

NRC Responses to Public Comments

Revision 2 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”

(Docket ID: NRC-2012-0068)

ADAMS Accession No. ML17005A187
February 8, 2017

**NRC RESPONSE TO PUBLIC COMMENTS RECEIVED ON
Revision 2 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”**

NRC–2012–0068

Introduction:

This document presents the U.S. Nuclear Regulatory Commission’s (NRC’s) responses to written public comments received on draft Revision 2 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,” published on November 10, 2016 (Volume 81 of the *Federal Register* (FR), page 79,056 (81 FR 79056)), for a 30-day public comment period.

In developing JLD-ISG-2012-01, Revision 2, the NRC considered all of the comments provided in response to the request for comment. If, as a result of its review of a public comment, the NRC changed the interim staff guidance (ISG), the NRC’s comment response indicates where in the document the change occurred.

Comment Overview:

The NRC received six timely comment submissions identified in the table below.

Table 1. Comment Submissions on Draft Revision 2 to JLD-ISG-2012-01

Comment Submission Number	Commenter	Affiliation	Abbreviation	ADAMS Accession No.
1	William Harris and Thomas Popik	Foundation for Resilient Societies	FRS	ML16351A190 (ML17010A002 ¹)
2	Charles Manto	Instant Access Networks, LLC	IAN	ML16351A191 and ML16351A192
3	Eric Holdeman	Private Citizen	Holdeman	ML16351A193 (ML17010A001 ¹)
4	Robert Bauman	Trusted Systems, Inc.	TS	ML16351A194
5	David Fichtenberg	Private Citizen	Fichtenberg	ML16351A195 ² and ML16351A196
6	Andrew Mauer	Nuclear Energy Institute	NEI	ML16356A302

¹ Comment submissions containing multiple individual comments that were not annotated by the commenter have been annotated. The individual annotated comments are denoted within each annotated comment submission by the submission abbreviation and number (e.g., FRS-1, FRS-2).

² Individual comments from this commenter are referred to using the change request numbering system of the commenter on the second page of the submittal.

In addition to the six timely comment submissions, the NRC received one late-filed comment dated December 13, 2016, from David Helker, representing Exelon Generation Company, LLC (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16362A185). This comment expressed support of the comments submitted by NEI and provided no further comments. The NRC considered this expression of support for the timely filed NEI comments because it was practical to do so; consideration of the underlying comments from NEI are documented solely as comments from NEI.

1. Comments on the Proposed Rule

Rule Comment 1:

The NRC received three comments that recommended modifications to the proposed Mitigation of Beyond-Design-Basis Events (MBDBE) rule (RIN 3150-AJ49), which was published requesting public comment on November 13, 2015 (80 FR 70609), with a 90-day comment period that ended February 11, 2016. These comments generally recommended that the rule require licensees to include additional hazards within the events that nuclear power plants develop, implement and maintain strategies and guidelines to mitigate. The hazards proposed include geomagnetic disturbances, electromagnetic pulses, coordinated physical attack on critical electric grid substations, coordinated high-power microwave device attacks on critical electric grid substations, and coordinated cyber technology attack on critical electric substations. One commenter recommended that the hazards included be those in the 2013 National Fire Protection Association 1600, "Standard on Disaster/Emergency Management and Business Continuity/Continuity of Operations Programs," Annex A, Section A.5.2.2.1. (FRS, Holdeman, Fichtenberg)

NRC Staff Response:

Although not marked with the appropriate rulemaking identification number or docket number, these comments may be considered late-filed comments for the draft final MBDBE rule, which was provided to the Commission on December 15, 2016, in SECY-16-0142, "Draft Final Rule—Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)" (ADAMS Accession No. ML16301A005). Because they were filed beyond the end of the comment period for the rule and were not provided using the procedures set forth in the *Federal Register* notice seeking public input on the MBDBE rule, the NRC did not have sufficient time to take them into account in the development of the rule. The comments that were received and considered in the development of the rule did, however, cover substantially similar issues and recommendations. Disposition of those issues and recommendations is documented in SECY-16-0142, Enclosure 2, "NRC Response to Public Comments: Mitigation of Beyond-Design-Basis Events Rule," issued December 2016 (ADAMS Accession No. ML16271A063). The NRC response to General Comments 9, 15, and 18 and the NRC response to Rule Comments 18, 27, 31, 32, 35, and 43 pertain to these issues and recommendations to the extent that they suggest changes to the MBDBE rule. The issue of geomagnetic disturbances will instead be considered as part of the NRC's future action on Petition for Rulemaking (PRM)-50-96, which the NRC accepted for consideration within its rulemaking process. The NRC published this determination in the *Federal Register* on December 18, 2012 (77 FR 74788).

The staff considers these suggested changes with respect to JLD-ISG-2012-01, Revision 2, in Section 2 of this document.

2. Comments on JLD-ISG-2012-01

ISG Comment 1:

One commenter provided a discussion of the appropriate time limits for the capability to initiate offsite support to licensee-owned facilities following a beyond-design-basis event. The commenter stated that time limits of 24 hours, 72 hours, and 7 days may be appropriate for some limited hazards, but they would be too late and imprudent for various hazards identified in the comments provided. The commenter cited as an example the lack of benefit in installing geomagnetically induced current (GIC) monitors 72 hours after a specific beyond-design-basis event, the onset of a severe solar storm. (FRS-1a-d)

NRC Staff Response:

This comment appears to be responding, in part, to the first specific request for comment that was included in Section III of the notice soliciting comment on JLD-ISG-2012-01 (81 FR 79056, 79058; November 10, 2016). The subject matter of that specific request for comment was a proposed change from the prior revisions of Nuclear Energy Institute (NEI) guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," regarding Section 11.5.4.f time limits for the initiation of action and the implementation of compensatory measures for unavailable FLEX equipment. These time limits, which were discussed in the notice, were combinations of 24 hours, 72 hours, and 7 days. These time limits are not related to the capability to initiate offsite support to licensee-owned facilities, which is governed by NEI 12-06, Section 12.1, which provides for the following:

On-site resources will be used to cope with the first two phases of the casualty for a minimum of the first 24 hours of the event. The site-specific [extended loss of alternating current power] ELAP analysis will dictate the deployment schedule for off-site equipment. The delivery schedule for the off-site equipment must allow for sufficient margin to meet the deployment times of the off-site equipment. The schedule for initial delivery of off-site equipment (equipment needed to back up on-site equipment and extend the coping duration) needs to be contractually arranged with the off-site facility.

This provision is identical in all revisions of NEI 12-06 that have been provided for review by the NRC and is based upon the specific licensee-developed analyses to show the duration for which a facility can cope with an ELAP prior to needing offsite support. This provision sets in place a need for a contractual arrangement for the delivery of the offsite support prior to the time when a licensee needs it and is outside the scope of the first specific request for comment and NEI 12-06, Section 11.5.4.f. These contractual arrangements have been made by all currently operating nuclear power reactor licensees in the United States in the course of the development and implementation of the guidance and strategies required by Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012, and are not linked in time to the occurrence of a beyond-design-basis event.

The NRC staff disagrees with this comment because the proposed guidance does not link time limits for the initiation of offsite support to the type or character of initiating events that could occur. Instead, it sets the times for which a licensee should make contractual arrangements for the initiation of offsite support based upon a site-specific analysis of the progression of plant conditions that could necessitate offsite support. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of this comment.

ISG Comment 2:

One commenter provided support for an “all-hazards” risk assessment and mitigation standard, including backfitting requirements when appropriate. The commenter stated that the NRC should mandate the installation of GIC monitors. The commenter stated that “if GIC monitors and health indicators for transformers and generators are also installed, and as a result they encourage hardware protection of large power transformers before a severe solar storm, our electric grid might avert reactive power collapse.” The commenter incorporated by reference its October 24, 2016, filing in Federal Energy Regulatory Commission (FERC) Docket RM15-11-001 seeking a rehearing of FERC Order No. 830, “Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance Events,” 156 FERC 61215, dated September 22, 2016. (FRS-2, FRS-8, FRS-9)

NRC Staff Response:

The NRC staff disagrees with the comment because the potential safety benefits of installing GIC monitors, which might be gained if the information they collect “encourage[s] hardware protection of large power transformers,” is too far attenuated from the operation of nuclear power plants to constitute a substantial safety benefit under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.109, “Backfitting.” This is because the information gained by a licensee as a result of the installation of GIC monitors could not be used by the licensee to initiate an appropriate safety action at the licensed facility to address a needed action at the licensed facility, which is the paradigm under which the NRC mandates instrumentation. (See, for example, 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” Appendix A, “General Design Criteria for Nuclear Power Plants,” General Design Criterion (GDC) 13, “Instrumentation and Control,” which requires instrumentation to monitor variables and systems in combination with appropriate controls to maintain those variables and systems within prescribed operating ranges; GDC 63, “Monitoring Fuel and Waste Storage,” which requires appropriate systems to detect conditions that may result in loss of residual heat removal capability and excessive radiation levels in fuel and waste storage systems in combination with a means to initiate appropriate safety actions; and 10 CFR Part 50, Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities,” Section IV.B.1, which requires a means to be used for determining the magnitude of, and continually assessing the impact of, the release of radioactive materials, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies.) The goal of the commenter’s suggestion appears to be improvement of the reliability of the electric grid to withstand the effects of geomagnetic disturbances, which is outside of the authority of the NRC and is more appropriately addressed to FERC. The commenter has provided copies of submittals to FERC on this subject matter. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of these comments.

ISG Comment 3:

Several commenters suggested consideration of solar storms, physical attack on critical electric grid substations, high-power microwave attack on critical electrical grid substations, cyberattack on critical electrical grid substations, high-altitude electromagnetic pulses (EMPs), and “asteroids big enough to knock modern civilization back to the 18th Century” under the guidance for Order EA-12-049. (FRS-3, FRS-4, FRS-5, FRS-6, FRS-7, Holdeman-1, Holdeman-2, Holdeman-3, Holdeman-4, Holdeman-5, Holdeman-6, Holdeman-7, Holdeman-9, Fichtenberg-C.1, Fichtenberg-C.2, Fichtenberg-C.3, Fichtenberg-C.4, Fichtenberg-C.6, Fichtenberg-C.7, Fichtenberg-C.8, Fichtenberg-C.9, Fichtenberg-C.11, Fichtenberg-C.13, Fichtenberg-C.20, Fichtenberg-C.21, Fichtenberg-C.22)

NRC Staff Response:

The staff describes its treatment of these comments as they pertain to the MDBDE rule in the NRC Staff Response to Rule Comment 1. To the extent that these comments suggest modifications to the guidance for Order EA-12-049, they are fundamentally suggesting that the NRC take a different regulatory approach to addressing the mitigation of beyond-design-basis events than the NRC took under Order EA-12-049 following the Fukushima event. The practical effect of fully addressing these comments would be for the NRC to revisit the possible set of external events that might occur, identify which of these events from the entire set should be within the scope of the MDBDE rule, establish mitigation strategy requirements that include the new and revised events, and then specifically establish requirements for the damage states and conditions that are postulated to stem from the new and revised set of events.

Rather than following the approach discussed above, the NRC is continuing with the regulatory approach taken with the issuance of Order EA-12-049, which requires licensees to assume a challenging, deterministic damage state that exceeds the design basis and to develop and implement the mitigation strategies to address that damage state, resulting in a capability for the mitigation of beyond-design-basis external events (BDBEEs). The regulatory approach provides additional mitigation capability, recognizing the uncertainties associated with BDBEEs. In recognition of the fundamentally unbounded nature of the events to which these requirements are directed, it was a more practical approach to achieve the regulatory objective of addressing BDBEE uncertainty by assuming a challenging damage state that such events might create and then add to that damage state the consideration of event effects in terms of physical equipment and strategies protection.

In terms of the physical design requirements for equipment (i.e., design of the equipment to withstand event effects), licensees used their current facility external design basis to implement Order EA-12-049, taking into account a screening process for external events provided in the guidance for the order. (See NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 21, 2012 (ADAMS Accession No. ML12242A378), Appendix B, "Identification of Beyond-Design-Basis External Events To Be Considered," as endorsed by 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," dated August 29, 2012 (ADAMS Accession No. ML12229A174).)

In parallel with the work under Order EA-12-049, operating power reactor licensees reevaluated their seismic and flooding hazards as requested by the NRC in a letter dated March 12, 2012 (ADAMS Accession No. ML12053A340), as part of Near-Term Task Force Recommendation 2.1. NRC work related to other external hazards is described in SECY-15-0137, "Proposed Plans for Resolving Open Fukushima Tier 2 and 3 Recommendations," dated October 29, 2015 (ADAMS Accession No. ML15254A006 (package)), and SECY-16-0074, "Assessment of Fukushima Tier 2 Recommendation Related to Evaluation of Natural Hazards other than Seismic and Flooding," dated June 2, 2016 (ADAMS Accession No. ML16102A297 (package)). The Commission recognized that the information stemming from the reevaluation of seismic and flooding hazards should be addressed as part of establishing licensees' mitigation capabilities.

The damage state assumed to occur following a BDBEE was an extended loss of alternating current (ac) power (with additional contingencies for loss of all ac power) and a loss of normal access to the ultimate heat sink (or, for passive reactor designs such as the AP1000, a loss of normal access to the normal heat sink). These assumptions then enabled the development and

implementation of mitigation strategies that provide a diverse, flexible capability that licensees can deploy for events that exceed the plant external design basis. This approach recognizes the unbounded nature of events that could occur and the need for licensees to have the means to address events that might occur in the future. Hence, the approach stresses flexibility, multiple sets of equipment, preplanned strategies that can be adjusted to fit the event, and design aspects that enable these strategies to be implemented within the time frames necessary to maintain or restore the plant's key safety functions. As such, this approach results in a capability that could allow licensees to address the suggested events, in part.

Addressing the specific external events suggested by the commenters would require identification of the specific values or sets of values chosen for controlling parameters defining the events (i.e., a design basis for the specific external event), allowing treatment of the challenges to the facility in a manner similar to the reevaluated seismic and flooding hazard information, and justifying the imposition of each hazard's requirements with a separate regulatory and backfit analysis. As described in the definition for "design bases" in 10 CFR 50.2, "Definitions," the values chosen for controlling parameters may be restraints derived from generally accepted "state-of-the-art" practices for achieving functional goals or requirements derived from analysis of the effects of a postulated accident for which a structure, system, and component (SSC) must meet its functional goals. The suggested additional external events, in many cases, do not have a generally accepted "state-of-the-art" practice that can currently be relied upon to develop their design bases. In addition, many of these events do not pose a sufficient risk to public health and safety to warrant specific treatment under the adequate protection exception of 10 CFR 50.109(a)(4)(ii) and also do not meet the criteria to be required as cost-justified substantial safety improvements under 10 CFR 50.109(a)(3).

Furthermore, the regulatory scope of actions taken after the events in Japan to require additional capability to mitigate BDBEEs did not include mitigation of malicious events. It was, instead, limited to external natural phenomena. Nevertheless, with respect to the comments regarding EMPs, the NRC's focus in terms of security threats to nuclear power plants is centered on the power reactor and not on the transmission system. The requirements concerning the design-basis threat for nuclear power plants are established in 10 CFR 73.1, "Purpose and Scope," which was amended on March 19, 2007 (72 FR 12705). The Commission received external feedback on that rulemaking concerning the interface between 10 CFR 73.1 and 10 CFR 50.13, "Attacks and Destructive Acts by Enemies of the United States; and Defense Activities" (referred to by the commenter as the "Enemy of the State" Rule). While the Commission did significantly increase the design-basis threat requirements to include, among other things, the requirement to defend against cyberattacks, the Commission declined to amend 10 CFR 50.13.

The NRC is aware of the potential significance of EMPs to the Nation's critical infrastructure. In the late 1970s, concerns with EMP-induced large currents and voltages in electrical systems led the NRC to undertake a research program to study the effects of EMPs on nuclear power plant safe-shutdown systems. The NRC conducted this study and documented the results in NUREG/CR-3069, "Interaction of Electromagnetic Pulse with Commercial Nuclear Power Plant Systems," issued February 1983. That report concluded that the safe-shutdown capability of nuclear power plants would, in general, survive the postulated manmade EMP event. In 2007, the NRC revisited this earlier study in light of the modernization of nuclear plants with digital systems, which potentially could be more susceptible to EMP. The new study, completed in 2009, also concluded that nuclear power plants can achieve safe shutdown following a manmade EMP event.

One other area of these comments that merits further discussion is the treatment of geomagnetic disturbances due to severe solar storms. The impact of geomagnetic disturbances is the subject of PRM-50-96, which the NRC accepted for consideration within its rulemaking process. The NRC published this determination in the *Federal Register* on December 18, 2012 (77 FR 74788). Accordingly, while not fully addressed within Order EA-12-049, the issue of geomagnetic disturbances will be addressed as part of the NRC's consideration of PRM-50-96.

The issue of geomagnetic storms, as it affects transmission system protection, is being addressed at a national level by the White House's Office of Science and Technology Policy (OSTP). OSTP has been meeting with representatives from several different Federal agencies, including the NRC, over the last several years to develop the National Space Weather Strategy and the National Space Weather Action Plan (NSWAP). On October 13, 2016, President Obama issued Executive Order 13744, "Coordinating Efforts to Prepare the Nation for Space Weather Events" (81 FR 71573, October 18, 2016), requiring agencies to begin to implement the NSWAP. The U.S. Department of Homeland Security (DHS) is the sector-specific agency with lead responsibility for nuclear reactors, materials, and waste; therefore, the NRC is working with DHS on delineating the NRC authorities associated with the NSWAP.

Following completion of the MBDBE rulemaking, and following completion of an ongoing rulemaking by FERC to establish requirements to provide transmission system protection for geomagnetic disturbances, the NRC will address PRM-50-96, giving consideration to the NSWAP, the MBDBE rule, the FERC requirements, and the additional comments provided on this rulemaking that further inform the consideration of geomagnetic disturbances.

No changes were made to JLD-ISG-2012-01, Revision 2, as a result of these comments.

ISG Comment 4:

Several commenters recommended the use of microgrids protected from electromagnetic attacks and capable of sustaining power at licensed facilities in the event the commercial grid is unavailable for weeks, months, or permanently. These commenters cited work of the Defense Threat Reduction Agency on the subject and suggested that the NRC fund a pilot program to make use of these approaches. (Manto, Holdeman-8, Holdeman-9, Fichtenberg-C.11, Fichtenberg-C.12, Fichtenberg-C.15, Fichtenberg-C.16)

NRC Staff Response:

NRC-licensed nuclear power plants are designed using the criteria in GDC 17, "Electric Power Systems" (or its predecessor principle design criterion), which species the following:

An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights of way) designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.

Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.

The differences between an onsite electric power system and a microgrid as described in the comments are the electromagnetic protection of the suggested microgrids and the duration for which the commenters believe onsite power systems should be able to operate without the possibility of offsite support. The staff considers the issue of the EMP hazard in the NRC Staff Response to ISG Comment 3. Long-term disabling of the commercial power grid due to geomagnetic disturbances resulting from a severe solar storm is also covered in the NRC Staff Response to ISG Comment 3.

The staff has reviewed the approach for the provision of offsite support in the event of a BDBEE provided in the NEI white paper titled "National SAFER Response Centers," dated September 11, 2014 (ADAMS Accession No. ML14259A223). The results of this review are provided in the "Staff Assessment by the Office of Nuclear Reactor Regulation Related to the Strategic Alliance for FLEX Emergency Response and National SAFER Response Centers Support for Response to Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,'" dated September 26, 2016 (ADAMS Accession No. ML14265A107). The commenters have provided no new information to change the staff's conclusions on the acceptability of this approach. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of these comments.

ISG Comment 5:

One commenter suggested that the NRC consider the source of explosive hydrogen gas from the oxidation of the zircaloy cladding material used for fuel rods. The commenter suggested the use of an alternate cladding material using silicon carbide (SiC) composite with SiC reinforcing filament winding but noted the limitations of funding sources for its development. (Bauman)

NRC Staff Response:

The NRC is following a program of work on this subject (accident-tolerant fuel) by the U.S. Department of Energy, Office of Nuclear Energy. The staff concludes that this comment

suggests no changes to the guidance in JLD-ISG-2012-01, Revision 2, but instead urges a greater priority and increased funding for the development of accident-tolerant fuel. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of this comment.

ISG Comment 5:

One commenter suggested that the Commission should direct its licensees to contact the NRC staff to request education on how EMP can damage electronics and training on the evaluation of testing and protection from EMP. (Fichtenberg-C.5.)

NRC Staff Response:

This comment suggests no changes to the guidance in JLD-ISG-2012-01, Revision 2. The subject of EMP is addressed in the NRC Staff Response to ISG Comment 3. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of this comment.

ISG Comment 6:

One commenter suggested that the Commission acknowledge that all of the United States may be impacted by a potential long-term power outage, so no offsite sources of fuel or other backup supplies should be expected. (Fichtenberg-C.10, Fichtenberg-C.11)

NRC Staff Response:

These comments were addressed to the content of the ongoing MBDBE rulemaking and were supplied after the conclusion of the comment period for the proposed rule, as discussed in the NRC Staff Response to Rule Comment 1. With regard to consideration of these comments for incorporation in the guidance of JLD-ISG-2012-01, Revision 2, the underlying requirements in Order EA-12-049 assume the availability of offsite support, which the commenter suggests might not be available. As a result, it would be inappropriate to include these criteria for the responsive guidance and strategies of the order. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of these comments.

ISG Comment 7:

One commenter recommended that the Commission should note that it is pursuing the use of small modular reactors (SMRs) by licensees isolated from their usual sources of electric power to maintain cooling of reactor core and spent fuel rod cooling ponds. (Fichtenberg-C.17)

NRC Staff Response:

At present, there are no licensed SMR designs or installations in the United States. Because JLD-ISG-2012-01, Revision 2, is intended to provide currently operating power reactor licensees with guidance on acceptable approaches to meet the requirements of Order EA-12-049 now, rather than at some future time when there are licensed SMRs, it would be inappropriate to include this concept in JLD-ISG-2012-01, Revision 2, which does not specify the types of power generation capability that may be used to satisfy the requirements of the order. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of this comment.

ISG Comment 8:

One commenter suggested the use of renewable energy from hydroelectric power, wind, solar, or SMRs as onsite backup power for the mitigating strategies. (Fichtenberg-C.18)

NRC Staff Response:

JLD-ISG-2012-01, Revision 2, and the underlying industry guidance in NEI 12-06 have been written to provide performance-based guidance on the subject of the sources of backup power

for the mitigation strategies. While many licensed facilities are located near freshwater rivers, there are a great many that would not have access to hydroelectric power sources. Similarly, wind and solar power for the backup sources would not be available for all possible times that they could be called upon (e.g., a BDBEE happening on a calm night). A licensee could make use of such power sources when they are available, but it would need to be able to demonstrate the availability of the power sources relied upon for the strategies during the time they are required.

The potential for reliance on SMRs as backup power sources is discussed in the NRC Staff Response to ISG Comment 7.

No changes were made to JLD-ISG-2012-01, Revision 2, as a result of this comment.

ISG Comment 9:

One commenter suggested the inclusion of clarifying text in the staff position on the contingencies for the loss of all ac power in Section 1.2 of the ISG. (NEI Additional Comment)

NRC Staff Response:

The staff agrees that the suggested clarifying text accurately describes and better conveys the process used for the development of the contingencies for the loss of all ac power than had been the case in Section 1.2 of Draft Revision 2 to JLD-ISG-2012-01. This section of JLD-ISG-2012-01, Revision 2, has been modified in response to this comment.

3. Specific Requests for Comment

Question 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.

Question 1 Comment 1:

One commenter quoted Specific Request for Comment Question 1 and provided input that was not responsive to the question. (FRS-1a-d)

NRC Staff Response:

The NRC Staff Response to ISG Comment 1 discusses this comment.

Question 1 Comment 2:

One commenter provided a revised version of the industry-developed guidance document modifying the time limit for initiating actions to 24 hours and maintaining the time limit of 7 days for the implementation of compensatory measures stated in Revision 3 of NEI 12-06, issued September 2016. In support of the change from 72 hours (in NEI 12-06 revisions prior to Revision 3) to 7 days for the implementation of compensatory measures, the commenter provided a discussion of the very low likelihood of a BDBEE and the existence of margins associated with installed plant equipment that could enable a licensed facility to avoid core damage with existing plant capabilities. The commenter further argued that some of the risk from a BDBEE is from events such as severe weather or flooding that can be forecast or occur with warning time that would allow for implementation of additional compensatory measures prior to the BDBEE impacting a licensed facility. The commenter provided the further justification that the additional 4 days of allowable outage time would involve a minimal increase in the percentage of an operating cycle for which a licensed facility could be exposed to a situation for which it would need to rely upon installed safety-related SSCs to mitigate a BDBEE rather than have the additional capabilities from the mitigation strategies fully available. In balance with this, the commenter cited operating experience with the prior 72-hour limit for implementation of compensatory actions due to vendor availability and the practicality of treating the mitigation strategies equipment on par with safety-related SSCs. (NEI Question 1 Response)

NRC Staff Response:

The staff agrees that the time limit of 7 days continues to be comparable with the allowable outage times for safety-related SSCs. Balancing the de minimis increase in exposure of a licensed facility through the change from a 72-hour time limit to a 7-day time limit for implementation of compensatory actions, combined with the additional guidance on implementation of compensatory actions prior to a forecast event, with the operating experience regarding the burden of the 72-hour time limit, it is appropriate to allow the proposed 7-day time limit for implementation of compensatory actions. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of this comment because the change was incorporated in NEI 12-06, Revision 4.

Question 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.

Question 2 Comment 1:

One commenter quoted Question 2 in his response to the notice requesting input on draft Revision 2 to JLD-ISG-2012-01 but provided no comment on the subject of time limits for the use of prestaged equipment for risk management during outages. (FRS)

NRC Staff Response:

No changes were made to JLD-ISG-2012-01, Revision 2, with regard to time limits for the use of prestaged equipment for risk management during outages because input on that subject was absent from the comment.

Question 2 Comment 2:

One commenter provided a revised version of the industry-developed guidance document incorporating a new provision in NEI 12-06, Section 11.5.4, to address the use of prestaged equipment for risk management during outages. This new provision allows the prestaging of equipment for up to 45 days to reduce the risk of maintenance or outage activities. (NEI Question 2 Response)

NRC Staff Response:

The staff agrees that it is appropriate to continue to allow for the prestaging of equipment for risk reduction during maintenance or outage activities for up to 45 days. No changes were made to JLD-ISG-2012-01, Revision 2, as a result of this comment because the change was incorporated in NEI 12-06, Revision 4.

Question 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.

Question 3 Comment 1:

One commenter quoted Question 3 in his response to the notice requesting input on Draft Revision 2 to JLD-ISG-2012-01 but provided no comment on the subject of Question 3. (FRS)

NRC Staff Response:

No changes were made to JLD-ISG-2012-01, Revision 2, in response to the submittal because the submittal provided no input related to the subject of Question 3.