approaches and whether they represent more appropriate alternatives to the approaches described in NEI 12-06, Revision 3.

IV. Backfitting and Issue Finality

This draft ISG would provide guidance on an acceptable method for implementing the requirements contained in Order EA-12-049. Licensees would be able to voluntarily use the guidance in JLD-ISG-2012-01, Draft Revision 2 to demonstrate compliance with Order EA-12-049. If this draft ISG is issued, methods or solutions that differ from those described in this draft ISG may be deemed acceptable if they provide sufficient basis and information for the NRC to

verify that the proposed alternative demonstrates compliance with Order EA-12-049. Issuance of this ISG would not constitute backfitting as defined in 10 CFR 50.109, “Backfitting” (the Backfit Rule), and would not otherwise be inconsistent with the issue finality provisions in 10 CFR part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants.”

V. Availability of Documents

The documents identified in the following table are available to interested persons through one or more of the following methods, as indicated.

DOCUMENT TITLE	ABBREVIATED TITLE	ADAMS ACCESSION NO.
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,” Draft Revision 2	JLD-ISG-2012-01, Draft Revision 2	ML16277A617
JLD-ISG-2012-01, Revision 1 (See Previous Entry for JLD-ISG-2012-01)	JLD-ISG-2012-01, Revision 1	ML15357A163
JLD-ISG-2012-01, Revision 0 (See Previous Entry for JLD-ISG-2012-01)	JLD-ISG-2012-01, Revision 0	ML12229A174
Order EA-12-049, “Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events”	Order EA-12-049	ML12054A736
V.C. Summer Nuclear Station, Unit 2 License, License No. NPF-93	n/a	ML14100A092
V.C. Summer Nuclear Station, Unit 3 License, License No. NPF-94	n/a	ML14100A101
Enrico Fermi Nuclear Plant, Unit 3 License, License No. NPF-95	n/a	ML15084A170

SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan"	SECY-11-0093	ML11186A950
SECY-11-0124, "Recommended Actions to be Taken without Delay from the Near-Term Task Force Report"	SECY-11-0124	ML11245A158
SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned"	SECY-11-0137	ML11272A111
Commission's staff requirements memorandum (SRM) for SECY-11-0093	SRM-SECY-11-0093	ML112310021
SRM for SECY-11-0124 (see entry to SECY-11-0124 for full title)	SRM-SECY-11-0124	ML112911571
SRM for SECY-11-0137 (see entry to SECY-11-0124 for full title)	SRM-SECY-11-0137	ML113490055
NEI Letter Titled, "An Integrated, Safety-Focused Approach to Expediting Implementation of Fukushima Daiichi Lessons Learned"	n/a	ML11353A008
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"	SECY-12-0025	ML12039A103
SRM for SECY-12-0025 (see entry for SECY-12-0025 for full title)	SRM-SECY-12-0025	ML120690347
Request for Information Pursuant to Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) 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	50.54(f) Letter	ML12053A340
NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision B	NEI 12-06, Revision B	ML12144A419

NEI 12-06, Revision B1 (See Previous Entry for NEI 12-06)	NEI 12-06, Revision B1	ML12143A232
JLD-ISG-2012-01, Draft Revision 0 (See Previous Entry for JLD-ISG-2012-01)	JLD-ISG-2012-01, Draft Revision 0	ML12146A014
“NRC Response to Public Comments, JLD-ISG-2012-01 (Docket ID NRC-2012-0068)”	n/a	ML12229A253
NEI 12-06, Revision C (See Previous Entry for NEI 12-06)	NEI 12-06, Revision C	ML121910390
NEI 12-06, Draft Revision 0 (See Previous Entry for NEI 12-06)	NEI 12-06, Draft Revision 0	ML12221A204
NEI 12-06, Revision 0 (See Previous Entry for NEI 12-06)	NEI 12-06, Revision 0	ML12242A378
Vermont Yankee Nuclear Power Station’s Overall Integrate Plan	n/a	ML13064A300
COMSECY-14-0037, “Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation (sic) of Flooding Hazards”	COMSECY-14-0037	ML14238A616
SRM-COMSECY-14-0037	SRM-COMSECY-14-0037	ML15089A236
NEI 12-06, Revision 1 (See Previous Entry for NEI 12-06)	NEI 12-06, Revision 1	ML15244B006
NEI 12-06, Revision 1A (See Previous Entry for NEI 12-06)	NEI 12-06, Revision 1A	ML15279A426
JLD-ISG-2012-01, Draft Revision 1 (See Previous Entry for JLD-ISG-2012-01)	JLD-ISG-2012-01, Draft Revision 1	ML15294A078
NRC Responses to Public Comments: Revision to Japan Lessons-Learned Division Interim Staff Guidance JLD-ISG-2012-01	n/a	ML15357A147
NEI 12-06, Revision 2 (See Previous Entry for NEI 12-06)	NEI 12-06, Revision 2	ML16005A625
Appendix H to NEI 12-06, Draft to Support Public Meeting on September 8, 2016	n/a	ML16251A251

NEI 12-06, Revision 3 (See Previous Entry for NEI 12-06)	NEI 12-06, Revision 3	ML16267A274
NRC Non-Concurrence Process document NCP-2016-014	NCP-2016-014	ML16295A104

The NRC may post materials related to this document, including public comments, on the Federal Rulemaking Web site at <http://www.regulations.gov> under Docket ID **NRC-2012-0068**. The Federal rulemaking Web site allows you to receive alerts when changes or additions occur in a docket folder. To subscribe: 1) Navigate to the docket folder (**NRC-2012-0068**); 2) click the “Sign up for E-mail Alerts” link; and 3) enter your e-mail address and select how frequently you would like to receive e-mails (daily, weekly, or monthly).

Dated at Rockville, Maryland, this 4th day of November, 2016.

For the Nuclear Regulatory Commission.

Michael X. Franovich, Acting Director,
Japan Lessons-Learned Division,
Office of Nuclear Reactor Regulation.

NEI 12-06, Revision 3 (See Previous Entry for NEI 12-06)	NEI 12-06, Revision 3	ML16267A274
NRC Non-Concurrence Process document NCP-2016-014	NCP-2016-014	ML16295A104

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Dated at Rockville, Maryland, this 4th day of November, 2016.

For the Nuclear Regulatory Commission.

/RA/

Michael X. Franovich, Acting Director,
Japan Lessons-Learned Division,
Office of Nuclear Reactor Regulation

ADAMS Accession Nos.: Pkg: ML16277A566; FRN Memo ML16277A587;
FRN ML16277A597; ISG ML16277A617 *** via e-mail**

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