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## **NRC Response to Public Comments**

### **Mitigation of Beyond-Design-Basis Events Rule (RIN: 3150-AJ49)**

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ADAMS Accession No. ML16271A063  
December 2016

# **NRC RESPONSE TO PUBLIC COMMENTS RECEIVED ON PROPOSED MITIGATION OF BEYOND-DESIGN-BASIS EVENTS RULE**

**RIN 3150–AJ49  
[NRC–2014–0240]**

## **Introduction:**

This document presents the U.S. Nuclear Regulatory Commission's (NRC's) responses to written public comments received on the proposed Mitigation of Beyond-Design-Basis Events (MBDBE) rule, published on November 13, 2015 (Volume 80 of the *Federal Register* (FR), page 70,609 (80 FR 70609); Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML15259A279 and ML15265A610), for a 90-day public comment period. This document also provides, in Section 8, the NRC's responses to written public comments received on three associated draft regulatory guides (DGs) referenced in the *Federal Register* notice (FRN).

In developing the final rule and supporting guidance, the NRC considered all of the comments provided in response to the proposed MBDBE rule. If, as a result of its review of a public comment, the NRC changed the rule, the supporting statement of considerations (SOC), or the supporting guidance, the NRC's comment response indicates where the change occurred.

## **Comment Overview:**

In response to the proposed rule, the NRC received 20 comment submissions identified in the table below. The comment submissions were reviewed and annotated to identify what the NRC concluded were separate comments. Accordingly, a single comment submission may have several individual comments associated with it, and the NRC's comment responses identify which individual comments are addressed by each comment response. Four comment submissions, identified in the final column in Table 1, were each considered to be single comments and were not annotated to subdivide them into separate comments.

During the public comment period, on January 21, 2016, the NRC held a Category 3 public meeting to discuss the proposed rule with external stakeholders (the meeting summary is available at ADAMS Accession No. ML16029A337). The meeting was held to provide stakeholders with a better and more complete understanding of the proposed rule and the supporting guidance and enable a more informed comment on the proposed rule.

Table 1. Comment Submissions on Proposed MBD BE Rule

Comment Submission Number	Commenter	Affiliation	Abbreviation	ADAMS Accession No.	Annotated Comment Submission (ADAMS Accession No.) See note.
1	Nancy Allen	Private Citizen	Allen	ML15321A423	Addressed as a single comment/not annotated
2	Peter Bamford	NRC Staff	Bamford	ML15328A495	Addressed as a single comment/not annotated
3	Tim Keating	Private Citizen	Keating	ML15328A494	ML16068A240
4	Thomas Gurdziel	Private Citizen	Gurdziel1	ML16012A395	ML16068A310
5	Roy Mathew	NRC staff	Mathew	ML16012A396	Addressed as a single comment/not annotated
6	Thomas Gurdziel	Private Citizen	Gurdziel2	ML16012A394	ML16068A301
7	Thomas Koshy	NRC Staff	Koshy	ML16040A167	Addressed as a single comment/not annotated
8	Linda Castillo	Private Citizen	Castillo	ML16040A165	ML16119A406
9	James Riley	Nuclear Energy Institute	NEI	ML16041A445	ML16068A252
10	Mark Leyse	Private Citizen	Leyse	ML16042A096	ML16068A250
11	Edwin Lyman and David Lochbaum	Union of Concerned Scientists	UCS	ML16042A095	ML16067A104
12	Anonymous	South Carolina Electric and Gas	SCE&G	ML16042A565	ML16067A100
13	Robin Ritzman	First Energy Nuclear Operating Company	FENOC	ML16043A117	ML16067A094
14	Anthony Leshinskie	Vermont Public Service Department	Vermont	ML16043A114	ML16061A191
15	Bob Lutz	Lutz Safety Consultant	Lutz	ML16043A113	ML16061A140
16	Richard Stein	Private Citizen	Stein	ML16043A117	ML16061A124
17	Thomas Popik	Foundation for Resilient Societies	FRS	ML16043A116	ML16061A120
18	Thomas Bergman	NuScale Power	NuScale	ML16048A103	ML16068A248
19	David Helker	Exelon	Exelon	ML16056A568	ML16061A113
20	Michel Lee	Indian Point Safe Energy Coalition	IPSEC	ML16056A569	ML16067A136

Note:

Comment submissions containing multiple individual comments were annotated. The individual comments are denoted within each annotated comment submission by the submission abbreviation and number (e.g., UCS-1, UCS-2). In some cases, the comment may be denoted as NEI CL-1 or NEI TC-1. This refers to a Nuclear Energy Institute (NEI) comment provided in the comment cover letter (CL) or an NEI comment provided in a table (TC), respectively. Also, the comment may be denoted as NEI SR-x or NEI CER-x, and this refers to feedback provided in response to the NRC's specific requests (SR) or the NRC's questions on the cumulative effects of regulations (CER).

## **Comment Categorization:**

This comment response document separates the comments into the eight general categories identified below. In general, each individual comment is addressed, unless there are similar comments that can be readily grouped together, in which case the similar comments are “binned” as a single comment and the NRC’s response addresses the “binned” comment. The comments are in the following eight categories:

- (1) general comments on the proposed rulemaking
- (2) comments on the rule language proposed for both Title 10 of the *Code of Federal Regulations* (10 CFR) 50.155 and the amended or added portions of Appendix E to 10 CFR Part 50 (no comments were received on the amended portions of 10 CFR 50.8, 10 CFR 50.34, 10 CFR 50.54, or 10 CFR 52.80)
- (3) comments on the supporting statements of consideration in the proposed rule notice (except for the categories 4-7 below)
- (4) comments on the questions requesting feedback
- (5) comments on the CER questions
- (6) comments on the supporting regulatory analysis
- (7) comments on the supporting backfit analysis
- (8) comments on the supporting draft regulatory guidance

### **1. General Comments on the Proposed Rule**

#### **General Comment 1:**

The NRC received two comments that expressed the view that severe accident management guidelines (SAMGs) should be included in the rule as requirements, as part of the integrated response capability. The first commenter stated that it is patently absurd, and extremely dangerous, to allow U.S. nuclear plants to "voluntarily" implement the new SAMG changes. The commenter stated that one of the lessons learned from Fukushima is that plant owners lie and obfuscate about details in a severe accident. The commenter notes that the NRC is supposed to protect the public, and the only responsible action to take here is to require plant management to follow the SAMGs. [Allen-1]

The second commenter stated that the final MBDBE rule must ensure that licensees develop, maintain, and administer SAMGs that can effectively guide workers to the successful selection and deployment of response measures mandated by the suite of NRC’s post-Fukushima directives. The commenter compared the voluntary approach for SAMGs (i.e., not having regulatory requirements associated with them) with the treatment of emergency procedure guidelines that were developed following the Three Mile Island accident and are required.

The commenter referenced the NRC audit of the implementation of SAMGs that was performed following the Fukushima event at every U.S. nuclear power plant (ADAMS Accession No. ML113210459). The commenter noted that the NRC's audit confirmed that SAMGs had been developed for every nuclear plant but also revealed that SAMGs were not available in the control rooms for over 10 percent of the reactors. The commenter highlighted other data points from the audit, which the commenter provided as evidence that the voluntary implementation of SAMGs was not effective.

The commenter referenced questions from Commissioner Jeff Baran during the July 9, 2015, Commission briefing on the MBDBE proposed rule, and responses by Michael Johnson, Deputy Executive Director for Reactor and Preparedness Programs, and Bill Dean, Director of Nuclear Reactor Regulation, to support the commenter's contention that, without requirements on SAMGs, there can be no confidence that the SAMGs will be maintained and implemented.

The commenter states that it makes no sense to require extensive damage mitigation guidelines (EDMGs) and FLEX support guidelines (FSGs) to be integrated into emergency operating procedures (EOPs), but to allow SAMGs to remain nonintegrated. The commenter is aware that the staff removed a provision requiring SAMGs from the proposed rule at the direction of the Commission but believes this was the wrong decision and expects that it will be reversed in the future. [UCS-2]

**NRC Response:**

The NRC disagrees with these comments. The first commenter provided no substantive new information on the subject of SAMGs, and all of the substantive information provided by the second commenter was included within the NRC staff's proposal to issue the proposed MBDBE rule with SAMG requirements, as described in SECY-15-0065, "Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)," dated April 30, 2015 (ADAMS Accession No. ML15049A201). The Commission also had the benefit of the interactions cited by the commenter that occurred during the July 9, 2015, briefing, as well as a presentation by one of the two parties that provided the second comment. However, the Commission's staff requirements memorandum (SRM) on SECY-15-0065 (ADAMS Accession No. ML15239A767) directed that SAMG requirements not be proposed, and that the industry's voluntary initiative for SAMGs continue as the regulatory approach. The information provided by the commenters does not add new substantive information that would cause the NRC to reconsider its decision regarding SAMGs. Accordingly, the NRC continues to conclude that there is not sufficient basis for imposing SAMG requirements on licensees and that the SAMGs should remain a voluntary industry initiative.

While SAMGs will remain a voluntary initiative, based on Commission direction in the SRM to SECY-15-0065, oversight of this initiative will be included in the NRC's Reactor Oversight Process (ROP). The following discussion provides a potential methodology for this oversight, which may differ pending the actual incorporation into the ROP. Inspection of SAMGs will be in accordance with an inspection procedure (IP) included in the Inspection Manual (see <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/>); this IP will be developed following

the guidance of Inspection Manual Chapter (IMC) 0040, "Preparing, Revising and Issuing Documents for the NRC Inspection Manual" (ADAMS Accession No. ML14147A186). Should an inspector identify an issue of concern with SAMGs, the inspector would resolve it following the processes in IMC 0612, "Power Reactor Inspection Reports" (ADAMS Accession No. ML13058A316), and IMC 0609, "Significance Determination Process" (ADAMS Accession No. ML14153A633). While these references will potentially need revision to reflect the inclusion of SAMGs, the provisions currently in the Inspection Manual illustrate the necessary concepts. IMC 0612, Section 03, provides the definitions of the terms used within the ROP that provide this illustration.

The first of these terms is "issue of concern," which is defined as a "well-defined observation or collection of observations potentially impacting safety or security, which may warrant further inspection, screening, evaluation, or regulatory action." Once an inspector identifies an issue of concern, that item would be considered under the processes of the ROP to determine if it were a "performance deficiency," which is defined as the "licensee's failure to satisfy one or more regulatory requirements or self-imposed standards, where such failure was reasonably foreseeable and preventable." (Emphasis added.) A "self-imposed standard" is a "licensee-established expectation that does not constitute a regulatory requirement;" industry voluntary regulatory commitments such as those docketed by all operating licensed power reactors would be one mechanism by which a licensee-established expectation that does not constitute a regulatory requirement could be identified. Because there is no existing regulatory requirement for SAMGs, a performance deficiency that was limited to having an effect on the SAMGs would not fall within the definition of a "violation," which is the "failure to comply with a legally binding regulatory requirement, such as a statute, regulation, order, license condition, [or] technical specification." As a result, performance deficiencies that are limited to having an effect on the SAMGs would only have the potential to result in "findings," which are defined as "performance deficienc[ies] determined to be More-than-Minor in accordance with IMC 0612, Appendix B." These findings would be considered along with the other results of the ROP in the assessment process of IMC 0305, "Operating Reactor Assessment Program" (ADAMS Accession No. ML15317A147). Should performance deficiencies in SAMGs include impacts on other areas that are subject to regulation, the results could include violations.

Regarding concerns raised that licensees might lie and obfuscate with regard to the details associated with a severe accident, the NRC has several requirements in place that address that concern, including 10 CFR 50.9, "Completeness and Accuracy of Information"; 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors"; and the emergency response data system (ERDS) requirements of Appendix E to 10 CFR Part 50. These regulations either require that complete and accurate information be provided to the NRC should a severe accident occur or, in the case of ERDS requirements, facilitate the process of NRC receiving complete and accurate information during such an accident.

Regarding the stakeholder feedback that it makes no sense to require EDMGs and FSGs to be integrated into EOPs but allow SAMGs to remain nonintegrated, the NRC disagrees with the characterization of the EDMGs and FSGs as being integrated into the EOPs; instead, the

EDMGs and FSGs are being integrated with the EOPs, as is discussed in the SOC for the MBDBE rule. Additionally, SRM-SECY-15-0065 included direction to the NRC staff to ensure that endorsed guidance for the rule provides for appropriate coordination of the FSGs, EDMGs, and voluntarily maintained SAMGs with the existing EOPs at each plant (e.g., appropriate transition criteria between EOPs and guidelines and clarity of command and control). The guidance supporting the final MBDBE rule has been revised consistent with that Commission direction, and consideration of this aspect of the comment is addressed in Section 8 of this document.

No changes were made to the final MBDBE rule as a result of these comments.

**General Comment 2:**

A commenter congratulated the NRC Commissioners for clearly defining the scope of the proposed rulemaking within the authority and responsibility of the agency; the NRC staff for diligently considering stakeholder input and developing a set of meaningful regulatory requirements; and the nuclear industry for their leadership in proposing guidance and methods for mitigation of beyond-design-basis (BDB) events. In particular, the commenter acknowledged the industry leadership in developing implementation guidance for the new regulatory requirements, as well as the voluntary licensee commitments to the NRC to implement and maintain enhanced SAMG, which represents a mutually agreeable path forward that has made the NRC's task a bit easier. [Lutz-4]

**NRC Response:**

This comment does not propose any changes to the treatment of SAMGs under the MBDBE rulemaking. No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 3:**

A commenter notes that the proposed rulemaking provides an adequate response to the lessons learned from the Fukushima accident in 2011. The commenter concludes that, while the U.S. post-Fukushima response is different in some respects from international response, it is nonetheless a significant safety enhancement for the U.S. nuclear fleet that is consistent with existing U.S. regulatory policies and procedures. [Lutz-1]

**NRC Response:**

This comment does not propose any changes to the final MBDBE rule. No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 4:**

The commenter notes that, in the background discussion for the NRC's November 19, 2015, Advance Notice of Proposed Rulemaking (ANPR) for Regulatory Improvements for Decommissioning Power Reactors (80 FR 72358), the NRC went to lengths to discuss a Sandia

National Laboratories investigation into the zirconium fire event. While the commenter recognizes that this investigation is not publically available due to security concerns, it would have more confidence in these statements if an independent organization (e.g., the National Science Foundation) also attested to what the Sandia investigation addressed. The commenter noted that the NRC discussion on the Sandia investigation in the NRC Decommissioning Power Reactor ANPR does not indicate whether the impact of accelerants was considered.  
[Vermont-3]

**NRC Response:**

This comment does not suggest any changes to the MBDBE rule, but instead provides comments on the ANPR for decommissioning. No changes were made to the final MBDBE rule as a result of this comment for the reasons stated in the NRC responses to General Comments 8 (spent fuel pool (SFP) safety) and 14 (decommissioning).

**General Comment 5:**

Several commenters endorsed the comments provided by NEI in response to the proposed MBDBE rule. [FENOC-1, Exelon-1, NuScale-CL-1]

**NRC Response:**

These comments propose no further changes to the MBDBE rule beyond those suggested in the underlying comments from NEI. The NRC's consideration of this feedback can be found in its response to the NEI comments.

**General Comment 6:**

The commenter commended the NRC on the MBDBE, noting that it clearly represents an enormous effort on the part of the team that devised it. The commenter stated that it was particularly relieved to finally see attention paid to station blackout (SBO) and that the NRC recognizes the impacts of external events. [IPSEC 1]

**NRC Response:**

This comment does not suggest any changes to this rule. No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 7:**

The commenter notes that the impact of the Fukushima disaster was, and will be, felt not only by individuals who may have been exposed to radiation, but also by those people affected by the presence of radiation in the ocean and their homes, communities, and groundwater for years to come. The commenter questions the limits of mitigating the impacts of a nuclear accident and wonders when the number of people potentially harmed by a nuclear power reactor accident becomes untenable. The commenter compares the effects of the Fukushima



and 1986 Chernobyl accident on the surrounding populations with the potential impact of an accident at the Indian Point nuclear power plant. [IPSEC 5]

**NRC Response:**

This comment does not suggest any changes to this rule. This comment could be understood to mean that the NRC needs to fundamentally change the manner in which it regulates nuclear power to provide reasonable assurance of adequate protection of public health and safety. The NRC understands that nuclear accidents can have a significant adverse effect on the surrounding population; in large measure, many of the regulations imposed on power reactor licensees and applicants are directed towards ensuring that adverse effects are extremely unlikely to occur. It is not within the scope of the MBDBE rule to revisit the NRC's fundamental implementation of the Atomic Energy Act of 1954, as amended, through its implementing regulations and associated regulatory processes, all of which result in nuclear power plants not posing an undue risk to public health and safety. The NRC has underway a number of regulatory efforts that are intended to improve its regulatory analyses, which are key to how the NRC approaches regulatory problems, decides on regulatory approaches, and examines the costs and benefits of different approaches, and which also support determinations on whether new requirements can be imposed under the NRC's backfitting requirements. These improvements are discussed in SECY-14-0002, "Plan for Updating the U.S. Nuclear Regulatory Commission's Cost-Benefit Guidance," dated January 2, 2014.

With regard to this MBDBE rulemaking, the NRC examined the Fukushima event to identify lessons learned and whether safety enhancements stemming from those lessons learned should be implemented in the United States. The NRC has taken a significant number of regulatory actions, many of which are being made generically applicable by the MBDBE rulemaking. These new requirements reflect both the NRC's and the nuclear power industry's focus on safety and significantly enhance the safety of nuclear power plants in the United States.

No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 8:**

The commenter believes there are dangers inherent in high-level nuclear waste and that the NRC disregards the risk presented by the SFPs over a very long duration, which the commenter characterizes as untenable. The commenter provides the following information to support this conclusion:

- Nuclear waste (spent fuel) is among the most hazardous materials on the planet.
- Nuclear waste remains highly toxic for hundreds of thousands of years.
- When the SFPs were originally constructed, they were planned to hold spent fuel for a very short term—less than a year. The SFP structures at nuclear plant sites were thus

never designed, nor built, with the intention of holding large quantities of nuclear material for four decades, much less a near century.

- Nearly 70,000 metric tons of uranium (MTUs) high-level nuclear waste are being stored at commercial nuclear power plants and the amount is expected to increase at a rate of approximately 2,000 a year or 20,000 MTUs each decade.
- The typical SFP at a light-water reactor now holds the equivalent of about six reactor core loads of spent fuel, about 700 MTUs.
- Low-burnup fuel can be transferred from cooling pools into dry casks after 5 years, but high-burnup fuel may need to remain within pool cooling for 20 years or more, and the use of high-burnup fuel has been increasing. Further, aging effects/mechanisms applicable to high-burnup fuel remain to be determined
- America's existing nuclear fleet and the onsite SFPs where most of the high-level spent fuel waste remains stored are aging.
- It is a fundamental of engineering that as machines and structures age, they become subject to age-related deterioration, and aging effects/mechanisms apply to SFPs and their associated structures.
- The SFPs at Indian Point and elsewhere have already shown evidence of age-related deterioration and deterioration of fuel cladding. [IPSEC 10a]

**NRC Response:**

This comment does not suggest any changes to this rule. Several commenters in addition to IPSEC raised issues associated with the safety of SFPs. These comments included suggestions that the NRC, as part of the MBDBE rule, should reconsider SFP fires, events that can lead to SFP fires, malicious attacks involving SFPs, SFP integrity during and following extreme events, and longer-term SFP aging issues.

The MBDBE rule enhances requirements for SFP safety by making generically applicable Orders imposed after the Fukushima event that (1) enhance SFP safety through strategies that maintain or restore SFP cooling capabilities for BDB external events and (2) provide information, through the use of SFP instrumentation (SFPI), that enables operators to appropriately prioritize the use of resources following a BDB external event. The NRC has a long history of evaluating SFP safety and security and has taken action to enhance safety and security, when necessary. The following, while not a complete discussion, includes a few of the more important NRC actions involving SFPs and is provided as a convenience to stakeholders.

Studies conducted over the last four decades have consistently shown that the risk of an accident causing a zirconium fire in an SFP to be low. The risk of an SFP accident was examined in the 1980s as Generic Issue 82, "Beyond Design Basis Accidents in Spent Fuel Pools," in light of the increased use of high-density storage racks and laboratory studies that

indicated the possibility of zirconium fire propagation between assemblies in an air-cooled environment (Section 3 of NUREG-0933, "Resolution of Generic Safety Issues," <http://nureg.nrc.gov/sr0933/>). The risk assessment and cost-benefit analyses developed through this effort, Section 6.2 of NUREG-1353, "Regulatory Analysis for the Resolution of Generic Issue 82, Beyond Design Basis Accidents in Spent Fuel Pools" (ADAMS Accession No. ML082330232), concluded that the risk of a severe accident in the SFP was low and appeared to meet the public health objectives of the Commission's Safety Goal Policy Statement (51 FR 30028; August 21, 1986), and that no new regulatory requirements were warranted.

The risk of an SFP accident was reassessed in the late 1990s to support a risk-informed rulemaking for permanently shutdown or decommissioned nuclear power plants in the United States. The study, NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants" (ADAMS Accession No. ML010430066), conservatively assumed that if the water level in the SFP dropped below the top of the spent fuel, an SFP zirconium fire involving all of the spent fuel would occur, and thereby bounded those conditions associated with air cooling of the fuel (including partial-drain-down scenarios) and fire propagation. Even with this conservative assumption, the study found the risk of an SFP fire to be low and well within the Commission's safety goals.

New requirements to mitigate the potential loss of SFP water inventory were implemented following the terrorist attacks of September 11, 2001, which result in enhanced spent fuel coolability and the potential to recover SFP water level and cooling prior to a potential SFP zirconium fire. Based on the implementation of these additional strategies, the probability and, accordingly, the risk, of an SFP zirconium fire initiation has decreased and is expected to be less than analyzed in NUREG-1738 and previous studies. The effects of aircraft impacts on SFP safety were previously addressed through orders issued after the events of September 11, 2001, that contained requirements that were then made generically applicable in the power reactor security rule issued on March 27, 2009 (74 FR 13926). Specifically, the power reactor security rulemaking included the provisions in 10 CFR 50.54(hh). The MBD BE rule relocates the current requirements in 10 CFR 50.54(hh)(2) to 10 CFR 50.155(b)(3), but does not otherwise modify these requirements.

In response to the 2011 accident at Fukushima Dai-ichi, on March 12, 2012, the NRC issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," which further enhanced SFP safety. This order required licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and SFP cooling capabilities following a BDB external event. Of most importance to SFP safety, Order EA-12-049 required that strategies to maintain or restore SFP cooling capability be developed, implemented, and maintained, and that this capability be maintained indefinitely, and for all modes of operation. In addition, the NRC issued Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," requiring licensees to install wide-range SFPI, in addition to the existing narrow-range SFP level instrumentation, to enable operators to remotely determine the

condition of the pool and appropriately prioritize resources, as needed, following a BDB external event. Order EA-12-049 requirements are a substantial portion of the requirements being made generically applicable by the MBDBE rulemaking and result in a significant enhancement to SFP safety, further reducing the risk calculated in previous studies.

In 2014, the NRC documented a regulatory analysis in COMSECY-13-0030, “Staff Evaluation and Recommendation for Japan Lessons Learned Tier 3 Issue on Expedited Transfer of Spent Fuel” (ADAMS Accession No. ML13329A918), which considered a broad history of the NRC’s oversight of spent fuel storage and SFP operating experience (domestic and international) and relied on information compiled in NUREG-2161, “Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling-Water Reactor” (ADAMS Accession No. ML14255A365). In COMSECY-13-0030, the NRC staff concluded that SFPs are robust structures with large safety margins and recommended to the Commission that possible regulatory actions to require the expedited transfer of spent fuel from SFPs to dry cask storage were not warranted. The Commission subsequently approved the staff’s recommendation in the SRM to COMSECY-13-0030 (ADAMS Accession No. ML14143A360).

In conclusion, the stakeholder feedback concerning SFP regulatory issues has been previously considered and dispositioned by the Commission. The commenter did not introduce new information that brought into question the bases by which the Commission made its decisions.

No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 9:**

The commenter states that climate change, with extreme weather, oscillating temperatures, and disturbed environmental dynamics, render past analyses of component and structure performance outmoded. The commenter states that basing an estimation of performance on “historic” data of weather or ambient conditions is no longer valid. [IPSEC 11]

**NRC Response:**

This comment does not suggest any changes to the MBDBE rule. Rather, it implies that the NRC should change its basic approach for consideration of historic information, with regard to ensuring that nuclear power plants are properly designed and protected against external events in accordance with the general design criteria (GDC) or predecessor principal design criteria (PDC).

At a more general level, several other commenters, in addition to IPSEC [FRS, Vermont, and Leyse], provided feedback that the MBDBE rule should contain requirements that address various specific external events. The suggestions included geomagnetic storms (note that this suggestion, due to it being the subject of a petition for rulemaking (PRM) currently under consideration by the NRC, is also addressed in the NRC response to General Comment 8, above), cyber events that might disable the electric grid, attacks involving devices that may disable the electric grid, malicious attacks on a nuclear facility, and explosions from gas lines

running in the near vicinity of a nuclear facility. In all cases, the NRC response to this feedback is the same. These comments are fundamentally suggesting that the NRC take a different regulatory approach to addressing the mitigation of BDB events than the NRC took under Order EA-12-049 following the Fukushima event. While the comments tend to explicitly identify specific external events or conditions that commenters believe should be addressed by the MBDBE rule, 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 MBDBE 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 BDB external events. The regulatory approach provides additional mitigation capability, recognizing the uncertainties associated with BDB external events. 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 BDB external event 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 (ADAMS Accession No. ML12242A378), Appendix B, "Identification of Beyond-Design-Basis External Events To Be Considered," as endorsed by Japan Lessons-Learned Project Directorate 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" (ADAMS Accession No. ML12146A014).)

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 (NTTF) 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), and SECY-16-0074, "Assessment of Fukushima Tier 2 Recommendation Related to Evaluation of Natural Hazards other than Seismic and Flooding" (ADAMS Accession No. ML16102A297).

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 BDB external event 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.

The MBDBE rule does require additional consideration of reevaluated seismic and flooding hazard information, should that information exceed the current design basis. This aspect of the MBDBE rule recognizes that licensees can decide to use the mitigation strategies as a means to address such events should they occur, and accordingly, the rule provides flexibility, consistent with its overall structure and performance-based approach, for licensees to address these events mechanistically, determining the challenges posed to the facility by the specific effects of the seismic and flooding hazard information and countering these challenges with either installed structures, systems, and components (SSCs), with the new mitigation strategy equipment, or with a combination of both.

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, 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 an 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). Accordingly, while the MBDBE rule does contain elements that require licensees to address reevaluated seismic and flooding hazard information, it is not within

the regulatory scope of the MBDBE rulemaking to assume other new hazard information or additional events.

Furthermore, the regulatory scope of actions taken after the events in Japan to require additional capability to mitigate BDB external events did not include mitigation of malicious events. It was, instead, limited to external natural phenomena. While the MBDBE rule is relocating the current requirements in 10 CFR 50.54(hh)(2) into 10 CFR 50.155 in recognition of the similarity of those strategies to the mitigation strategies for BDB events, this should not be taken to mean that the NRC is reconsidering the requirements in 10 CFR 50.54(hh)(2); rather, the NRC is using this opportunity to produce a more coherent set of regulations.

The NRC's consideration of NTTF Recommendation 2.2 regarding the periodic confirmation of external hazards addresses issues very similar to those in this comment. The NRC staff's closure plan for this NTTF recommendation, which indicates that specific regulatory requirements are not necessary, is documented in Enclosure 2, "Proposed Resolution Plan for Tier 3 Recommendation 2.2 Periodic Reconfirmation of External Hazards" (ADAMS Accession No. ML15254A010), to SECY-15-0137. The Commission, in its SRM on SECY-15-0137, dated February 8, 2016 (ADAMS Accession No. ML16039A175), approved the staff's closure plan. The NRC is currently implementing this closure plan, and the completed assessment of the subject will be provided to the Commission for approval in a separate document.

No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 10:**

The commenter notes that Indian Point, for example, has had more than 10 fires already, the most recent from a transformer explosion in May 2015, which led to a leak of 20,000 gallons of oil into the Hudson River. The commenter indicates that the licensee was able to fight the fire without radioactivity release because the transformer did not hold radioactive elements. The commenter states that such would not be the case in an effort to fight a containable fire threatening the SFPs, since the overflow of cooling water would distribute substantial radioactivity. [IPSEC 10c]

**NRC Response:**

This comment does not suggest any changes to this rule. The NRC considered the potential for integration of fire response procedures within the scope of the MBDBE rule, as documented in the SOC, but concluded that it would not be appropriate for the reasons stated in the SOC. The NRC notes that the commenter provides no new information to change this conclusion. No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 11:**

The commenter has concerns with the potential for a sudden explosion-triggered fire and indicates that the risks extend past decommissioning. The commenter states that, at Indian

Point, for example, two half-century-old interstate natural gas lines currently run mere yards from the site. One gas line is 30 inches in diameter, the other is 26 inches. The lines are part of a system that transports some 2.4 billion cubic feet of gas at high pressure every day. Adding considerably to the hazard of a gas explosion and fire is the recent approval of a third pipeline: the Spectra Energy Algonquin Incremental Market Project pipeline (or AIM Pipeline), a 42-inch high-pressure gas pipeline planned for construction right next to the nuclear site. The commenter states that the rupture of a gas pipeline of the AIM size could release explosive gas at the rate of 376,000 kilotons (nearly 1 million pounds) per minute, per warnings from experts. The commenter indicates that the blast and fire radius could readily encompass SFP structures. The commenter indicates that the spent fuel will generate less heat after being in the SFP for many years, and that may reduce the risk of spontaneous fire. But the commenter states that this hardly protects against a massive gas explosion and inferno that could engulf the entire facility. The commenter then discusses another scenario where planes laden with fuel or explosives could crash into the roofs of an SFP structure and, likewise, potentially ignite a catastrophic spent fuel fire. Finally, the commenter states that, as many nuclear experts have pointed out, an SFP fire would emit extraordinarily high levels of radioactivity, making extinguishment all but impossible. [IPSEC 13]

**NRC Response:**

This comment does not suggest any changes to this rule. The NRC response to General Comment 9 provides the NRC's response to comments such as these regarding BDB events and the NRC's consideration of these events within the MBDBE rule. Regarding the plant-specific issues raised by this comment, the NRC has addressed the issues associated with the gas lines that run in the vicinity of the Indian Point nuclear plant in response to requests filed under 10 CFR 2.206. The first two gas lines noted by the commenter were considered as part of the initial licensing of Indian Point, and these concerns were raised again in a 2.206 petition filed on October 25, 2010. The disposition of that request is provided in an NRC letter dated March 31, 2011 (ADAMS Accession No. ML110890309). On October 15, 2014, the commenter petitioned the NRC under 10 CFR 2.206 to take action concerning the third pipeline. The NRC rejected this petition in a letter dated September 9, 2015 (ADAMS Accession No. ML15251A023).

The commenter also raises an issue concerning SFP protection from an airplane impact, which was addressed in the Power Reactor Security Rule, as discussed in the NRC response to General Comment 8. The comment did not provide any new information that would lead the NRC to revisit the requirements imposed in that rulemaking as 10 CFR 50.54(hh)(2), which are relocated by this rulemaking to 10 CFR 50.155(b)(3).

No changes have been made to the MBDBE rule as a result of this comment.

**General Comment 12:**

The commenter states that the American people are now stuck with aging nuclear plants and a virtually continuous litany of "events" and "incidents" at nuclear plant sites. The commenter



expresses a particular concern that there are the massive quantities of high-level nuclear waste sitting in SFPs, perhaps in perpetuity. The commenter states that the NRC should, at the very least, require operators of commercial nuclear power plants to provide the strongest possible storage for nuclear fuel, both new and spent, for as long as communities are put at risk by these nuclear materials.

The commenter indicates that safeguards need to be commensurate with the risk, and high-level nuclear waste remains highly hazardous under decommissioning and long-term conditions.

The commenter expresses a view that the NRC disregards the strong likelihood that climate change will exert a multiplier effect on the aging mechanisms applicable to spent fuel assemblies and SFPs.

For a wide assortment of risks—flooding risk, dam failure risk, earthquake risk, site structure hazard risk, construction accident risk, landslide risk, hurricane risk, tornado risk, site fire risk, wildfire risk, [IPSEC 4b] malevolent insider risk, terrorism risk, [IPSEC 4c] human error, acts of nature—the commenter states that small risks can grow exponentially when combined and when the time periods are long. [IPSEC 4d]

**NRC Response:**

This comment does not suggest any changes to this rule. The commenter is raising general risk issues and, more specifically, long-term risk issues associated with spent fuel storage and aging. The NRC response to General Comment 9 explains the scope of events considered within the MBDBE rule and addresses the issue of external weather events. The NRC response to General Comment 8 is applicable to the portions of this comment that refer to SFP safety. No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 13:**

The commenter states that the safety, security, health, and environmental dangers involved in nuclear power are of such potential magnitude that neither the commercial nuclear industry nor the insurance industry has been willing to accept more than a fraction of the potential liability. The commenter states that industry lobbying has enabled laws like the Price-Anderson Act of 1957 and the Nuclear Waste Policy Act of 1982 to shift the substantial risk burden to the American citizenry and taxpayers.

The commenter states that the NRC continues to allow nuclear power plants to be owned and run by limited liability corporations and other legal constructs that would allow the multibillion parent corporations to walk away from a major liability, not just in the future, but today.

It is the commenter's view that the commercial viability of the nuclear power industry may not properly be weighed against the continued viability of communities; the health, welfare, and safety of tens of millions of Americans; and the habitability of sizable regions of the nation for generations to come.

The commenter applauds the efforts to tackle the challenges and exigencies that may arise under nuclear plant emergency conditions and is glad to see more attention paid to improving emergency response and integrating response capability. The commenter states that the reevaluation of SBO conditions, manpower, training, equipment, site condition monitoring, offsite radioactive release monitoring, communication systems—all of these steps are positive and long overdue.

The commenter states that enhanced coping capability alone does not provide sufficient assurance that a nuclear disaster will be prevented. [IPSEC 14]

**NRC Response:**

This comment does not suggest any changes to this rule. This comment raises issues regarding potential liability for nuclear accidents, the Price-Anderson Act, and the corporate structures for licensees. The MBDBE rule is making generically applicable a number of requirements that make nuclear power plants safer, and therefore decrease the likelihood of severe nuclear accidents of concern to the commenter. With regard to concerns regarding the statutory framework, it is not within the regulatory authority of the NRC to modify legislation.

With regard to the comment that enhanced coping does not alone provide a level of assurance a disaster will not happen, the NRC agrees with the comment. In this regard, the NRC notes that it issued the mitigation strategies requirements to provide continued reasonable assurance of the adequate protection of public health and safety. The NRC concluded that additional defense-in-depth measures were required to address uncertainties associated with BDB external events. The additional mitigation strategy requirements, in conjunction with the existing regulatory framework, together provide reasonable assurance of the adequate protection of public health and safety.

No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 14:**

The commenter states that if large-scale power outages were to last months or longer, multiple nuclear power plants would lose their supply of offsite ac power, which is necessary for daily operation and preventing severe accidents. The commenter indicates that multiple loss-of-offsite power events—especially in the event of prolonged power grid failures—could lead to a number of SBOs; an SBO is a complete loss of both grid-supplied and backup onsite ac power. The commenter states that the Fukushima Dai-ichi accident was an SBO accident that led to three reactor core meltdowns. [Leyse-3]

**NRC Response:**

This comment does not suggest any changes to this rule. No changes were made to the final MBDBE rule in response to this comment.

**General Comment 15:**

The commenter wonders whether the NRC ever conducted probabilistic risk assessments (PRAs) estimating the core damage frequency that could occur at multiple nuclear sites in the event of long-term catastrophic grid failures—blackouts that would last months to years—or if the NRC has conducted PRAs estimating the frequency of SFP fires that could occur at multiple nuclear sites in the event of long-term catastrophic grid failures.

The commenter quotes the NRC's statements from the FRN on PRM-50-96 on the subject of the probability of a geomagnetic disturbance and extrapolates them, given that the frequency of a catastrophic grid failure may be as high as once in 153 years. The commenter postulates that, assuming this is the frequency of occurrence of a catastrophic grid failure, a PRA considering the frequency of core damage and SFP fires at multiple nuclear sites, in the event of a catastrophic grid failure, might lead the NRC to find that the operation of nuclear power plants and their *over-packed* SFPs presents an "undue risk to public health and safety."

[Leyse-4]

**NRC Response:**

This comment does not suggest any changes to this rule. The NRC response to General Comment 9 above addresses the broader issue of feedback that requested the NRC to explicitly address specific external events within the MBDBE rule; however, the specific external event of geomagnetic disturbances deserves more discussion, due to the NRC's ongoing consideration of the issue. While the MBDBE rule puts in place mitigation strategies that could be initially deployed and used to address the effects of geomagnetic disturbances (should such disturbances lead to adverse impacts on the transmission system and an associated loss of offsite power), its regulatory scope does not address the issue of geomagnetic disturbances in its entirety. 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 the MBDBE rule, 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 (NSWS) 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 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 the Federal Energy Regulatory Commission (FERC) to establish requirements to provide transmission system protection for geomagnetic disturbances, the NRC will address PRM-50-96, giving consideration to NSWAP, the MBDBE rule, the FERC requirements, and the additional comments provided on this rulemaking that further inform the consideration of geomagnetic disturbances. The comments provided on geomagnetic disturbances did not result in changes to the final MBDBE rule and will instead be considered as part of the NRC's future action on PRM-50-96.

No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 16:**

One commenter, citing supporting examples, states that the United States is particularly vulnerable to SFP fires because licensees' SFPs are densely packed with spent fuel assemblies. The commenter criticized the Commission's decision not to expedite the transfer of spent fuel assemblies from SFPs to dry storage. The commenter references his letter on PRM-50-108, dated June 19, 2014 (ADAMS Accession No. ML14195A388). The commenter additionally states that PRM-50-96 did not ask the NRC to expedite the transfer of spent fuel assemblies from SFPs to dry cask storage; however, in the commenter's opinion, expediting the transfer of spent fuel assemblies would help remedy the serious safety issues that PRM-50-96 raised. The commenter suggests that the NRC should make a regulation requiring licensees to expedite the transfer of spent fuel assemblies from SFPs to dry cask storage. Removing spent fuel assemblies from SFPs—making SFPs less densely packed—would be in accordance with the NRC's philosophy of defense in depth. [Leyse-5, Leyse-6]

**NRC Response:**

These comments do not suggest any changes to this rule. No changes were made to the final MBDBE rule as a result of these comments for the reasons stated in the NRC responses to General Comments 8 and 15. Many of the issues raised by this commenter were also raised in the commenter's petition (PRM-50-108), which the Commission denied (see 81 FR 29761, dated May 13, 2016).

**General Comment 17:**

The commenter commends the Commission and its staff for these post-Fukushima initiatives, including the requirement for spent fuel facility instrumentation that will enable remote assessment of capabilities to protect spent fuel assemblies and facilities at licensee-controlled sites.

The commenter also supports the more robust, integrated response capabilities for command and control, enhanced onsite emergency response capabilities, and the ongoing deployment of regional spare equipment, including high-voltage transformers, at two (later three) regional

facilities, together with mutual assistance agreements among electric utility owner-operators and among mutual assurance regions. [FRS-3]

**NRC Response:**

The NRC agrees with these comments with regard to the reference to more robust integrated response capabilities. Both the Order EA-12-049 requirements and the MBDBE rulemaking result in this increased capability. The NRC notes that the industry response to Order EA-12-049 was limited to two National SAFER (Strategic Alliance for FLEX Emergency Response) Centers. (See the NRC document, “Staff Assessment of National SAFER Response Centers Established in Response to Order EA-12-049,” dated September 26, 2014, ADAMS Accession No. ML14265A107.) The NRC interprets the reference to a later third regional facility as being related to the nonnuclear industry’s related proposals for provision of “a readily available inventory of equipment at secure, strategically located warehouses in the United States and also will offer logistics support to facilitate expedited delivery of that equipment to affected sites following a qualifying event,” proposed in response to grid resilience policy issues under consideration at other Federal agencies. (See, generally, [www.gridassurance.com](http://www.gridassurance.com); last downloaded June 28, 2016.) No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 18:**

The commenter notes that, to engage in an “all hazards” assessment, the Commission should further modify the “Enemy of the State” Rule (1967), as the Commission has earlier done to require protections against terrorism and strengthening of cyber security. The commenter notes that, following Cuba’s veto of onsite inspections after the Cuban missile crisis of 1962, concerns arose that nuclear power plants in Florida would be at risk of missiles that might be fired from Cuba. This caused the Atomic Energy Commission (now the NRC) to promulgate the “Enemy of the State” doctrine. This doctrine exempts nuclear power plant owner-operators from responsibility to defend their facilities from threats that are the responsibility of the United States Government.

The commenter states that the Enemy of the State Doctrine has been modified to require some protective measures against terrorists or cyber threat actors. The commenter expresses the view that, in its present form, however, with the proliferation of nuclear weapons and public understanding of vulnerabilities to a high-altitude electromagnetic pulse (HEMP) attack, the Enemy of the State Doctrine invites attacks designed to black out electric grids and turn nuclear power plants into Fukushima-class radioactive fallout sources. [FRS-5]

**NRC Response:**

The NRC disagrees with this comment. 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 (DBT) for nuclear power plants are established in 10 CFR 73.1, 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 (referred to by the commenter as the “Enemy of the State” Rule). While the Commission did significantly increase the DBT requirements to include, among other things, the requirement to defend against cyber-attacks, the Commission declined to amend 10 CFR 50.13.

The NRC is aware of the potential significance of electromagnetic pulse (EMP) 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 EMP 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 in 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.

**General Comment 19:**

The commenter encourages safety and reliability programs that encourage joint retrofitting initiatives or future design initiatives that use an “all hazards” framework. The commenter expresses the views that the Commission’s “Beyond Design-Basis-Events Rulemaking” provides an opportunity for the Commission to consider potentially beneficial retrofit requirements and future redesign of nuclear power facilities to enable these facilities to “black start” other electric generation facilities during extensive electric blackouts. [FRS-6]

**NRC Response:**

The NRC disagrees with this comment. It is not within the regulatory scope of the MBDBE rule to address whether a nuclear facility should be required to have the means to “black start” another power plant on the electric transmission system. The commenter’s proposal appears to be a means to reestablish power to the transmission systems following a geomagnetic disturbance. The NRC does not have regulatory authority over electric transmission systems, which instead is addressed by the Federal Energy Regulatory Commission (FERC). The requirements of the MBDBE rule are focused towards ensuring that there is a regulatory framework in place that provides reasonable assurance that nuclear power reactors do not pose an undue risk to public health and safety. No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 20:**

The commenter expresses ongoing concerns that the regulatory procedures, by which FERC must depend upon industry-initiated reliability standard proposals, per Section 215 of the Federal Power Act, have the effect of impairing the reliability of outside power upon which commercial nuclear power plants depend. [FRS-7]

**NRC Response:**

This comment does not suggest any changes to this rule. This comment is not within the regulatory scope of the MBDBE rule, nor is it within the regulatory authority of the NRC. Concerns with FERC's regulatory procedures should be directed to FERC. Concerns with the Federal Power Act are legislative in nature and should be addressed to Congress.

No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 21:**

The commenter disagrees with the statement made by the NRC that the changes to 10 CFR Parts 50 and 52 will address, in part, issues brought forth in PRM-50-96. The commenter states that the proposed changes to 10 CFR Parts 50 and 52 allow provision of offsite resources to address BDB events. The commenter indicates that, in contrast, the fundamental premise of PRM-50-96 is that a severe geomagnetic disturbance could cause such widespread disruption to normal societal processes that no outside resources would be available to licensees. [FRS-8]

**NRC Response:**

This comment does not suggest any changes to this rule. The requirements contained within the MBDBE rule establish additional capability to maintain or restore core cooling, containment, and SFP cooling indefinitely for a loss of all ac power damage state. The new capabilities would enable, initially, the nuclear power reactor safety functions to be maintained by onsite resources, and then offsite resource centers (and potentially other nuclear facilities, depending on the severity of the offsite power loss) would be able to provide additional assistance to maintain the safety functions. The NRC recognizes that, depending on the scenario (severity of grid disturbance and length of time the condition exists), there is potential that this could become challenging in the longer term, and hence the reason for stating that the new requirements would address the scenario "in part." Therefore, while the MBDBE rule does provide additional capability to indefinitely maintain the safety functions, which addresses, in part, the issues brought forth in PRM-50-96, it is not concluded at this time to be the entire solution to challenges that geomagnetic disturbances might present. Further consideration of this issue will occur as part of the NRC's consideration of PRM-50-96. No changes were made to the final MBDBE rule as a result of this comment.

**General Comment 22:**

The commenter stated that, in PRM-50-96, the commenter proposes that mitigation measures for SFPs to operate in unattended mode for a period of time sufficient for the rods to cool down and therefore not result in SFP fires were for the pools to boil off. The commenter states that this is not the equivalent of using "reasonable" measures to provide assistance from offsite resources, as proposed in the current rulemaking docket. Accordingly, the commenter requests that the NRC continue to address PRM-50-96 as a separate rulemaking. [FRS-9]

**NRC Response:**

This comment does not suggest any changes to this rule. Further consideration of this issue will occur as part of the NRC's consideration of PRM-50-96. No changes were made to the final MBDBE rule as a result of this comment for the reasons stated above and in the NRC response to General Comment 15.

**General Comment 23:**

The commenter expresses views disagreeing with the ongoing efforts of FERC and the National Electric Reliability Council to address geomagnetic disturbances. The commenter states that, as a result, generator stepup transformers at nuclear power plants will not be properly protected.

The commenter states that there is some evidence that stators vibrate and overheat during solar storms and that generator turbines are at risk of damage. The commenter states that, as a result, NRC-licensed commercial power plants could be at risk of extended loss of ac power for months or years in the aftermath of a severe solar geomagnetic storm. The commenter cites data that suggest that geomagnetic disturbances are not low probability events.

The commenter indicates that the Commission can benefit from the October 28, 2015, White House Space Weather Strategy and Space Weather Action Plan, and followup implementation by various Federal departments and agencies.

The commenter states that the record of solar geomagnetic events since the Carrington event of 1859 indicates that a Poisson probabilistic frequency distribution provides a best fit. Accordingly, there is a far greater frequency of moderate-level solar geomagnetic disturbances than the frequency of severe solar geomagnetic disturbances. It is the commenter's view that, if near-real-time monitoring of solar storms and their impacts on vulnerable transformers is feasible, at a low price, then safety can be enhanced while protecting operator-owner revenues.

The commenter requests that the Commission, as part of its "Beyond Design-Basis Event" assessment, consider a retrofit Order requiring that all commercial nuclear power plant licensees install geomagnetic-induced current (GIC) monitors at the neutral of generator stepup transformers of nuclear power plants. The commenter provides additional information concerning the costs and benefits of GIC monitors, including potential revenue savings to avoid nuclear plant shutdowns.

The commenter states that the proposed FERC hardware protection standard (with a rulemaking due imminently) in FERC Docket RM15-11-000, "Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance Events," does not mandate the use of GIC monitors, and it does not mandate sharing of GIC data where such data could assist the Reliability Coordinator in the region, or the NRC Operations Center. And the earlier requirements for "operating procedures" excludes mitigation responsibilities for generator operators on the dubious grounds that they might not have "visibility" of a



geomagnetic disturbance in their area of operations, so they should not be responsible for participating in operational mitigation measures. [FRS-10]

**NRC Response:**

No changes were made to the final MBDBE rule as a result of this comment for the reasons stated in the NRC response to General Comment 15. Note that the NRC is a participant on the Space Weather Operations, Research, and Mitigation Task Force. Most of the above information pertains to the ongoing FERC rulemaking, RM15-11-000. The information provided in this comment will be considered as part of the NRC's consideration of PRM-50-96.

**General Comment 24:**

A commenter noted that a schematic flaw that may be fatal for the proposed MBDBE rule is that the scheme remains effectively left to the industry to self-design and implement. [IPSEC 3]

**NRC Response:**

The NRC disagrees with this comment. The regulatory approach used for the MBDBE rule is a typical approach used when NRC issues new requirements. Where practical, the NRC will rely on the industry to develop guidance for implementing the new requirements. The NRC reviews the industry guidance and, if the NRC finds the guidance acceptable, endorses it with appropriate exceptions and clarifications. This process of developing endorsed regulatory guidance is conducted as a public process. For example, a large number of public meetings were held during the development of the guidance for implementing Order EA-12-049, which resulted in the NRC issuing JLD-ISG-2012-01, which subsequently has become Regulatory Guide (RG) 1.226 for the MBDBE rule. Furthermore, the NRC has conducted audits, has issued safety evaluations, and is, as of December 2016, inspecting the implementation of the Order requirements to ensure that licensees comply with the requirements. Accordingly, the NRC did not allow the industry to "self-design and implement" as suggested by the commenter. No changes were made to the final MBDBE rule as a result of this comment.

**2. Comments on Proposed 10 CFR 50.155, or the Amended or Added Portions of Appendix E to 10 CFR Part 50.**

**Rule Comment 1:**

The commenter believes that a performance-based approach is appropriate that would include, for example, a review of the manner in which enhancements are incorporated into accident management procedures and guidance based on lessons learned (e.g., further insights from decommissioning and dismantling of the Fukushima reactors, insights from trial usage during drills and exercises). [Lutz-3]

**NRC Response:**

This comment does not suggest any changes to this rule. The comment is consistent with the Commission's direction in its October 18, 2011, SRM on SECY-11-0124, "Recommended

Actions to Be Taken without Delay from the Near-Term Task Force Report” (ADAMS Accession No. ML112911571), which stated:

As the staff evaluates Fukushima lessons-learned and proposes modifications to NRC’s regulatory framework, the Commission encourages the staff to craft recommendations that continue to realize the strengths of a performance-based system as a guiding principle. In order to be effective, approaches should be flexible and able to accommodate a diverse range of circumstances and conditions. In consideration of events beyond the design basis, a regulatory approach founded on performance-based requirements will foster development of the most effective and efficient, site-specific mitigation strategies, similar to how the agency approached the approval of licensee response strategies for the “loss of large area” event under its B.5.b program.

The staff followed this direction in drafting the proposed and final MBDBE rule. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 2:**

The commenter notes that the draft rulemaking and supporting guidance is based on specific assumptions and design features relevant to existing light-water reactor designs. The commenter suggests that NuScale has, and other advanced nuclear reactor designs will likely have, an inherently different design that does not align with these assumptions or design features. The commenter recommends that the final rulemaking not discourage advanced (future) nuclear reactor designs from making enhancements to their designs by limiting a designer’s ability to take credit for features inherent in designs that can be demonstrated to address these BDB external events. The commenter provides specific examples where NuScale has identified differences in the design assumptions that could affect an advanced (future) nuclear reactor design. Comments and recommendations for addressing these differences are also provided. [NuScale CL-2]

**NRC Response:**

The NRC generally agrees with the premise of this comment. The MBDBE rule is not intended to limit or discourage a reactor designer from addressing the provisions through design features. While the NRC recognizes that designers could address certain requirements of this rulemaking through design features, it is not requiring that a new design address the MBDBE rule using design features. Instead, a designer has the flexibility to address some of the requirements in the design or leave that obligation to a combined license (COL) applicant (to whom the MBDBE requirements apply). The MBDBE rule was developed considering the design features of current operating reactors. A future reactor design, like that of NuScale, which may greatly differ from current certified designs and operating reactors, may address, at least in part, the provisions of the MBDBE rule in the design certification application. If a designer includes such design features in the design certification, a COL applicant referencing that design would have a standardized basis for complying with certain requirements of this rule, possibly including issue

resolution and issue finality (although that would be decided under a design certification rulemaking). No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 3:**

The commenter notes that Section IV.A.1 of the proposed rule states that the regulatory objective of the rulemaking is to “Make the requirements in Order EA-12-049 and Order EA-12-051 generically applicable, giving consideration to lessons learned from implementation of the orders.” The commenter notes that the proposed rule replaces the three-phase mitigation approach (i.e., Phase One limited to permanently installed equipment, Phase Two allowing temporary equipment already on site, and Phase Three allowing offsite resources) recommended by the NRC’s NTTF with “higher level, performance-based requirements.”

The commenter believes that it is important to maintain a three-phase structure so that licensees are required to demonstrate, at a minimum, that they can cope with the installed equipment until the FLEX equipment is operable and that the site can be self-sufficient until offsite resources are available.

The commenter states that the substitution of “higher level, performance-based requirements” reduces confidence that the MBDBE measures will be successful, if needed. The nuclear industry and the NRC have consistently disagreed on what constitutes appropriate compensatory measures and associated administrative controls. The commenter cites, as an example, the disagreement regarding the March 31, 2013, stator drop event at Arkansas Nuclear One Unit 1. The commenter notes that the licensee’s evaluation of the event concluded the reactor water would begin boiling in 12 hours and the reactor core would be uncovered in 115 hours, and that the NRC’s evaluation concluded 11 hours and 96 hours, respectively. The licensee’s evaluation concluded there was a 97-percent probability that workers would repower the switchyard and in-plant safety buses; the NRC’s evaluation concluded that the probability was 90 percent.

The commenter notes that the “higher level, performance-based requirements” are essentially the reactor core cooling and power restoration objectives pursued in the licensee and NRC staff assessments of the Arkansas Nuclear One event, and that, despite the common criteria, the evaluations produced widely disparate results. The commenter states that the final MBDBE rule must be as explicit as possible to narrow the wide gulf between what licensees perceive as acceptable and what the NRC determines to be acceptable. The three-phase structure provides a clearer definition of what is expected, better enabling licensees to meet those expectations and NRC inspectors to independently verify that this desired outcome has been achieved.  
[UCS-1]

**NRC Response:**

The NRC disagrees with this comment. The issuance of Order EA-12-049 included a separate Attachment 3 for the imposition of requirements on Vogtle Electric Generating Plant Units 3 and 4 to reflect their use of the AP1000 design. In Order EA-12-049, Attachment 3, the NRC

documented that the inherent features of the AP1000 design obviate the need for phase two of the three-phase response required of currently operating power reactors in Attachment 2 to Order EA-12-049. In making the requirements of Order EA-12-049 generically applicable, the NRC is recognizing the existence of regulatory guidance that carries forward the three-phase approach as being acceptable while acknowledging that it may be possible for future designers to implement an approach that meets the rule's requirements without the need for three phases. This is consistent with the Commission's direction in SRM-SECY-11-0124 to follow performance-based approaches for BDB events, while harmonizing the treatment of currently operating and new power reactors. Such approaches allow greater flexibility and enable more effective and efficient implementation of the requirements. Such an approach does not come without challenges, and it is recognized that differences such as those cited by the commenter can and have occurred. The NRC, through its current review, audit, and inspection activities supporting implementation of Order EA-12-049, is identifying the types of challenges noted by the commenter and ensuring that they are resolved. No changes were made to the final MBDBE rule as a result of this comment.

#### **Rule Comment 4:**

The commenter states that, as part of the "develop, implement, and maintain" provision, the final rule needs to explicitly address the NRC's expectations for reevaluating external hazards. The Fukushima fixes mandated by the NRC in the orders and the MBDBE rulemaking can be eroded by either internal means (e.g., modifications to the plant that render connection points unusable) or external factors (e.g., natural events being larger than previously understood).

The commenter states that, as an illustrative straw man, the final rule could include a requirement that applications for operating reactor license renewals include external hazard reevaluations. The commenter indicates that the current license renewal rule requires that applications address aging management for passive SSCs with safety roles to perform during design-basis events. The final MBDBE rule could expand this scope to require that license renewal applications address SSCs that protect the plant from external hazards, both from the perspective of ensuring that aging management does not compromise their effectiveness and from the perspective that emerging knowledge about external hazards has not suggested that existing protections are insufficient. [UCS-7]

#### **NRC Response:**

The NRC disagrees with this comment. The aspect of this comment regarding reevaluation of external hazards is very similar to the issue considered in NTF Recommendation 2.2, which recommended a rulemaking that would contain requirements to periodically reconfirm external hazards. The NRC considered NTF Recommendation 2.2 in Enclosure 2 to SECY-15-0137. The NRC staff concluded in this closure plan that regulatory requirements to reconfirm external hazards were not needed, but that the NRC staff could address the recommendation by enhancing its own processes for obtaining and evaluating such information. The Commission approved the staff's closure plan for this "Group 3" activity in SRM-SECY-15-0137. The NRC is

currently implementing this closure plan, and the completed assessment of the subject will be provided to the Commission for approval in a separate document.

In terms of this comment, and consistent with the Commission direction in its SRM on SECY-15-0137, the NRC does not agree that requiring applicants for license renewal to address reevaluated hazards is warranted and concludes that the NRC has (and will enhance) current processes for gathering information on external events to enable informed regulatory decisions to be made, when it is appropriate to do so.

The aspect of this comment regarding the potential for internal causes of erosion of the capabilities required under the MBDBE rule has been addressed by the requirement of 10 CFR 50.155(b) for licensees to maintain the integrated response capability and the requirement of 10 CFR 50.155(g) for documentation of changes. These requirements are supported at the guidance level in the specification of NEI 12-06, Section 11.8.2, for licensees to include consideration of the effects of modifications to the plant on the mitigating strategies and guidelines under 10 CFR 50.155(b)(1) in their plant configuration control procedures.

No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 5:**

The commenter provides an example of a nuclear power plant's implementation of Order EA-12-049, where a diesel air compressor did not develop sufficient air pressure. The commenter expresses the view that this deficient implementation of Order EA-12-049 resulted in a distraction of licensee resources, which was evidenced when the power plant used the air compressor following a loss of offsite power. The commenter states that the final rule needs to contain provisions to ensure that mitigation strategies for BDB events can aid the response rather than constituting a different way to adversely affect effective prioritization of emergency response actions.

The commenter cites an example concerning hardened venting systems that were not reliable and that, as a consequence, the NRC had to follow up the initial treatment of containment venting systems under Generic Letter 89-16 with the post-Fukushima Order EA-13-109.

The commenter concludes that the final MBDBE rule needs to contain provisions that ensure that the mandated measures are reliable now, rather than waiting several years to overlay the reliable attribute. [UCS-8]

**NRC Response:**

The NRC disagrees with this comment. The examples cited by the commenter regarded licensees that were still within the implementation process for the guidance and strategies required by Orders EA-12-049 and EA-12-051, which are being made generically applicable in this rulemaking, taking into account lessons learned in the implementation and the feedback received from stakeholders during the rulemaking. The review process for licensee submittals

under those orders, as well as the auditing of the implementation, are intended to identify and address issues such as those raised by the commenter prior to licensees reaching compliance; after compliance, such issues are addressed through the inspection and enforcement processes. Additionally, the MBDBE rule includes a drill or exercise requirement that will provide a means to identify deficiencies similar to those pointed out by the commenter. No changes were made to the final MBDBE rule as a result of this comment because the information provided merely points out that there is a potential for performance deficiencies in meeting the requirements as implemented by a licensee and discovered in the normal course of events through lessons learned or by means of oversight by the regulator.

**Rule Comment 6:**

The commenter notes that proposed 10 CFR 50.155(e) would require licensees to conduct initial drills and exercises and to subsequently conduct drills and exercises at least once every 8 years. The commenter states that the 8-year interval seems too long. Also, the exercises should be comprehensive and as realistic as possible and involve personnel and equipment performance testing to the extent feasible.

The commenter states that, in the 1990s, the NRC began conducting force-on-force tests of physical protection (i.e., security) plans at each nuclear plant once every 8 years. After the 9/11 attacks, the NRC changed the testing interval to at least once every 3 years. The commenter indicates that the original 8-year interval was found by the NRC to be too infrequent to prevent inconsistent performance. According to the commenter, the NRC determined that licensees would significantly ramp up physical protection capabilities shortly before the force-on-force test, then capabilities would steadily decline over time until the next pretest step change.

The commenter notes that, since the March 2011 earthquake/tsunami that caused the Fukushima accident, Browns Ferry experienced a tornado (April 2011), North Anna experienced an earthquake that caused ground motion more than its design-basis earthquake levels (August 2011), and Pilgrim experienced a severe winter storm causing a loss of offsite power event with complications (January 2015). The commenter concludes that, given the relatively high frequency of extreme natural events and the potentially high consequences, the final rule must require an exercise interval no longer than that used for force-on-force security testing. [UCS-9]

**NRC Response:**

The NRC disagrees with this comment. The focus of this comment is that the NRC should revise the MBDBE drill and exercise requirements to provide a greater level of assurance, and the commenter suggests that the timing of MBDBE drills or exercises should align with the frequency of force-on-force exercises (3-year frequency). The NRC judged that the 8-year frequency, and use of a drill rather than an exercise as the minimum requirement, produces the appropriate level of regulatory assurance for MBDBE and is aligned with the frequency of similar current emergency preparedness (EP) exercise requirements. While the NRC recognizes that a requirement for more frequent, comprehensive, and realistic drills and exercises would provide

a higher level of assurance that the MBDBE requirements are being maintained, the NRC is also sensitive to diverting limited licensee resources from activities that have greater importance to public health and safety. The NRC concluded that the MBDBE drill requirement strikes the correct balance in terms of providing an appropriate level of regulatory assurance, and by aligning with the current EP exercise requirements, it provides licensees with flexibility, should they choose to implement the drill requirements in conjunction with design-basis EP exercises. Additionally, the MBDBE rule training requirements include the use of the systems approach to training (SAT) as defined in 10 CFR 55.4, which would provide a feedback mechanism to increase the frequency of training and other performance-enhancing experiences, such as drills and exercises, if necessary. No changes were made to the final MBDBE rule as a result of this comment.

#### **Rule Comment 7:**

The commenter notes that proposed 10 CFR 50.155(d) would require licensees to “provide for the training and qualification of personnel that perform activities in accordance with the strategies and guidelines.” The commenter states that, unlike 10 CFR 50.155(e), the proposed language of 10 CFR 50.155(d) does not explicitly define requirements for initial training and retraining. The commenter states that the final rule must define the NRC’s requirements as clearly and completely as possible or be accompanied by an RG that more fully explains what the NRC seeks by the training provision in the rule. The commenter suggests, as an example, that the final rule and/or guidance must answer questions such as the following:

- If the mitigation strategy for an external event specifies that multiple workers will take FLEX equipment and install it, must all workers be trained and qualified for these tasks or is it sufficient to only train and qualify one worker per team?
- Are the training and qualifications provided for a worker at site x on the use of FLEX equipment transferrable to use of that equipment at site y?
- How often must workers receive retraining on the integrated response capabilities outlined in § 50.155(b)? [UCS-10]

#### **NRC Response:**

The NRC agrees with the comment. The training requirements in 10 CFR 50.155(d) do not explicitly define requirements for initial training and retraining. That information will be found in RG 1.228, and the NRC’s responses to the comments on regulatory guidance are addressed in the comment resolution document for DG-1319.

#### **Rule Comment 8:**

The commenter requests that the NRC carefully reexamine its reasoning in determining that the SFP zirconium fire BDB event as presently evaluated by the licensee of a permanently defueled or decommissioning power reactor is sufficient to justify the elimination of the

defueled/decommissioning facility's offsite emergency planning zone (EPZ). The commenter states that the zirconium fire event, as presently analyzed (i.e., the analysis for Vermont Yankee included as Attachment 2 in ADAMS Accession No. ML14080A141), assumes that the only energy source that can heat spent nuclear fuel to the zirconium fire ignition temperature of 900 degrees Celsius (C) is the spent fuel itself, following the loss of SFP water inventory by an unspecified means (i.e., the ignition temperature is reached through adiabatic heating of the spent fuel). The commenter adds that the acceptance criterion for this zirconium fire event is set arbitrarily: that the time to reach the 900 degrees C ignition temperature must be greater than 10 hours. The commenter objects to reliance on a 10-hour period for initiating mitigating actions for the zirconium fire event. The commenter notes that Vermont has experienced flooding numerous times in the past 100 years that limited the capabilities of all authorities (i.e., the licensee and offsite authorities) for much more than 10 hours; limitations can persist for days and weeks because of impacts to roads and communications, and due to competing demands on resources for lifesaving and protection of critical infrastructure. Accordingly, the commenter requests that this "10-hour" criterion be clearly justified as part of the proposed MBDBE rule, the proposed decommissioning rule (Docket ID # NRC-2015-0070), or in related regulatory guidance, rather than being a "sufficient time to respond" criterion based on engineering judgment. (For example, was 10 hours sufficient time for the Fukushima Dai-ichi units to reestablish a means to provide SFP cooling during the events of March 11, 2011? If not, is it appropriate to use 10 hours as a sufficient response time criterion?) The commenter states that the environmental conditions, including seismic and flooding considerations, at individual reactor sites should be factored into this response time criteria evaluation. The commenter states that the 10-hour period should be extended in instances where potential worst case environmental conditions warrant. [Vermont-1]

**NRC Response:**

This comment is out of scope of the MBDBE rule for the reasons stated in the NRC response to General Comment 8. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 9:**

The commenter notes that it is possible for accelerants such as thermite or jet fuel to be introduced into an SFP as the result of a hostile action. The presence of these accelerants could result in the spent fuel igniting well before the calculated 10-hour time to reach the spent fuel adiabatic ignition temperature. Accordingly, the commenter questions whether the current zirconium fire analysis method is sufficient justification to warrant the elimination of an offsite EPZ surrounding a permanently defueled or decommissioning power reactor. The commenter therefore requests that the NRC incorporate modeling for the use of accelerants into accepted analysis methods for evaluating and mitigating the SFP zirconium fire BDB event. The commenter recognizes that the risk of introducing accelerants into an SFP is significantly mitigated when the SFP is completely enclosed within a reinforced containment structure (as is the case for most pressurized-water reactors (PWRs) built within the United States). Accordingly, the commenter's concern may be limited to power reactors without a full



containment structure surrounding their SFPs (i.e., most, if not all, boiling-water reactors (BWRs), including Vermont Yankee). The commenter also recognizes that the continued presence of an offsite EPZ at a decommissioning reactor facility will not, by itself, mitigate the risk of a hostile action-induced zirconium fire in an SFP. Nonetheless, the continuation of the offsite EPZ will serve to ensure adequate public safety were this event to occur. [Vermont-2]

**NRC Response:**

This comment is out of scope of the MBDBE rule for the reasons stated in the NRC responses to General Comments 8 and 9. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 10:**

The commenter states that the NRC has used the permanent cessation of power operations and permanent defueling of a power reactor to justify the rescission of the Order EA-12-051 regarding the implementation of more reliable SFP instrumentation, on the grounds that, with the permanently shutdown and defueled reactor, “the safety of the fuel in the SFP becomes the primary safety function for site personnel.” (See ADAMS Accession No. ML14321A696 for an example.) The underlying reasoning for this type of decision is that the only need for the enhanced SFPI was for a quick assessment of SFP conditions while site personnel were primarily focused on addressing conditions within the reactor vessel. The commenter requests that the NRC keep the enhanced SFPI requirements for permanently shutdown/permanently defueled and decommissioning power reactors. The lowest accurate measurement of water level by existing SFPI is frequently limited to a level slightly above the top of spent fuel assemblies stored in an SFP. (The extant instrumentation will indicate that the water level is likely below the top of the spent fuel assemblies, but cannot accurately measure how much of the assemblies are no longer covered by water.) While some licensees have added video cameras to view the SFP water level, these will likely become unreliable due to fogging caused by the steam surrounding the SFP during an ongoing spent-fuel uncover event in the SFP. The commenter strongly suggests that the NRC require alternate SFP water level instrumentation (possibly based on variations in neutron or gamma attenuation as a function of water or steam density between spent fuel and neutron or gamma detectors). [Vermont-4]

**NRC Response:**

The NRC disagrees with the comment. As the commenter correctly notes, the SFPI was imposed under Order EA-12-051 to address the potential for operator distraction from addressing conditions within the reactor vessel, and this safety concern can no longer exist once all the fuel has been permanently moved to the SFP as part of decommissioning.

The commenter’s discussion of “existing SFP instrumentation” appears to be inaccurate, assuming that, by “existing SFP instrumentation,” the commenter means that instrumentation that existed at licensed power reactors prior to the issuance of Order EA-12-051. As discussed in the order, “spent fuel pool level instrumentation at U.S. nuclear power plants is typically narrow range and, therefore, only capable of monitoring normal and slightly off-normal

conditions,” which are well in excess of 10 feet above the top of spent fuel assemblies stored within the SFP.<sup>1</sup> The discussion of the capability of existing narrow-range SFPI appears to assume that its range of detection is closer to the top of spent fuel assemblies than the normal SFP water level, which would result in a significantly shorter time period in which appropriate safety actions would need to be taken for a lowering SFP level. Licensed power reactors were designed taking into account 10 CFR Part 50, Appendix A, GDC 63, “Monitoring Fuel and Waste Storage,” or its predecessor PDC, which typically provided that “Appropriate systems shall be provided in fuel storage and radioactive waste systems and associated handling areas (1) to detect conditions that may result in loss of residual heat removal capability and excessive radiation levels and (2) to initiate appropriate safety actions,” and the location of the existing SFPI near Level 1 of Order EA-12-051 allows a sufficient amount of time in which a licensee should take appropriate safety actions. The commenter has provided no new information to suggest that SFPI that was licensed under these design criteria would need to be supplemented by alternative instrumentation to protect public health and safety during the decommissioning phase.

With regard to the commenter’s suggestion that the NRC require the new SFPI for decommissioning reactors, the decommissioning licensee is free to keep the instrumentation in place and use it in the manner suggested by the commenter, but the NRC will not impose such a requirement, since it would not benefit safety.

No changes were made to the final MBDBE rule as a result of this comment.

#### **Rule Comment 11:**

The commenter states that, in evaluating BDB event mitigation strategies at permanently shutdown/permanently defueled and decommissioning power reactors, the NRC should require licensees to use weather, flood, and seismic data collected for the subject plant’s geographic location subsequent to the plant’s initial construction. The commenter states that, in evaluating weather, flood, and seismic considerations at a permanently shutdown/permanently defueled or decommissioning facility, licensees frequently rely only upon the data available in Chapter 2 of the plant’s final safety analysis report (FSAR). If the facility had previously generated power for most or all of the time period specified in its operating license, the FSAR Chapter 2 weather, flood, and seismic data can be as much as 40-to-50 years old. The commenter states that, using more recent weather, flood, and seismic data may show the need for additional “natural

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<sup>1</sup> See NEI 12-02, “Industry Guidance for Compliance with NRC Order EA-12-051, ‘To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,’” ADAMS Accession No. ML12240A307, Section 2.3, “Wide Range Pool Level Instrumentation,” which provides the levels an instrument installed under Order EA-12-051 is required to be able to detect. Normal levels for an SFP correspond to the discussed Level 1 of Order EA-12-051, which varies from plant to plant. Level 2 of Order EA-12-051, which is below Level 1, is a level 10 feet above the top of the highest point of any fuel rack seated in the SFP or a designated level that provides adequate radiation shielding to maintain personnel radiological dose levels within acceptable limits while performing local operations in the vicinity of the pool. Level 3, or the level where fuel remains covered and actions to implement makeup water addition should no longer be deferred is set nominally (i.e., within 1 foot) at the highest point of any fuel rack seated in the SFP.

disaster” BDB event mitigation than would be required by only considering the corresponding FSAR data. [Vermont-5]

**NRC Response:**

The NRC disagrees with this comment. The NRC has not required operating power reactor licensees to update the data as suggested by the commenter and, recognizing the lower associated risk with facilities that are decommissioning, would not require those facilities to update this information. This comment is related to the issue considered in NTTF Recommendation 2.2, which recommended a rulemaking that would contain requirements to periodically confirm external hazards. The NRC considered NTTF Recommendation 2.2 in Enclosure 2 to SECY-15-0137. The NRC staff concluded in this closure plan that a regulatory requirement requiring licensees to perform such updates was not needed, but that the NRC staff could enhance its own processes for obtaining and evaluating such information. The Commission approved the staff’s closure plan for this “Group 3” activity in SRM-SECY-15-0137. The NRC is currently implementing this closure plan, and the completed assessment of the subject will be provided to the Commission for approval in a separate document. This effort is focused on operating power reactors and not specifically focused on decommissioning reactors.

As a separate initiative, on June 9, 2015, the NRC completed an evaluation of Fukushima lessons learned for facilities other than operating power reactors, including decommissioning reactors. This evaluation can be found in SECY-15-0081, “Staff Evaluation of Applicability of Lessons Learned From the Fukushima Dai-ichi Accident to Facilities Other than Operating Power Reactors” (ADAMS Accession No. ML15050A066). In that paper, the staff concluded that with the exception of certain limited-scope additional assessments for fuel facilities and the three highest-powered research and test reactors, there is no need for regulatory action for facilities other than operating power reactors in light of the accident.

No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 12:**

With regard to implementation time, the commenters state that the proposed rule would require that each holder of an operating license comply with its provisions no later than 2 years following the effective date of the rule. The commenters state that this timeframe is not adequate. The commenters note that the degree to which the reevaluated seismic or flooding hazard(s) may affect the implementation of mitigating strategies varies widely across the operating reactor fleet, and the effort required to address them varies widely, too. In addition, the various evaluations necessary to prepare for any necessary changes are in different stages of completion. As a result, the commenters recommend that the proposed rule allow licensees to submit site-specific schedules for achieving full compliance with the rule. The commenters provide proposed rule language to address this concern in their response to the NRC question on “Equipment Protection Implementation Deadline” in Section VI of the proposed rulemaking package. [NEI CL-1, SCE&G-1, FENOC-2]

**NRC Response:**

The NRC agrees that the proposed MBDBE rule schedule of a 2-year implementation may not be sufficient for many licensees and that greater flexibility is needed in the final rule. The NRC agrees that the approach suggested by the commenters that allows for a plant-specific schedule submission introduces sufficient flexibility for implementation. The final MBDBE rule was revised to provide more flexible implementation.

**Rule Comment 13:**

The commenters state that the need for a licensee's strategies and guidelines to be capable of execution in the context of the reevaluated flooding and seismic hazards should be addressed in 10 CFR 50.155(b)(1) rather than 10 CFR 50.155(c)(2). The commenters note that it is intended that the effects of the reevaluated hazards be mitigated in a manner similar to the strategies that have been developed by the industry for FLEX. The commenters state that the incorporation of the reevaluated hazards into 10 CFR 50.155(c)(2)(i) addresses reasonable protection, and reasonable protection only applies to FLEX equipment. The commenters state that this does not achieve the intended objective of developing mitigating strategies for the reevaluated flood and seismic hazards. In addressing mitigating strategies for the reevaluated hazards, the commenters state that 10 CFR 50.155(b)(1) should allow further flexibility in the licensee's strategies and guidelines by (1) establishing an alternative means of compliance that does not include the surrogate conditions of an extended loss of all ac power and loss of normal access to the ultimate heat sink, and (2) providing different success criteria for targeted or scenario-specific mitigating strategies (i.e., namely, requiring core cooling and SFP cooling but not the containment capability to be maintained). The commenters state that the rule should also allow for the use of risk insights to demonstrate reasonable protection for mitigation of BDB seismic events. The commenters note that the comment provided by NEI contained a response to the "Methodology for Addressing the Reevaluated Hazard" question to address this concern. [SCE&G-3, FENOC-5]

**NRC Response:**

The NRC agrees with the aspect of the comment regarding relocation of the reevaluation hazard treatment to 10 CFR 50.155(b). This will more clearly align the rule requirement with the measures being taken to address the reevaluated hazards. The NRC disagrees with the aspect of the comment regarding codifying the use of risk insights to demonstrate reasonable protection. Risk insights were taken into account in the regulatory guidance relied upon for compliance with Order EA-12-049. (See, for example, NEI 12-06, Appendix B, as endorsed by JLD-ISG-2012-01.) The NRC concludes that risk-informed approaches to the final MBDBE rule can be implemented without the need for explicit rule language. Changes were made to the final MBDBE rule to reflect the treatment of reevaluated hazards, and to the SOCs to reflect consideration of risk insights—specifically, how a risk-informed approach can be used to satisfy the MBDBE requirements.

**Rule Comment 14:**

Several commenters noted that the rule language, RGs, and related supporting information must keep the requirements for SFPI separate and distinct from the requirements for mitigating strategies. The commenters noted that the requirement for SFPI was promulgated by NRC Order EA-12-051, while the requirement for mitigating strategies was promulgated by NRC Order EA-12-049. The commenters further note that, while the two Orders were in response to lessons learned from the Fukushima accident, they are distinctly different in underlying purpose and character. EA-12-049 requires guidance and strategies to maintain core and spent fuel cooling and the containment function in the face of certain events, and requires the ability to take action under the circumstances specified in the Order. EA-12-051 requires the installation of reliable SFPI to provide decisionmakers with information about the amount of water in the spent fuel such that resources can be allocated. Compliance with EA-12-051 does not require the ability to take action; it only provides information. The commenters state that the fact that the industry FLEX program implemented in response to EA-12-049 uses this information to indicate the need to add water to the pools does not change the underlying SFPI requirement and does not justify including SFPI as part of mitigating strategies, as appears to have been done in the draft of proposed 10 CFR 50.155(c)(4). [NEI CL-7, SCE&G-5, FENOC-7]

**NRC Response:**

The NRC agrees with the comments. The final MBDBE rule was revised to clearly separate the requirements for SFPI from the requirement for mitigation strategies.

**Rule Comment 15:**

The commenter believes that the largest vulnerability that the U.S. nuclear industry faces is an unclear and unspecified command and control structure. The commenter is not referring to the command and control structure supporting the site emergency director. The commenter believes that the Institute of Nuclear Power Operations (INPO) and possibly the Electric Power Research Institute are now going to lead U.S. nuclear accident response efforts. The commenter also states that AREVA will supply equipment and manpower from the regional supply centers recently established. The commenter indicates that this is not a problem; however, the commenter states that the communications between the site and INPO, and the 24-hour-a-day NRC Operations Center, would be a large hindrance. [Gurdziel1-1]

**NRC Response:**

The NRC disagrees with this commenter's assertion that the largest vulnerability that the U.S. nuclear industry faces is an unclear and unspecified command and control structure. There are command and control provisions currently in place (i.e., prior to issuance of the MBDBE rule). The MBDBE rule enhances this important element of accident response with additional command and control requirements. The NRC also notes that the commenter's understanding of the response to an accident is not correct. Neither INPO nor AREVA, nor any other entity not licensed to operate the nuclear power plant having the accident, would lead the mitigation efforts. These organizations would likely function in a support role. Accordingly, the comment does not reflect the command and control for events at U.S. nuclear power plants. This

comment does not suggest any changes to the MBDBE rule. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 16:**

The commenter states that, as noted in the second paragraph up from the bottom of page 139 of the International Atomic Energy Agency Technical Volume 2/5, Tokyo Electric Power Company Fukushima Dai-ichi site superintendent Yoshida did not follow instructions that depressurization and injection should be prioritized over venting. The commenter questioned whether this demonstrated an appropriate chain of command. [Gurdziel1-3]

**NRC Response:**

The NRC agrees with this comment in that individuals in the chain of command for response to an accident should not be able to decide on their own to take whatever action they want. Allowing individuals to take actions inconsistent with chain of command would be counter to the NRC's requirements for training, drills, or exercises, command and control, EOPs, and preplanned mitigation strategies, in addition to other relevant requirements. These requirements are all intended to provide licensees with the tools to have success in accident mitigation. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 17:**

The commenter is "quite disturbed" to hear that the NRC has allowed various plants to not use the ERDS in drills. The commenter states that the U.S. nuclear industry needs an automated communication system that provides information (at least during accidents) without the need to tie up a valuable licensed plant operator or two. [Gurdziel1-2]

**NRC Response:**

The NRC agrees, in part, with this comment. Although the NRC requires that licensees have simulators for training plant operators, no requirement exists that licensees transmit ERDS data from those simulators during a drill or exercise. Many licensees do have that capability and do transmit ERDS data to the NRC during exercises. Regardless of ERDS transmittal capability from a simulator, all licensees are responsible for communicating and clarifying plant status information and key parameter values to support NRC assessment activities. The NRC agrees with the commenter's statement that the U.S. nuclear industry needs an automated communication system that provides information during accidents. Requirements for such a system (ERDS) are contained in 10 CFR Part 50, Appendix E, Section VI. The NRC disagrees with the implication of the comment that there should be a requirement for licensees to transmit ERDS data from simulators during drills. The NRC's regulations contain requirements for periodic testing of the system. Also, drills conducted in simulators have a different purpose than the required demonstration of the capability to transmit ERDS data. This comment does not suggest any changes to the MBDBE rule. No changes were made to the final rule as a result of this comment.

**Rule Comment 18:**

The commenter states that a “schematic flaw” is a failure to delineate, and apparently to give consideration to, the many different accident initiator and exacerbating scenarios that the events of even just this new century have brought to light. The commenter states that it is well and good (although quite late) to begin implementation of the “Fukushima Lessons Learned,” but many of the Chernobyl, 9/11, BP, and Deepwater Horizon lessons appear quite forgotten, as do those of Katrina, Sandy, and the long litany of other storms and natural and manmade disasters that have beset the United States in recent years, with the Flint, Michigan, contaminated water crisis being just the latest.

The commenter states that it is not just earthquakes, floods, and loss of offsite power, but landslides, dam bursts, severe droughts, extreme storms, wildfires, and malevolent action conditions that must be considered, as well as such events in combination and/or in rapid succession over large geographic regions, with all the attendant chaos and infrastructure damage that would ensue, require serious consideration. The commenter states that most notably, nuclear power accidents occurring during natural and manmade disasters can involve the release of large quantities of radioactivity during periods when populations are simultaneously trapped and fleeing. The commenter further notes that mitigation response may require thousands of responders to be active for prolonged periods, including the National Guard and reservists; firefighters; Federal, State, and local law enforcement; HAZMAT; construction workers; utility workers; large equipment operators; transit workers; public officials; public health workers; volunteer groups like the Red Cross; and large numbers of individual citizens. The commenter further states that, if there is one thing we know for a certainty from all of the recent disasters above noted, it is that responders are not just first responders.

[IPSEC 4a (DG-1301)]

This commenter also commented that the NRC has a disregard for grave national security risks—not just terrorist attack(s), but sabotage and cyber. [IPSEC 9]

**NRC Response:**

This comment does not suggest any changes to this rule. This comment is outside the scope of this rulemaking for the reasons stated in the NRC response to General Comment 9. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 19:**

The commenter states that the metrics of compliance or success are unarticulated. The commenter indicates that this issue links strongly to the strong reliance on the industry itself being the primary deviser of mitigation modes. [IPSEC 7]

**NRC Response:**

The NRC disagrees with this comment. The metrics for success are a direct function of the objectives for the regulatory action (i.e., objectives that can be linked to how the requirements

are adequately ensuring or enhancing safety). In this case, the NRC is imposing requirements for licensees to have additional BDB event mitigation capability. The Commission imposed these requirements through Order EA-12-049 to provide additional defense-in-depth capability to address uncertainties associated with BDB external events. Accordingly, the metrics for success are licensees having an additional capability to maintain or restore core cooling, containment, and SFP cooling capabilities in the event that a BDB external event causes these functions to be challenged (i.e., meeting these criteria will result in an implemented additional mitigation capability for BDB external events). The assumed onsite damage state used to establish the mitigation strategies, a loss of all ac power with loss of access to the ultimate heat sink, is an assumed damage state that both immediately challenges the three functions and also yields mitigation strategies that provide significant additional capability. The use of strategies, and supporting equipment, that can be adapted to the conditions provides the flexible capability to address the conditions that actually occur. An installed capability that meets these objectives constitutes success. The metrics of compliance and success are articulated in the guidance for this rule: RG 1.226, "Flexible Mitigation Strategies for Beyond-Design-Basis Events;" RG 1.227, "Wide-Range Spent Fuel Pool Level Instrumentation;" and RG 1.228, "Integrated Response Capabilities for Beyond-Design-Basis Events." No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 20:**

The comment states that one of the most serious specific flaws of the mitigation rulemaking is the grandfathering provisions, which allow structures that would not be considered safe today to continue in operation. [IPSEC 8]

**NRC Response:**

The NRC disagrees with this comment. This comment refers to the use of installed SSCs as part of the mitigation strategies and suggests that these installed SSCs are not adequately designed, based on current understanding. This safety concern is addressed through the consideration of reevaluated hazards in 10 CFR 50.155. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 21:**

The commenter notes that, unlike the reactors, the spent fuel containments are not hardened. The roofs are similar to the roofs commonly built at "big box stores." The commenter additionally notes that accidental releases of radiation into the environment from SFPs have already occurred at Indian Point and at other nuclear plant sites. The commenter further states that attestations as to the safe containment of large quantities of nuclear waste, particularly high-burnup fuel, in SFPs, for half a century or beyond, are hypothetical, based on limited collections of experiential data and untested by reality. The commenter states that security and nuclear experts have identified SFPs to be nonrobust terrorist targets, vulnerable to tactics such as kamikaze aircraft strikes and demolition of cooling intake structures via MANPADs or targeting with explosive-laden speedboats.



The commenter states that, yet, the mitigation rulemaking proposes allowance of relaxation of emergency planning and capability for SFPs and states that this is a “stupendously reckless” proposal that flies in the face of the mitigation rulemaking’s purported goal, which is to increase protection with regard to BDB events.

The commenter states that, while it is reasonable to reduce requirements for some dormant and unused plant structures following decommissioning, it is unacceptable to lower any safeguard of SFPs. To the contrary, the commenter states that the combined effects of aging and climate change stressors mandate increased oversight and that, as decades go by, these old deteriorated structures will become more and more vulnerable to natural disasters and other high-load events.

The commenter states that SFPs at sites proximate to active seismic faults have especially elevated risk, since the geometry of both the pools and the landscape (including the rock and soil structural foundation) can be dramatically altered. The commenter notes that cooling water supply pipes can rupture, debris can collapse (displacing cooling water), and the pool walls can crack. The commenter notes that, at Indian Point, a considerable portion of one of the pool structures is buried and inaccessible to full inspection. The commenter states that even a moderately compromised containment could lead to a long-term leaking or leaching of radioactive water into the ground water and nearby source water, which, in the commenter’s view, would be a slow-forming radiation disaster similar to that which Fukushima’s underground leaking may portend. The commenter concludes that this end result could be a kind of radioactive version of the Flint, Michigan, contaminated water disaster. [IPSEC 10b]

**NRC Response:**

The NRC disagrees with this comment. The portions of this comment regarding the safety of SFPs are outside the scope of this rulemaking for the reasons stated in the NRC response to General Comment 8.

The portion of this comment asserting that the MBDBE rulemaking allows a relaxation of emergency planning is factually incorrect; the MBDBE rulemaking does not change the existing emergency planning requirements. Concerns with the phaseout of emergency planning requirements in the decommissioning process are out of scope for this rulemaking and should be provided during opportunities for public comment on the decommissioning rulemaking.

The portion of this comment asserting that the MBDBE rulemaking allows a relaxation of SFP cooling capability in the context of a hostile action-based event is factually incorrect. The proposed MBDBE rule included the following discussion on the subject at 80 FR 70620:

The NRC proposes to maintain the EDMGs requirement, because an event for which EDMGs would be required is not based on the condition of the fuel, but may instead result from aircraft impact and a beyond-design-basis security event which could introduce kinetic energy into the spent fuel pool independent from

the decay heat of the fuel. These types of events and their potential consequences were considered as a part of the rulemaking dated March 7, 2009, on Power Reactor Security Requirements (74 FR 13926). In the course of that rulemaking, the NRC took into account stakeholder input and determined that it would be inappropriate to apply the EDMG requirements to permanently shutdown and defueled reactors where the fuel was removed from the site or moved to an ISFSI [independent spent fuel storage installation]. However the resulting rule was written to remove the EDMG requirements once the certifications of permanent cessation of operations and removal of fuel from the reactor vessel were submitted rather than upon removal of fuel from the SFP. The NRC proposes to correct this error from the 2009 final rule in this proposed rule as explained in the “EDMGs” portion of this section.

The pertinent portion of the EDMG section of the FRN referred to in the above passage is at 80 FR 70624 and reads:

Applicability of the requirements of § 50.54(hh)(2) is currently governed by § 50.54(hh)(3), which makes these requirements inapplicable following the submittal of the certifications required under § 50.82(a) or § 52.110(a)(1). As discussed in the statement of considerations for the Power Reactor Security Rulemaking (74 FR 13926), the NRC believes that it would be inappropriate for the requirements for EDMGs to apply to a permanently shutdown, defueled reactor, where the fuel was removed from the site or moved to an ISFSI. The NRC proposes to require EDMGs for a licensee with permanently shutdown defueled reactors, but with irradiated fuel still in its spent fuel pool, because the licensee must be able to implement effective mitigation measures for large fires and explosions that could impact the spent fuel pool while it contains irradiated fuel. The difference between this proposed rule and § 50.54(hh)(3) would correct the wording of the latter provision to implement the sunseting of the associated requirement as was intended by the Commission in 2009. This change would not constitute backfitting for currently operating reactors because the proposed change concerns decommissioning reactors. The proposed change would not constitute backfitting for currently decommissioning reactors because the EDMGs are also required by the licensees’ license conditions that were made generically applicable through the Power Reactor Security Rulemaking and remain in effect.

These passages underlie the provisions of 10 CFR 50.155(a)(2) and 10 CFR 50.155(a)(2)(i) that govern the allowance to cease maintaining the strategies and guidelines for SFP cooling capabilities under circumstances associated with loss of large areas of the plant due to explosions or fire. The final MBDBE rule is structured to require the mitigation strategies to be maintained until the decay heat of the spent fuel is sufficiently low to provide enough time to enable the licensee to obtain offsite resources to sustain SFP cooling, at which time the

provisions in 10 CFR 50.155(b)(3) are the only remaining provision in effect. This provision remains in effect until the spent fuel is removed permanently from the SFP.

No changes were made to the final MBDBE rule as a result of this comment. As discussed in the NRC response to Rule Comment 47, the final MBDBE rule has been modified to clarify the decommissioning provisions of the rule.

**Rule Comment 22:**

The commenter states that sites proximate to hazard-elevating nonnuclear infrastructure, such as high-pressure pipelines, must also be understood to pose elevated risk mandating far more protection than now envisioned. [IPSEC 12]

**NRC Response:**

Although this comment is directed towards one nuclear power plant and did not recommend specific changes to the MBDBE rule, the NRC concludes that this comment proposes that the MBDBE rule address external hazards such as gas lines as one of any number of other specific external hazards that might exist around nuclear power plants. This comment is outside the scope of this rulemaking for the reasons stated in the NRC response to General Comment 9. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 23:**

The commenter states that the current 7–30 days of emergency fuel is not nearly enough, and that this would guarantee both a meltdown and an SFP fire. In the face of a national natural disaster, providing additional fuel and replacement generators to the reactor sites would not be viable options. The comment states that the NRC should require nuclear power plants to have a multiyear solution to prevent a massive radioactive isotope release. [Keating 1] The commenter states that there should be resilient onsite housing for employees, security, and their families, sufficient food stores for several years, several million rounds of ammunition, etc. The commenter further notes that all the plans in the world are useless, if there is no one around to operate, maintain, and secure the plant. The commenter also indicates that he hopes we never need to use some of these resources. [Keating 3]

**NRC Response:**

The NRC disagrees with this comment. The NRC imposed new requirements for licensees to have additional capability to mitigate BDB events to address uncertainties associated with such events. It is not the regulatory objective of these requirements that mitigation strategies should be able to address every conceivable BDB event, including the need to maintain indefinitely the key functions while outside the facility, societal collapse has occurred. The NRC response to General Comment 15 addresses a specific scenario of geomagnetic storms, which some external stakeholders believe could lead to such conditions. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 24:**

The commenter states that the NRC should require onsite solar/wind renewable power in the range of 2 to 4 times excess of requirements, several days of onsite LIFEPO<sub>4</sub> battery backup, plus necessary inverters/control equipment, spare parts to keep the plant in cold shutdown, and a complete set of replacement solar panels in secure storage. [Keating 2a] The commenter states that onsite renewable power could be added to the grid, and battery storage could be used for grid peaking/load leveling/cold start. [Keating 2b]

**NRC Response:**

The NRC disagrees with this comment. The NRC, in making Order EA-12-049 generically applicable, does not conclude that prescriptive requirements for a specific type of power source are the best means for establishing requirements. Future new reactors may identify innovative means for accomplishing the objective, which is established through performance-based requirements, and that is for licensees to have the capability to maintain or restore the key functions indefinitely, or until site functional capabilities can be maintained without the need for mitigation strategies. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 25:**

The commenter states that the NRC plan should include recently decommissioned plants that currently maintain hot reactor assemblies in cooldown pools. The commenter states that nuclear power plants should only be allowed to reduce their compliance as they reduce the risk. The commenter states that, once all fuel is in secured dry cask storage, then personal/energy requirements can be reduced to maintaining security and communications. [Keating 4]

**NRC Response:**

The NRC agrees with this comment that the requirements of the MBDBE rule should be adjusted (i.e., can be reduced) as the decommissioning process proceeds and risk is reduced. The MBDBE rule contains decommissioning provisions that were developed consistent with such an approach. Specifically, the applicability provisions of 10 CFR 50.155(a) allow for removal of requirements for decommissioning plants, based upon the inherent risk posed by irradiated fuel in the SFPs. It is not clear whether this commenter is suggesting that the MBDBE rule apply to ISFSIs. In fact, the MBDBE rule is constructed to not apply to ISFSIs for the reasons provided in the rule's SOC. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 26:**

The commenter states that the proposed requirements of 10 CFR 50.155(b)(1) are not adequate, or even partial solutions to the safety issues raised in PRM-50-96.

The commenter states that PRM-50-96 addressed scenarios in which the North American power grids would experience long-term blackouts that would last months to years. The commenter states that PRM-50-96 cited and quoted reports stating that coronal mass ejections from the sun could direct electrically charged particles to Earth, causing “a 1-in-100-year geomagnetic storm.” The commenter states that such an event could, in turn, cause more than 300 extra-high-voltage transformers to overheat and incur permanent damage, leading to large-scale, long-term blackouts. The commenter states that PRM-50-96 recommends regulations for preventing SFP fires in the event of such long-term blackouts. The commenter states that PRM-50-96 describes that in such an event, “the North American commercial grids...cannot be relied on to provide continual power for active cooling and/or water makeup of (SFPs). Moreover, existing means of onsite backup power are designed to operate for only a few days, while spent fuel requires active cooling for several years after removal from the reactor core.” The commenter believes that PRM-50-96 is a very important petition; it has drawn attention to the vulnerabilities of SFPs in the event of blackouts that would last months to years. The commenter states that the NRC seems to agree and notes that in December 2012, NRC staff members decided to consider safety issues raised in PRM-50-96 in its rulemaking process.

The commenter states that the NRC’s conclusion is that the frequency of a “catastrophic grid failure” from a Carrington-type event may be as high as once in 153 years, and the NRC also concludes that such a power failure, in turn, could initiate “a series of events potentially leading to core damage at multiple nuclear sites.”

The commenter expresses the view that PRM-50-96 is invaluable; it identified one of the events—blackouts that would last months to years—that most threatens public health and safety. The commenter states that the NRC’s FRN announcement on PRM-50-96’s acceptance also warns about the threat of long-term blackouts. The commenter states that, however, the NRC has failed to properly address the fact that the safety of SFPs (as well as reactor cores) is threatened by long-term blackouts.

The commenter states that licensees could devise a plan for obtaining sufficient resources in the event of a power blackout that would last for months to years; however, there is no way they could ensure that sufficient resources would actually be obtained. The commenter points to statements the NRC published in its December 2012 FRN announcing that PRM-50-96 had been accepted as support for these claims.

The commenter states that the proposed rules in “Mitigation of Beyond-Design-Basis Events” need to be rewritten in accordance with what PRM-50-96 requests. The commenter states that the new rules need to stipulate a means to adequately protect SFPs in the event of a long-term blackout and that adequately protecting reactor cores at nuclear plants in such an event is also needed. [Leyse-1]

**NRC Response:**

The NRC disagrees with the commenter’s views that the MBDBE rule is not an adequate or even a partial solution to addressing the effects that might be caused by geomagnetic

disturbances. By establishing a capability to maintain or restore the key safety functions at nuclear power plants for an indefinite period of time, supported by offsite assistance from the regional response centers, the MBDBE rule does address the effects that might be caused by geomagnetic disturbances, in part. As the commenter notes, the NRC did accept PRM-50-96 and will give further consideration to that PRM, including the feedback provided on the MBDBE rule that relates to geomagnetic disturbances. Accordingly, this comment is outside the scope of this rulemaking for the reasons stated in the NRC response to General Comment 15. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 27:**

The commenter states that there are other events that could also lead to power blackouts that would last months to years, including cyberattacks. It is noteworthy that, in 2015, Ted Koppel released a bestselling book, *Lights Out: A Cyberattack, A Nation Unprepared, Surviving the Aftermath*, addressing the threat of cyberattacks collapsing the U.S. power grid for a period of months. Koppel interviewed General Lloyd Austin III, Commander of U.S. Central Command, for *Lights Out*. Koppel asked the General if he thinks that a cyberattack could disable a large portion of the U.S. power grid. “It’s not a question of if,” the General replied, “it’s a question of when someone will try that.” [Leyse-2]

**NRC Response:**

This comment is outside the scope of the MBDBE rule for the reasons stated in the NRC response to General Comment 9. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 28:**

The commenter states that the requirements of 10 CFR 50.155(b)(1) are based on the premise that offsite assistance and resources would be available whenever they were needed in the event of a power blackout that would last for months to years. The commenter expresses the view that this is a major flaw. [Leyse-8]

**NRC Response:**

The NRC agrees with the comment that the MBDBE rule is based on the premise that offsite assistance would be available when needed (i.e., what the commenter terms “whenever they are needed” and which, for implementation of the mitigation strategies, means “within a reasonable period of time after occurrence of the event”). The NRC disagrees that the rule is flawed because it does not contain requirements to address a longer duration of offsite assistance and that access to the site could be limited. The NRC imposed new requirements for licensees to have additional capability to mitigate BDB events to address uncertainties associated with BDB events. It is not the regulatory objective of these requirements that mitigation strategies should be able to address every conceivable BDB event, including events for which the transmission system may be disabled for months or years, which this comment suggests. The commenter should note that the NRC’s consideration of geomagnetic

disturbances will be further addressed when it gives further consideration to PRM-50-96, as discussed in the NRC response to General Comment 15. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 29:**

The commenter states that the proposed requirements of 10 CFR 50.155(b)(1) do not address a means to prevent criticality accidents in certain SFP accident scenarios in which the fuel assemblies would overheat after being exposed to air. The commenter states that neutron-absorber materials could melt in such scenarios, and if neutron-absorber materials melted, criticality accidents could occur if the SFP were partly or completely refilled with water.

The commenter states that, in the event of a power outage that would last months to years, a nuclear power plant could have an SBO, which the commenter states would be a complete loss of ac power. The commenter states that, in the event of an SBO, the SFP could boil off enough water to partly or completely expose the fuel assemblies to air, and if fuel assemblies were uncovered, temperatures in the SFP could increase enough to cause neutron-absorber materials placed in high-density storage racks to melt. The commenter states that Boraflex and Boral are neutron-absorber materials with the following characteristics: Boraflex vitrifies and melts at approximately 300 degrees C (572 degrees Fahrenheit (F)) and 500 degrees C (932 degrees F), respectively, and would be ineffective once heated above approximately 300°C (572 degrees F); and Boral melts at approximately 657 degrees C (1,214 degrees F).

The commenter states that, hence, the NRC seems to believe that criticality accidents, or inadvertent criticality events, could play a significant role in an SFP accident in cases in which neutron-absorber materials would become ineffective. The commenter states that, if a critically accident were to occur, local fuel and fuel-cladding temperatures would rapidly increase and there would also be “an increase in decay products, which [would] have a delayed effect on temperature increase[s].” The commenter states that increased onsite dose rates, caused by a criticality accident, would impede (or possibly prevent for significant time periods) efforts to mitigate an SFP accident. The commenter notes that the “SFP Consequence Study” cautions that “[t]he possibility of a criticality event cannot be summarily dismissed.” The commenter further notes that the NRC has a regulation pertaining to preventing criticality accidents in the event that an SFP would be partly or completely refilled with either unborated or borated water—10 CFR 50.68, “Criticality Accident Requirements,” under which borated water would absorb neutrons and help prevent criticality accidents. Regarding refilling an SFP with unborated water, the commenter notes that 10 CFR 50.68(b)(4) states:

If no credit for soluble boron is taken, the k-effective [the estimated ratio of neutron production to neutron absorption and leakage] of the spent fuel storage racks loaded with fuel of the maximum fuel assembly *reactivity must not exceed 0.95* [below 1.0 is subcritical], at a 95 percent probability, 95 percent confidence level, if flooded with unborated water [emphasis added in the comment].

The commenter states that, nonetheless, the NRC has overlooked how SFP criticality “events” could make an SFP accident far worse: first, MELCOR analyses that the NRC conducted to help justify its decision to not expedite the transfer of spent fuel assemblies did not consider criticality accidents, and second, 10 CFR 50.155(b)(1) does not have provisions for preventing criticality accidents in cases in which water would be sprayed into an SFP (the refilling of a drained SFP). The commenter states that, in the event of an SFP accident, in some scenarios, an SFP could be partly or completely refilled with unborated water. The commenter notes that in the Fukushima Dai-ichi accident, SFPs were refilled (at least to some degree) with seawater; and reactor cores were injected with both unborated and borated seawater. The commenter states that the proposed rules in “Mitigation of Beyond-Design-Basis Events” need to be rewritten to stipulate a means that would adequately protect SFPs against criticality accidents in cases in which there would be the refilling of a drained SFP. The commenter speculates that it should be stipulated and explicitly stated that drained SFPs, in cases in which neutron-absorber materials have possibly become ineffective, must be refilled with adequately concentrated borated water. [Leyse-8]

**NRC Response:**

The NRC disagrees with this comment. This comment raises a number of concerns that are outside the scope of this rulemaking for the reasons stated in the NRC response to General Comment 8. The NRC notes that, for instances where depletion of water in an SFP occurs through the mechanism of boil off, the boiling will not remove boron in solution in the SFP. Therefore, refilling the SFP with unborated water would have the effect of returning the boron to near its original concentration within the SFP. There could be some dilution of boron concentration within the SFP only for those instances where there is drainage or sloshing that removes water from the SFP, which are addressed in the NRC response to General Comment 8. Additionally, this comment raises issues that this same commenter raised in a petition for rulemaking (PRM-50-108) that was considered and denied by the Commission (81 FR 29761; May 13, 2016). No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 30:**

The commenter urges the Commission to mandate deployment and reporting from GIC monitors at all commercial nuclear power plants under NRC license, in part, to reduce costs of needless shutdown and associated safety risks of needless shutdowns during moderate geomagnetic disturbances that depend upon near-real-time assessments; and, in part, to improve assessments that may lead to purchase of hardware to protect from quasi-direct current (dc) and associated harmonic damage; and also, to facilitate timely replacement of transformers damaged through cumulative quasi-dcs during solar storms. [FRS-1]

**NRC Response:**

This comment is outside the scope of the MBDBE rulemaking for the reasons stated in the NRC response to General Comment 15. This feedback provided on the MBDBE rule that pertains to the NRC’s treatment of geomagnetic disturbances will be addressed under the NRC



consideration of PRM-50-96. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 31:**

The commenter asks the Commission to develop design and safety criteria that will enable demonstration programs to better protect nuclear power plant operations and to improve NRC decisionmaking in anticipation of solar storms and during solar storms; and demonstration programs to protect NRC-licensee power plants from man-made EMP hazards, including the interconnection of these facilities via reliable “cranking pathways” from hydroelectric plants, other generating facilities, and possibly pumped storage facilities to more reliably “black start” nuclear power plants after both natural occurring and man-made EMP events. [FRS-2]

**NRC Response:**

The portion of the comment regarding the protection of nuclear power plants from the effects of geomagnetic disturbances is outside the scope of the MBDBE rulemaking for the reasons stated in the NRC response to General Comment 15. This feedback will be addressed when the NRC further addresses PRM-50-96. Other portions of this comment address issues associated with reliability of the transmission system, for which the NRC does not have regulatory authority, and instead are within the purview of FERC. Finally, the commenter suggests that the NRC implement requirements for demonstration programs to protect nuclear power plants from EMP hazards. Protection of nuclear power plants against electromagnetic impulses, which might occur due to hostile acts, exceeds the requirements set forth in 10 CFR 73.1(a), which define the DBT. Therefore, this portion of the comment is both out of scope of the MBDBE rule and beyond the DBT against which nuclear power plants must establish protection. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 32:**

The commenter, noting the importance of a reliable electricity transmission infrastructure, urges the NRC to adopt an “all hazards” framework for risk assessment and for prioritization of mitigation initiatives. The commenter criticizes the NRC for focusing on only five external hazards from five classes of events: seismic impacts; external flooding; severe storms with high winds; snow, ice, and extreme cold temperatures; and extreme high temperatures. By limiting the scope of mitigation to these five hazards, the NRC essentially ignores three hazards that could place the North American electric grid, or major regions of it, at significant risk of extended electric blackout: severe solar geomagnetic disturbances, high-altitude EMP attack, and cyberattacks. The commenter urges the Commission to include these three hazards in the scope of “beyond-design-basis event” assessment and mitigation, partly to ensure that the licensee power plants remain safe but also to protect the future viability of nuclear electric power as an essential component of baseload electric generation. The commenter also asks the NRC to require its licensees to use equipment to protect against severe solar storms and EMP attacks. [FRS-4]

**NRC Response:**

The portions of this feedback that are arguing for NRC to address geomagnetic disturbances are outside the scope of the MBDBE for the reasons stated in the NRC response to General Comment 15. The associated feedback will be addressed with PRM-50-96. The portions of this feedback requesting that the NRC consider, within the scope of the MBDBE rule, malicious events (i.e., cyber-attacks and EMP) that could affect the transmission system are outside the scope of the MBDBE rule for the reasons stated in the NRC response to General Comment 9. Portions of this comment that are directed to improving the reliability of the transmission system (i.e., requesting that the NRC impose requirements on nuclear power reactors that would serve that objective) are not within the regulatory authority of the NRC, and instead are within the regulatory purview of FERC.

The commenter provides feedback specific to the portion of supporting guidance that addresses external hazards and underlies implementation of Order EA-12-049 and will be adapted to the regulatory supporting guidance for the MBDBE rule. The commenter's feedback suggests that this consideration of hazards was limited to five classes of events. The NRC disagrees with this comment. The requirements that were imposed under Order EA-12-049 and contained in the MBDBE rulemaking are not specific to the hazard but instead are for an all-hazards capability. The selection of specific hazards to address for specific sites under Order EA-12-049 was accomplished using the guidance provided in JLD-ISG-2012-01, Revision 0, and the industry guidance it endorsed, NEI 12-06, Revision 0. The most pertinent portion of the guidance to this particular issue is contained in NEI 12-06, Appendix B, which discusses the screening process used to determine specific BDB aspects to address at particular sites. As a result of this screening process, a number of sites appropriately considered site-specific hazards beyond the five generic hazards identified by the commenter (e.g., the volcanic ash hazard at Columbia Generating Station).

No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 33:**

The commenter states that the NRC should assess solar geomagnetic disturbance events as a threat to extended loss of ac power (ELAP) conditions. [FRS-11]

**NRC Response:**

The NRC disagrees with the comment. The MBDBE rule assumes an ELAP occurs, since it provides a challenging damage state and enables the mitigation strategies to be developed and implemented. The NRC did not assume that the ELAP stemmed from a specific external event (i.e., it simply assumes the damage state occurs). The NRC will consider this feedback as part of its consideration of PRM-50-96 and determine whether there is a need to pursue additional regulation to address the effects of a geomagnetic disturbance (whatever those effects may be, to include an ELAP) on nuclear facilities. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 34:**

The commenter states that the Commission could encourage retrofits so that nuclear power plants could operate through solar geomagnetic disturbance events. It is the commenter's view that this could reduce the risks of loss of offsite power, or loss of extended or cascading outages in a region, since nuclear power is a contributor to stability of baseload electric grid operations. The commenter states that, with relatively modest retrofit costs, NRC-licensed power plants could be modified so they can "operate through" solar geomagnetic storms. The commenter identified one Minnesota company that offers neutral ground blocking devices that have been third-party tested and verified by the U.S. Department of Energy's Idaho National Laboratory. The commenter states that the cost is about \$400,000 per neutral blocking device, plus transportation costs. The American Transmission Company in Wisconsin has successfully beta-tested a prototype neutral blocker in its commercial grid since February 2015. [FRS-12]

**NRC Response:**

The NRC notes that encouraging retrofits so that nuclear power plants can operate through solar geomagnetic disturbance events to maintain grid stability is outside the mission of the NRC and should be addressed by other means. To the extent that this comment suggests imposing requirements for such retrofits, it is outside the scope of the MBDBE rulemaking for the reasons stated in the NRC response to General Comment 15. This feedback will be addressed when the NRC gives further consideration to PRM-50-96. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 35:**

The commenter asks whether an ability to "operate through" or to recover from a HEMP attack should be a responsibility of nuclear power plant operators in an era of asymmetrical warfare.

The commenter states that the world has witnessed an attack on the electric grid of Yemen in 2013; a less than successful denial-of-service attack on the Israeli electric grid in June 2014; and a temporarily successful attack that shut down eight regional electric utilities in the Ukraine by foreign cyber attackers on December 23, 2015. The commenter asks what can be done to enhance deterrence of attacks on critical infrastructure, of which the electric grid is a prime target. The commenter states the view that it should not be necessary to protect the entire electric grid of North America to enhance the deterrence of a HEMP attack. The commenter references one study that estimates that protection of 20 percent of the electric grid could enable recovery of about 60 percent of the economy. The commenter asks what the minimal level of protection needed to deter attack is, and how much that effort would cost.

The commenter asks how much it would cost to protect a commercial nuclear power plant from a HEMP device. The commenter references a firm in Newtown, CT, which operates EMP test laboratories, and estimates that the cost to protect a high-voltage commercial generating facility would be about \$250,000, largely irrespective of generating capacity; and the cost to protect

(against E-1 and E-3)<sup>2</sup> for a step-up transformer would be about 10 percent of the transformer cost, roughly an additional \$300,000 to \$600,000, depending upon the specific transformer. The commenter states that the same protections would also be afforded from severe solar geomagnetic storms.

The commenter states that some nuclear generating facilities have been partially tested for their electronic equipment's immunity against electromagnetic interference. The commenter states that the primary purpose of the testing was to ensure safe shutdown of the nuclear reactor. The commenter expresses the view that there appears to be substantial, but incomplete, E-1 EMP protection of nuclear power plants, due to the attenuation of EMP fields by facility walls. The commenter states that the EMP transients penetrating the facility on incoming cabling remain a significant problem. The commenter proposes that, as a "beyond-design-basis event" category, the NRC develop, in cooperation with industry and the national laboratories, criteria for (1) "operate through" capabilities for solar storms, and (2) "prompt recovery" capabilities of nuclear power plants after HEMP events, including protection of "black start" cranking paths from designated black start plants (usually hydroelectric or internal combustion-driven generators) to nuclear power plants.

The commenter states that the goal would be to develop standards for "demonstration projects," whereby some combination of hydroelectric generators and nuclear generators, and possibly pumped storage hydroelectric facilities, would be protected.

The commenter states that this is not a proposal to mandate EMP protection for NRC-licensed nuclear power plants. The commenter states that it is a proposal to develop design and safety criteria for demonstration programs that might enable existing and future nuclear power plants to operate through solar geomagnetic storms and to limit damage from a man-made EMP attack, and to recover after either a severe solar geomagnetic storm or a HEMP event occurs. [FRS-13]

**NRC Response:**

This comment does not suggest any changes to the MBDBE rule. The portion of the comment associated with geomagnetic disturbances will be addressed when the NRC gives further consideration to PRM-50-96. Other portions of this comment address issues associated with the reliability of the transmission system, for which the NRC does not have regulatory authority. No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 36:**

Three commenters provided similar feedback concerning the MBDBE rule's loss of all ac power requirements.

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<sup>2</sup> E-1, E-2, and E-3 are three components of the electromagnetic impulse as defined by the International Electrotechnical Commission.

First, a commenter stated that the proposed rule does not fully address the lessons learned from the meltdown of three nuclear units and loss of SFP cooling at multiple units at the Fukushima Dai-ichi site. One of the root causes of the accident was due to the total loss of all power systems (loss of all ac and dc power systems, including power from inverters). Based on the commenter's review of the proposed rule and Order EA-12-049 and its implementing guidance documents, the commenter noted that the proposed rule did not consider the loss of dc electric power and ac power produced by inverters through station batteries. The current mitigation strategies developed by the industry are based on the availability of power from batteries and the inverters. Without the initial assumption of loss of all power systems (ac and dc systems) and an appropriate Phase 1 mitigation strategy to address loss of all power, the U.S. nuclear power plants will not be able to prevent a future BDB event, such as the Fukushima Dai-ichi accident. The current SBO rule (10 CFR 50.63) also did not consider the loss of dc and vital ac power from inverters. For passive plants, such as the AP1000 and ESBWR reactor designs, mitigating strategies involving an initiating event that causes the loss of dc power is detrimental in preventing a nuclear reactor accident such as the Fukushima Dai-ichi. The first commenter recommended that the Commission amend the proposed rule for consideration of loss dc power and power from inverters, in addition to the loss of ac power, as initial assumptions the licensees need to consider for mitigating BDB events, such as the Fukushima Dai-ichi accident.

The second commenter noted that the initial condition for 10 CFR 50.155(b)(1) addresses only loss of all ac. At Fukushima, the dc was also lost, and most of the electrical switchgear, including ac and dc, was not in a condition to be reenergized. Dc batteries are centrally located, usually two sets (train A and B). These batteries are also susceptible to failure as a consequence of the severe accident. For certain models of BWRs, different voltage levels of the safety power supply are needed for addressing a simple SBO (250 volts dc for valve operation and 125 volts dc for control, and in certain cases, 24 volts for indication). Unless there is decentralized dc power (appropriate dc supplies locally) for nonelectric cooling systems (diesel-driven/steam-driven pumps), the system operation cannot be assured under severe accident conditions. A reactor trip following a full-power operation would require these capabilities to be immediately available for preventing core damage. Therefore, assuming loss of ac power alone is clearly inadequate.

A third commenter stated that the proposed rule does not fully address the improvements that the commenter feels need to be made to further enhance safety. The root cause of the Fukushima accident was due to the total loss of all power systems (both ac and dc power systems). The current proposal does not consider the total loss of dc power nor ac power from inverters through station batteries. The rule does not relate the electrical power system enhancements to address the total loss of all ac power leading to an SBO. For example, it does not require backup power supplied by a portable diesel generator(s) to be made readily available to allow key instrumentation and control equipment and key electrical loads to remain operable. [Mathew, Koshy, Castillo-1]

**NRC Response:**

The NRC disagrees with these comments. These three comments state that the NRC did not address a loss of all ac and dc power events and that the MBDBE rule should require that this condition be assumed in light of the events at Fukushima. The NRC concludes that the MBDBE rule requirements do not have to be revised. The MBDBE rule does address the condition cited by the commenters, although it does not address this condition in the manner that the comments propose. The MBDBE rule addresses the loss of all ac power, including ac power from inverters fed by batteries or dc power directly from batteries, as follows:

- (1) An extended loss of ac power and loss of normal access to the ultimate heat sink (or loss of access to the normal heat sink for passive designs) is assumed for the purposes of developing the supporting analysis, determining the resultant conditions, and establishing times for key actions that support the development and implementation of mitigation strategies providing additional capability for beyond-design-basis external events.
- (2) To address conditions more severe than the assumed conditions discussed above (potentially including loss of power from batteries) and thereby provide a set of regulatory guidance that implements the loss of all ac power requirement of the MBDBE rule, the mitigation strategies contain contingencies. These contingencies involve such actions as sending personnel to locally and manually operate non-ac driven core cooling pumps (e.g., a turbine-driven auxiliary feedwater (TDAFW) or reactor core isolation cooling (RCIC) pump) to maintain or restore core cooling. These contingencies include the capability to obtain instrument readings using portable multimeters at locations that do not rely on the functioning of intervening installed electrical equipment.

The staff notes there are limitations to what instruments can be repowered by a portable multimeter. While it is possible to repower, and obtain readings from, a resistance temperature detector (RTD) or a thermocouple (T/C), there are many types of sensors that would need a more specialized type of equipment to accomplish the repowering and measurement. The choice of instrument readings to obtain through these contingencies should allow a licensee to diagnose the symptoms and verify system response to confirm the success of actions taken or to select actions that should be taken in response to the symptoms. Engineering evaluations and/or calculational aids needed to facilitate the interpretation of readings from such instrumentation when taken under the MBDBE conditions expected should be performed as part of the planning process for the mitigating strategies, and should identify constraints and limitations of such capabilities, including uncertainties in the results.

The NRC received other comments that indicated it should only require that an extended loss of ac power be assumed and no other actions are necessary to comply with the proposed requirements. These comments caused the NRC to conclude that the proposal was not clear with regard to the “loss of all ac power” requirements. First, the word “extended” is removed from 10 CFR 50.155(b)(1) because the NRC concludes that it contributes to the confusion

regarding the requirement. The requirements in 10 CFR 50.155(b)(1) require that a loss of all ac power be assumed and that the strategies be capable of maintaining or restoring the key safety functions, indefinitely or until the mitigation strategies are no longer needed, and this includes the acquisition of offsite resources to sustain those functions. As such, the requirements are clearly requiring a capability to address an “extended” loss of ac power, and the word “extended” is not necessary in (b)(1). Additionally, changes were made to the SOC of the final MBDBE rule to clarify the meaning and intent of “loss of all ac power” (refer to SOC Comments 1 and 10). These changes to the rule and SOC address the three comments above (Rule Comment 36).

**Rule Comment 37:**

The commenter states that the rule does not take into account the load shedding strategy to extend the existing station's battery life to ensure that the connection of portable generators can be completed before batteries are depleted. The commenter further states that the rule does not take a proactive approach to ensure the availability of backup power and that there needs to be an evaluation to determine if the batteries can be extended past 8 hours that may be needed to mitigate a “BDB accident.” The commenter suggests that a predefined time should be required to be determined between the total loss of ac power and connection of additional power sources, such as having a readily available portable generator. [Castillo-2]

**NRC Response:**

The NRC disagrees with this comment. The MBDBE rule establishes performance-based requirements that require core cooling, containment, and SFP cooling capabilities to be maintained or restored. The supporting guidance provides an acceptable approach for complying with these requirements and addresses the need to have strategies for extending battery life and use of portable generators, as well as many other actions, including those that are time sensitive. Of note, this guidance reflects current operating reactors. Future reactors may require a different set of strategies, based on the specific reactor design, to meet the rule requirements. No changes were made to the MBDBE rule as a result of this comment.

**Rule Comment 38:**

One commenter noted that, with respect to the proposed rule FRN text for 10 CFR 50.155(b)(1) on page 70,644 that reads, “ELAP concurrent with either a loss of normal access to the ultimate heat sink (LUHS) or, for nuclear power plants with passive reactor designs, a loss of normal access to the normal heat sink...”<sup>3</sup>; 10 CFR 50.155(b)(1) does not address the possibility that some new plant designs may use an ultimate or normal heat sink.

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<sup>3</sup> This quotation in this document is included verbatim from the comment, which does not accurately reflect the text of the proposed § 50.155(b)(1) in the FRN at page 70,644, which uses the phrase “extended loss of all ac power” rather than the acronym “ELAP” and does not include the parenthetical identification of the acronym “LUHS.”

To avoid having to make a rule change when additional new plant designs progress, the commenter suggests revising the language in 10 CFR 50.155(b)(1) regarding heat sinks to accommodate new designs as they become available. [NEI TC-54]

**NRC Response:**

The NRC disagrees with this comment. While the NRC recognizes that the rule language may create challenges for future designs in terms of the assumed damage state (and the NRC notes that this may be true for both the “access to the ultimate heat sink” and the assumed “loss of all ac power”), the NRC concludes that keeping this language in the final MBDBE rule is the best path forward, based on what is currently known (i.e., currently operating power reactors and currently approved designs and COL applications). If new power reactor designs are reviewed and approved and require different regulatory treatment for mitigation of BDB events, that revised regulatory treatment will need to be addressed at that time, once the specifics of the design are known. This may be accomplished in the design certification rulemaking or COL proceeding, as appropriate. No changes were made to the final MBDBE rulemaking as a result of this comment.

**Rule Comment 39:**

One commenter noted that, with respect to the proposed rule language for loss of large areas of the plant in 10 CFR 50.155(b)(2) (renumbered as 10 CFR 50.155(b)(3) in the final rule), while the requirement in 10 CFR 50.155(b)(1) addresses strategies and guidelines that must be capable of being implemented sitewide, 10 CFR 50.155(b)(2) does not specify that it is only intended to apply to the affected unit.

To avoid backfit concerns regarding a potential unanalyzed expansion of what is now required by 10 CFR 50.54(hh)(2), the commenter suggests that 10 CFR 50.155(b)(2) be reworded to clearly state that the extensive damage mitigation guidelines must be capable of being implemented in the affected unit and not sitewide. [NEI TC-55]

**NRC Response:**

The NRC agrees with this comment and has modified the final MBDBE rule to more clearly define the requirements for the mitigation of losses of large areas of the plant due to explosions and fires.

**Rule Comment 40:**

One commenter noted that the proposed rule language in 10 CFR 50.155(c)(4), “The equipment relied on for the mitigation strategies in paragraph (b)(1) of this section must include reliable means to remotely monitor wide-range [SFP] levels to support effective prioritization of event mitigation and recovery actions,” would “sweep up” SFPI into the requirements for mitigating strategies. Order EA-12-051 was separate and distinct from the mitigating strategies order with different purposes and characteristics.



The commenter notes that the strategies under 10 CFR 50.155(b)(1) do not rely on SFPI under Order EA-12-051, which is only intended to provide information for the prioritization of actions. The proposed rule language could lead to inadvertent application of unnecessary and unintended requirements for SFPI.

The commenter suggests clarifying 10 CFR 50.155(c)(4) to avoid such situations. [NEI TC-56]

**NRC Response:**

The NRC agrees with the concern that the proposed rule inappropriately linked the requirements for SFP level stemming from Order EA-12-051 with the requirements for mitigation of BDB external events stemming from Order EA-12-049. The NRC addresses this concern by separating the requirements for SFPI from the requirements for mitigation of BDB external events. The final MBDBE rule has been revised accordingly.

**Rule Comment 41:**

One commenter noted that the proposed rule, in 10 CFR 50.155(c)(2)(i), would require that “Each licensee that received the March 12, 2012, NRC letter issued under § 50.54(f) concerning reevaluations of seismic and flooding hazard levels, shall provide reasonable protection against that reevaluated seismic or flooding hazard(s) if it exceeds the design basis of its facility.” The commenter also noted that, with respect to this section and the discussion in the FRN at page 70,633, in “V. Section-by-Section Analysis, Proposed § 50.155(c), Equipment Requirements,” the guidance for implementation of mitigation strategies uses two concepts for ensuring equipment is available to perform its mitigation function(s). For plant equipment, the guidance provides that the equipment must meet the current design basis (including the reevaluated flooding and seismic hazards if they are greater). For FLEX equipment, the concept of reasonable protection is applied to provide reasonable assurance that the FLEX equipment will be available to perform its function. The rulemaking proposes to combine these two concepts under the term reasonable protection. This will create confusion and, in some cases, creates a conflict between the rule and the guidance. For example, the section-by-section analysis states that 10 CFR 50.155(c)(2) sets the hazard level for reasonable protection at the design basis or the reevaluated flood or seismic hazard, whichever is greater. But the analysis also recognizes that the guidance allows use of an American Society of Civil Engineers (ASCE) Standard, “Minimum Design Loads for Buildings and Other Structures,” ASCE 7-10, to be used for reasonable protection. These two are in conflict. Hazard protection requirements for SFPI are limited to the NRC-endorsed guidance, NEI 12-02, Revision 1, which cites the hazard protection requirements in NEI 12-06, Rev 0. SFPI would be subject to a new requirement for evaluation against the reevaluated hazards (the intent of proposed 10 CFR 50.155(c)(2)(i)—which is lost in this proposed change). As indicated above, this does not necessarily mean that the SFPI equipment must be altered in any way to account for the reevaluated hazards. Other actions might be available to provide the needed information contemplated by the original Order EA-12-051 or to support FLEX operations. With regard to

support for FLEX operations, SFPI shall be treated no differently than any other existing plant instruments providing information for FLEX operations.

Rather than state that all equipment needs to be “reasonably protected,” the final rule should reflect the approach allowed by guidance, which ensures that the equipment is available to perform its specified function. For example, 10 CFR 50.155(c)(2) should be worded “(2) The equipment relied on for the mitigation strategies required by paragraph (b)(1) of this section must withstand the effects of natural phenomena applicable to the facility (including the reevaluated seismic and flooding hazards).” Or, in place of “withstand,” the phrase “remain available” could be used. The phrase at the end of this section “that are equivalent to the design basis of the facility” cannot be used, as it is contrary to the guidance for reasonable protection of FLEX equipment in NEI 12-06. This language would also allow 10 CFR 50.155(c)(2)(i) to be eliminated. (See the comments in Attachment 3 under the question Methodology for Addressing Reevaluated Hazards). [NEI TC-49, NEI TC-57]

**NRC Response:**

The NRC disagrees in part with this comment for reasons similar to the discussions of SOC Comments 17 and 23. The fundamental applicability of the reasonable protection requirement is, as documented in the rule language, to equipment that is relied on for the mitigating strategies without regard to whether the equipment is FLEX equipment, as defined in NEI 12-06, or plant equipment, as that term is used in NEI 12-06. The confusion appears to be with regard to the application of the “reasonable protection” standard to safety-related SSCs that have both design-basis and BDB functions. Safety-related SSCs that function initially in response to BDB external events have two sets of functions: safety-related functions and BDB functions. The requirements placed on these SSCs to perform their safety-related functions for the design-basis events are extensive and are intended to result in an increased level of assurance that the SSCs will perform those safety-related functions, during and/or following the design-basis events, as applicable. (See “Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Reactors; Final Rule,” *Federal Register*, Vol. 69, No. 224, November 22, 2004, pp. 68,008–68,048.) The regulatory requirements and resulting level of regulatory assurance for the BDB functions (i.e., the BDB functions that these SSCs perform to maintain or restore core cooling, containment, and SFP cooling capabilities) for these same dual-function SSCs are intended to be less. The reevaluated hazards are not design-basis external events, and therefore the regulatory approach for addressing the reevaluated hazard information in the MBDBE rule is fundamentally different from the regulatory approach used to address design-basis external events. The “reasonable protection” standard is a means for enabling greater flexibility for addressing the reevaluated hazards, and in the process, enabling a BDB regulatory framework that establishes an appropriate level of assurance. Accordingly, the set of requirements that are applicable, and by direct extension, the resulting level of regulatory assurance, is directly linked to whether the SSC or equipment is performing a design-basis function or a BDB function. It is established by the function performed by the SSC, not by equipment or SSC alone.

With regard to the applicability of the reasonable protection requirement to SFP instrumentation, the NRC agrees with the comment. The NRC recognizes that the clarity of the discussion of this area could be improved and has therefore modified the SOC accordingly.

**Rule Comment 42:**

One commenter suggested that the rule language be modified to state that 10 CFR 50.65, “Requirements for monitoring the effectiveness of maintenance at nuclear power plants,” (the Maintenance Rule) does not apply to FLEX equipment or SFPI, whose primary design function is to support strategies developed to comply with this rule. The Maintenance Rule is intended to apply to SSCs whose failure affects safety-related functions, are relied upon for the mitigation of design-basis events, and are required for an EOP mitigating function. The failure of FLEX equipment or SFPI with the primary design function of supporting this rule does not affect any safety-related function nor is this equipment relied upon or required for a design basis or an EOP mitigating function.

The commenter suggests that the proposed regulation should state that the Maintenance Rule is not applicable to FLEX equipment or SFPI required by 10 CFR 50.155(c). [NEI TC-58]

**NRC Response:**

The NRC agrees that it was not intended that the Maintenance Rule apply to the FLEX equipment when used for compliance with 10 CFR 50.155. However, the criteria in 10 CFR 50.65(b) already ensures that the FLEX equipment is not scoped into the Maintenance Rule based solely upon its use to meet the requirements of 10 CFR 50.155. The commenter’s suggestion that the NRC should add a statement that the Maintenance Rule does not apply is therefore unnecessary. Furthermore, a licensee may choose to use FLEX equipment for another regulatory application (separate from 10 CFR 50.155) that could result in the FLEX equipment becoming within the scope of the Maintenance Rule. If this hypothetical scenario occurs, a statement as suggested by the commenter would create regulatory confusion and could result in the need for an exemption. No changes were made to the final MBDDBE rule as a result of this comment, however the NRC added a footnote to the SOC providing examples of the application of the scoping requirements of the Maintenance Rule to FLEX equipment.

**Rule Comment 43:**

One commenter suggested that the rule language be modified to reflect that the NRC’s cyber security rule codified in 10 CFR 73.54 would not apply to FLEX equipment or SFPI. The cyber rule provides the programmatic requirements to defend against the DBT of radiological sabotage cyber attack. The regulation applies to digital SSCs within the nuclear power plant that, if compromised, could directly or indirectly result in radiological sabotage (i.e., significant core damage or spent fuel sabotage). The FLEX equipment and SFPI do not provide safety-related or important-to-safety functions. Nor do the FLEX equipment and SFPI constitute support systems or equipment necessary for safety-related systems to perform their intended safety functions. Accordingly, the NRC’s cyber security regulations do not apply. Additionally,

given the FLEX equipment would be covered by a maintenance program, imposing the cyber security requirements would not provide a significant safety benefit.

The commenter suggests that the proposed regulation should state that the cyber security rule (10 CFR 73.54) is not applicable to FLEX equipment or SFPI required by 10 CFR 50.155(c). The proposed regulation should also state that the wide-range level instruments are not subject to the requirements of the cyber security rule, regardless of the use of the information provided by the instruments for any emergency action level(s). [NEI TC-59]

**NRC Response:**

The NRC agrees that the requirements of 10 CFR 73.54 do not apply to FLEX equipment or SFPI. The equipment reference does not meet the scoping requirements of 10 CFR 73.54. However, the NRC disagrees with the commenter's proposal to have the regulation state that 10 CFR 73.54 is not applicable to avoid the potential for regulatory confusion. Instead, the NRC revised the supporting SOC to reflect this fact and to improve clarity and understanding of the rule.

**Rule Comment 44:**

One commenter noted that, regarding the proposed 10 CFR Part 50, Appendix E, Section VII, the wording in this section notwithstanding, future readers may make the interpretation that these requirements must be described in a site emergency plan. Since 10 CFR 50.155(b)(4) addresses staffing and 10 CFR 50.155(e)(1)–(4) address communications, the clarity of the MBDBE requirements would be improved, if the related staffing and communications aspects were consolidated in 10 CFR 50.155.

The commenter suggests relocating the contents/requirements of proposed 10 CFR Part 50, Appendix E, Section VII, to proposed 10 CFR 50.155 as paragraph (f), redesignating "Change Control" as paragraph (g) and "Implementation" as paragraph (h), and making conforming changes throughout the FRN. [NEI TC-60]

**NRC Response:**

The NRC agrees that relocating the staffing and communications requirements into 10 CFR 50.155 results in a clearer rule because the staffing and communication requirements are more directly linked to implementation of the mitigation strategies. This revision would also facilitate better change control because both the staffing and communications capability are important elements to maintaining a continuing mitigation strategies capability, as the licensee makes changes to the implementation of these requirements. The final MBDBE rule was revised to address this concern.

**Rule Comment 45:**

One commenter noted that proposed 10 CFR Part 50, Appendix E, Section VII, "Communications and Staffing Requirements for the Mitigation of Beyond-Design-Basis Events,"

requires holders of COLs issued under 10 CFR Part 52, where the Commission has not yet made the finding under 52.103(g), to perform a detailed analysis and submit it to the NRC “at least 2 years before the date specified for completion of the last inspections, tests, and analyses in the inspections, tests, analyses, and acceptance criteria (ITAAC) completion schedule required by § 52.99(a) of this chapter for the plant.” Some COL holders are on schedule to complete all their ITAAC less than 2 years from the rule’s expected effective date (e.g., a January 2019 fuel load date with a January 2017 rule effective date). Under the proposed rule, such a licensee could not comply with the implementation schedule in the proposed rule. As a practical matter, a licensee in that situation may have to complete and submit the required analysis before the rule even becomes effective to avoid the need for an exemption. To give licensees a reasonable amount of time to comply with this rule, COL holders who are already within 2 years of the specified date for their last ITAAC completion when the rule becomes effective should be given the same submittal schedule as operating plants.

The commenter suggests revising proposed 10 CFR Part 50, Appendix E, Section VII.1.b, as follows:

b. A holder of a combined license issued under 10 CFR part 52 before the Commission has made the finding under § 52.103(g) of this chapter shall perform this analysis and submit it to the NRC under § 52.3 of this chapter at least 2 years before the date specified for completion of the last inspections, tests, and analyses in the inspections, tests, analyses, and acceptance criteria (ITAAC) completion schedule required by § 52.99(a) of this chapter for the plant OR [DATE 365 DAYS AFTER EFFECTIVE DATE OF THE FINAL RULE], whichever is later. [NEI TC-61]

**NRC Response:**

The NRC agrees that this concern needs to be addressed. By relocating the staffing and communications requirements into 10 CFR 50.155 (see NRC response to SOC Comment 38), the schedule for compliance is now addressed in 10 CFR 50.155(g). The rule no longer requires the analyses for staffing and communication to be submitted to the NRC on a specific schedule, which removes the concern this commenter expresses regarding meeting an explicit schedule requirement. Instead, the applicant needs to establish these schedules through interaction with the NRC, such that the NRC can make the 10 CFR 52.103(g) finding.

**Rule Comment 46:**

The comment notes that “mitigation” is an elusive term with a wide spectrum of applicability. The comment states that this problem runs like a weak thread throughout the greater NRC regulatory scheme. However, it is particularly problematic with respect to BDB eventualities, since the existing aging fleet of nuclear plants was not designed to consider many of the stressors it increasingly confronts. The commenter questions where else in the NRC regulatory framework there is allowance for the likelihood that certain kinds of accidents such as an SFP fire are likely effectively “unmitigatable.” [IPSEC 6]

**NRC Response:**

The NRC does not agree that mitigation is an elusive term, with regard to its use in implementing the requirements of the MBDBE rule. Mitigation is an element of the NRC's defense in depth, and, along with accident prevention and many other features, has been an important foundational element of the NRC's regulation of nuclear power reactors. As discussed in response to other comments, the mitigation strategies required through Order EA-12-049 and being made generically applicable in this rulemaking are constructed to address uncertainties associated with BDB events. It was not the objective that the mitigation strategies should be able to address every conceivable BDB event, and neither is that necessary to achieve a regulatory framework that provides reasonable assurance of adequate protection of public health and safety. There are external hazards for which mitigation may be unlikely to be successful (e.g., meteorite strike). These events are extremely remote and do not present an undue risk to public health and safety. The comment implies the need to achieve a zero risk state. It is not possible to achieve such a condition, nor is it necessary to achieve zero risk to comply with statutory requirements of the Atomic Energy Act. The MBDBE rule, in conjunction with all the other requirements and orders of the Commission, would provide for reasonable assurance of adequate protection of public health and safety (i.e., ensure no undue risk to public health and safety).

The portions of this comment regarding the safety of SFPs are outside the scope of this rulemaking for the reasons stated in the NRC response to General Comment 8.

No changes were made to the final MBDBE rule as a result of this comment.

**Rule Comment 47:**

One commenter noted that the FRN page 70,620, Section IV.D, "Applicability," states, "However, the resulting rule was written to remove the EDMG requirements once the certifications of permanent cessation of operations and removal of fuel from the reactor vessel were submitted rather than upon removal of fuel from the SFP. The NRC proposes to correct this error from the 2009 final rule in this proposed rule, as explained in the 'EDMGs' portion of this section."

While explained well in the supplementary information, the commenter indicated that 10 CFR 50.155(a)(3) could be clarified to address the applicability of plants undergoing decommissioning. The proposed changes to paragraph (3)(i) eliminate unnecessary language and explain that 10 CFR 50.155 applies until all irradiated fuel has been removed from the SFP(s). Paragraphs (3)(i)(A) and (B) are added to clarify when the requirements of 10 CFR 50.155(b)–(e) associated with maintaining and restoring secondary containment capabilities would be applicable to plants undergoing decommissioning. The supplementary information published with the proposed rule states, "This proposed rule would require secondary containment for reactor designs that employ this feature as a fission product barrier for the spent fuel pool source term" (see p. 70619, Col. II). Thus, secondary containment as a

fission product barrier for the SFP source term was used to define when the proposed requirements associated with maintaining and restoring secondary containment capabilities would be applicable to plants undergoing decommissioning. Paragraph (3)(iv) was added to explain that the requirements of 10 CFR 50.155 do not apply, once the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel have been docketed, and all irradiated fuel is permanently removed from the SFP(s). Under no circumstances would 10 CFR 50.155(c)(4) remain in effect once all spent fuel in the pool was removed from the reactor vessel 5 or more years earlier.

The commenter suggests that, in the final rule, 10 CFR 50.155(a)(3) should be clarified as follows:

(3)(i) After the NRC has docketed the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel described in § 50.82(a)(1) or § 52.110(a) of this chapter, the licensee shall comply with the following provisions until all irradiated fuel has been permanently removed from the spent fuel pool(s):

(A) If the reactor design employs secondary containment as a fission product barrier for the spent fuel pool source term, then the licensee shall comply with the requirements of § 50.155(b) through (e) associated with maintaining or restoring secondary containment capabilities, and spent fuel pool cooling capabilities, except that such licensees need not comply with § 50.155(c)(4); or

(B) If the reactor design does not employ secondary containment as a fission product barrier for the spent fuel pool source term, then the licensee shall comply with the requirements of § 50.155(b) through (e) associated with spent fuel pool cooling capabilities, except that such licensees need not comply with § 50.155(c)(4).

(ii) Holders of operating licenses or combined licenses for which the NRC has docketed the certifications described in § 50.82(a)(1) or § 52.110(a) of this chapter need not meet the requirements of this section except for paragraph (b)(2) of this section once the decay heat of the fuel in the spent fuel pool can be removed solely by heating and boiling of water within the spent fuel pool and the boil-off period provides sufficient time for the licensee to obtain off-site resources to sustain the spent fuel pool cooling function indefinitely, as demonstrated by an analysis performed and retained by the licensee.

(iii) Dominion Nuclear Connecticut, Inc. (Millstone Power Station Unit 1) is not subject to the requirements of this section.

(iv) Holders of operating licenses or combined licenses for which the NRC has docketed the certifications of permanent cessation of operations and permanent

removal of fuel from the reactor vessel described in § 50.82(a)(1) or § 52.110(a) are not subject to the requirements of this section once all irradiated fuel has been permanently removed from the spent fuel pool(s).

(4) § 50.155(c)(4) is not applicable if the spent fuel pool contains no fuel used in a reactor vessel for power generation within the past five years or the conditions in § 50.155(a)(3)(i),(ii),(iii),(iv) are met, whichever comes sooner.

[NEI TC-31]

**NRC Response:**

The NRC agrees in part with this comment. The NRC disagrees with the text proposed for 10 CFR 50.155(a)(4) because the condition of 10 CFR 50.155(a)(3)(iii) will always be met, since it merely makes the requirements of 10 CFR 50.155 inapplicable to Dominion Nuclear Connecticut, Inc. (Millstone Power Station Unit 1). Because the condition of 10 CFR 50.155(a)(3)(iii) is met, the proposed text for 10 CFR 50.155(a)(4) would always make 10 CFR 50.155(c)(4) inapplicable. Additionally, 10 CFR 50.155(a)(3)(i)(A) and (B) include a specific statement that licensees need not comply with 10 CFR 50.155(c)(4) and both 10 CFR 50.155(a)(3)(ii) and (iv) limit the applicability of the requirements of 10 CFR 50.155 for licensees meeting their conditions to 10 CFR 50.155(b)(2). The NRC agrees with the remaining portions of the comment, since the proposed revision improves the clarity of the rule. The final MBDBE rule, in 10 CFR 50.155(a), has been revised accordingly. Note that the final rule removed proposed 10 CFR 50.155(a)(2), so that the provisions for decommissioning that were proposed as 10 CFR 50.155(a)(3) became 10 CFR 50.155(a)(2) in the final MBDBE rule.

**Rule Comment 48:**

A commenter stated that the rule for mitigation strategies hazard protection appears to establish inconsistent levels of protection for various hazards. The commenter stated that the protection for high winds is to the 1-million-year event, and that there are lower levels of protection from flooding and seismic events, allowing some plants to provide marginal performance for a 10,000-year event. The commenter stated that the rule allows for the design of mitigation strategies that provide minimal to no protection for events even slightly greater than a 10,000-year event. It is the commenter's view that a common performance goal for mitigation strategies should be established to ensure plants can cope with a 100,000-year hazard event to complement the existing design-basis framework for nuclear safety. The commenter notes that mitigation strategies should be more robust than existing safety equipment, not less, to provide effective defense in depth. [Stein-1]

**NRC Response:**

The NRC disagrees with this comment for the reasons stated in the NRC response to General Comment 9. No changes were made to the final MBDBE rule as a result of this comment.



**Rule Comment 49:**

A commenter states that the proposed rule should include formal treatment of uncertainties associated with the reevaluated hazards. Consideration of uncertainties would inform the mitigation strategies to ensure they provide equal and creditable protection for nuclear plants. [Stein-2]

**NRC Response:**

The NRC agrees that uncertainties associated with the reevaluated hazards should be considered. The final MBDBE rule addresses this through incorporation of requirements into 10 CFR 50.155(b)(2) that require the effects of seismic and flooding reevaluated hazards to be addressed. The NRC's response to Comment 23 of DG-1301 in Section 8 of this document includes a discussion of the treatment of uncertainties within RG 1.226.

**Rule Comment 50:**

A commenter stated that, among the upgrades taken in response to 9/11, the NRC revised its regulations to integrate evaluations conducted for safety changes with those conducted for security changes (see RG 5.74 at ADAMS Accession No. ML091690036). This integration sought to avoid a safety change from inadvertently undermining security measures and vice versa. The commenter stated that the final MBDBE rule must integrate evaluations of proposed MBDBE changes with safety and security changes. [UCS-5]

**NRC Response:**

The NRC agrees with the commenter regarding the need for MBDBE rule changes to meet the requirements of 10 CFR 73.58, "Safety/Security Interface Requirements for Nuclear Power Reactors." This potential for changes to affect other aspects of the facility and, therefore, the need to meet other applicable change control processes including safety/security interface, was noted in the proposed rule (refer to 80 FR 70629). The final MBDBE rule contains a requirement in 10 CFR 50.155(g)(2) that addresses the need for licensees to comply with other change control requirements. No changes were made to the final MBDBE rule as a result of this comment.

**3. Comments on Other Portions of the Proposed Rule Notice (except as categorized below)****SOC Comment 1:**

One commenter noted, with respect to the definition of ELAP: The wording in Section IV.D, "Integrated Response Capability," can easily lead to the conclusion that the mitigating strategies implemented by the industry did not properly consider a loss of all ac power, in that the assumptions and initial conditions allowed for the availability of ac power from batteries through inverters. Even though the paragraph in question expressly states there is no intent to either relax or impose new requirements, the overall message of the paragraph is that a loss of all ac power includes the loss of ac power from batteries through inverters. This is inconsistent with

the definition of ELAP from the NRC-endorsed industry guidance in NEI 12-06, which defines an ELAP as a loss of offsite power, emergency diesel generators, and any alternate ac source but not the loss of ac power from buses fed by station batteries through inverters. To even infer anything different from this definition will create the potential for improper interpretation of the required capabilities by future inspectors. The last sentence of the paragraph clearly implies that the rule is requiring something different than what was implemented under the Order. The mitigating strategies do provide contingencies for the loss of ac power from inverters, but those contingencies are not the same as assuming a loss of ac power from inverters at the start of the event. [FENOC-3]

**NRC Response:**

The NRC agrees with this comment. The intent of this rulemaking is, in part, to make generically applicable the requirements that were imposed under Order EA-12-049. As described in the NRC response to Rule Comment 37, this includes addressing the loss of all ac power, including ac power from inverters fed by batteries or dc power directly from batteries, as follows:

- (1) An extended loss of ac power and loss of normal access to the ultimate heat sink (or loss of access to the normal heat sink for passive designs) is assumed for the purposes of developing the supporting analysis, determining the resultant conditions, and establishing times for key actions that support the development and implementation of mitigation strategies providing additional capability for beyond-design-basis external events.
- (2) To address conditions more severe than the assumed conditions discussed above (i.e., potentially including loss of power from batteries) and thereby provide a set of regulatory guidance that implements the loss of all ac power requirement of the MBDBE rule, the mitigation strategies contain contingencies. These contingencies involve sending personnel to locally and manually operate non-ac driven core cooling pumps (e.g., a turbine driven auxiliary feedwater or reactor core isolation cooling pump) to maintain or restore core cooling. These contingencies include the capability to obtain instrument readings using portable multimeters at locations that do not rely on the functioning of intervening installed electrical equipment.

The staff notes there are limitations to what instruments can be repowered by a portable multimeter. While it is possible to repower, and obtain readings from, an RTD or a T/C, there are many types of sensors that would need a more specialized type of equipment to accomplish the repowering and measurement. The choice of instrument readings to obtain through these contingencies should allow a licensee to diagnose the symptoms and verify system response to confirm the success of actions taken or to select actions that should be taken in response to the symptoms. Engineering evaluations and/or calculational aids needed to facilitate the interpretation of readings from such instrumentation when taken under the MBDBE conditions expected should be performed as part of the planning process for the mitigating strategies, and

should identify constraints and limitations of such capabilities, including uncertainties in the results.

Based on the feedback received from this commenter and the commenters in Rule Comment 36, the NRC concluded that the clarity of the explanation of the method used to address the potential for a loss of all ac power could be improved. Additionally, the word “extended” is removed from 10 CFR 50.155(b)(1) because the NRC concludes that it contributes to the confusion regarding the requirement. The regulations in 10 CFR 50.155(b)(1) require that a loss of all ac power be assumed and that the strategies be capable of maintaining or restoring the key safety functions, indefinitely or until the mitigation strategies are no longer needed; this includes the acquisition of offsite resources to sustain those functions. As such, the requirements are clearly requiring a capability to address an “extended” loss of ac power, and the word “extended” is not necessary in (b)(1). Changes have been made to the SOC discussion of the integrated response capability to address this comment.

**SOC Comment 2:**

One commenter noted that the SOC discussion on change control seems to contradict the proposed change control requirement by stating, on page 70,628, that “the proposed change control provisions may result in licensees seeking NRC review and approval of proposed changes that do not follow current regulatory guidance for this proposed rulemaking potentially through a license amendment.” As described in both proposed 10 CFR 50.155(f) and NEI 12-06, a licensee would not need a license amendment to implement strategies that are not approved in regulatory guidance if the licensee performs a documented assessment demonstrating that the change continues to meet applicable regulatory requirements.

[FENOC-9]

**NRC Response:**

The NRC agrees that the statement created confusion. It was not the intent of the statement referenced in this comment to imply that the MBDBE rule would have a “prior review and approval” type of change control criterion, or to otherwise suggest that prior NRC review and approval would be required. Instead, the intent was to recognize the practical reality that some licensees may want to make changes that are not within the approved guidance and are not an approved alternative that can be demonstrated to be applicable to their facility. At the same time, the licensees may not wish to take the regulatory risk that the NRC may inspect after the change has been implemented, find the change does not ensure compliance, and take enforcement action. Under such circumstances, the licensee may wish to voluntarily confer with the NRC on the prospective change, and this may in turn result in an NRC review of the change, if the licensee elects to send the information to the NRC for review. Again, this is not required but, instead, was intended to reflect the potential. The final MBDBE rule SOC was clarified to address this concern.

**SOC Comment 3:**

The commenter notes that the proposed rule does not discuss any “further research, review, and analysis” that the NRC has done on how to deal with extreme situations. There is no mention of a plan for “government assets [to] be called on to facilitate emergency deliveries of fuel to nuclear power plant sites before the fuel stored onsite is exhausted.” [Leyse-7]

**NRC Response:**

The NRC agrees with the factual statements provided in this comment. The implication that the rule should include further research, review, and analysis of extreme situations is outside the scope of this rulemaking for the reasons discussed in the NRC responses to General Comments 9 and 15. No changes were made to the final MBDBE rule or SOC due to this comment.

**SOC Comment 4:**

One commenter suggested that, as an alternative to updating the draft guidance to reflect advanced designs such as the commenter’s design, the commenter could develop a design-specific appendix to NEI 12-06 (Reference 2) for NRC endorsement or demonstrate an acceptable methodology to meet the requirements of the regulation as part of the design certification application. [NuScale CL-3]

**NRC Response:**

The NRC agrees that additional regulatory guidance, focusing on how a new reactor design can satisfy elements of the MBDBE rule, would be beneficial in supporting regulatory certainty. The NRC notes that any design-specific appendix included with the guidance could only be finalized after that design is licensed, certified, or approved under 10 CFR Parts 50 or 52. While the final MBDBE rule does not apply to new reactor design certifications, the NRC would nonetheless consider reviewing design certification applications that voluntarily address portions of the MBDBE rule, including requesting additional information, if needed, to reach a safety conclusion. If acceptable, the NRC may grant issue finality, under a design certification rulemaking, for that portion of the design as it relates to complying with elements of this rule. The COL applicant referencing that design could then incorporate by reference that portion of the design into its application and would then only need to address the remainder of the MBDBE rule. This regulatory approach does not require revisions to the MBDBE rule. However, the NRC recommends that any design certification applicant who may be interested in using this approach should discuss its plans as early as possible with the NRC staff. No changes were made to the final MBDBE rule due to this comment.

**SOC Comment 5:**

One commenter noted that, in the Executive Summary of the FRN, Section C, “Costs and Benefits,” in the first column of page 70,611, the changes being made to the mitigation strategies to address the information from the reevaluated flooding and seismic hazards is not for the purpose of reasonably protecting the FLEX equipment but is for the purpose of ensuring

that the reevaluated hazards can be mitigated. Furthermore, reasonably protecting the FLEX equipment is not the only acceptable method of addressing the hazard. The commenter suggested the wording be revised to the following:

Although the draft regulatory analysis did not estimate the impacts that may occur as a result of licensees needing to make changes to mitigation strategies including potential plant modifications as a result of the need to address the seismic and flooding reevaluated hazards, the NRC requested information on this issue and these costs are now reflected in the final regulatory analysis.

[NEI TC-27]

**NRC Response:**

The NRC agrees with this comment with regard to the need include in the regulatory analysis impact estimates for licensee's efforts to address the reevaluated hazard information. This information was provided as noted by the commenter, and the supporting regulatory analysis for the final MBDBE rule has been revised to include the new information.

**SOC Comment 6:**

One commenter noted that, in the FRN on page 70,615, the proposed rule states, in Section IV.A.1, "In making the requirements of Order EA-12-049 generically-applicable, this proposed rule would also consider the reevaluated hazard information developed in response to the March 12, 2012, NRC letter issued under § 50.54(f) as part of providing reasonable protection for mitigation strategies equipment against external flooding or seismic hazards."

The changes being made to the mitigation strategies to address the information from the reevaluated flooding and seismic hazards are not for the purpose of reasonably protecting the FLEX equipment but, instead, for the purpose of ensuring that the reevaluated hazards can be mitigated. Furthermore, reasonably protecting the FLEX equipment is not the only acceptable method of addressing the hazard.

The commenter suggests the following wording:

In making the requirements of Order EA-12-049 generically applicable, this rule would also require that licensees consider the reevaluated hazard information developed in response to the March 12, 2012, NRC letter issued under § 50.54(f) in development of the mitigation strategies.

[NEI TC-28]

**NRC Response:**

The NRC agrees with this comment. The final MBDBE rule has been revised to more closely align with accepted guidance concerning acceptable approaches for addressing the reevaluated

hazard information. As the commenter correctly notes, approaches for addressing the reevaluated hazard information are not necessarily limited to changing the protection level for FLEX equipment, although such an approach can be acceptable if, by doing so, the licensee demonstrates that the effects of the reevaluated hazards can be mitigated. Other alternative approaches can involve the use of other plant equipment, and that may or may not involve the use of FLEX equipment. The SOC for the final MBDBE rule has been revised as suggested by the commenter.

**SOC Comment 7:**

One commenter noted that, in the FRN on page 70,617, the discussion on “SAMG Implementation” concludes in the middle of the second column with the statement that, “The Commission notes that the industry indicated it would strengthen its voluntary initiative for SAMGs in its letter dated May 11, 2015.”

This section should be revised to state that the strengthened voluntary industry initiative was approved by the NEI Nuclear Strategic Issues Advisory Committee (NSIAC) on October 15, 2015, and will be implemented per site-specific commitments. Refer to NEI letter, Anthony R. Pietrangelo, Senior Vice President and Chief Nuclear Officer, Nuclear Energy Institute, to Michael R. Johnson, Deputy Executive Director for Reactor and Preparedness Programs, NRC, dated October 26, 2015 (ADAMS Accession No. ML15335A442).

The commenter suggests that the NRC add this information (or similar) to the “SAMG Implementation” section:

The NEI Nuclear Strategic Issues Advisory Committee (NSIAC) approved a strengthened voluntary initiative for SAMGs on October 15, 2015. This initiative requires timely updates of site-specific SAMGs based on revisions to Owners Group generic severe accident technical guidelines. In addition, SAMGs will be considered within plant configuration management processes, integrated with other emergency response guideline sets and symptom-based EOPs, and validated. Each licensee has sent a letter to the NRC docketing site-specific commitments related to these actions.

[NEI TC-29]

**NRC Response:**

Although the NRC agrees with the commenter that the FRN, as published, did not reflect the entirety of actions taken by industry concerning SAMGs, the NRC has decided not to include a detailed discussion concerning the SAMGs in the final MBDBE rule because those proposed requirements were removed in response to Commission direction on the proposed rule and are not part of the MBDBE rule.

**SOC Comment 8:**

One commenter noted that, in the FRN on page 70,617, in Section IV.B, “Scope of Procedure and Guideline Integration,” under “2. EDMGs,” the NRC proposes to expand the scope of the generic term “EDMGs” to include all of the strategies and guidelines used to implement 10 CFR 50.54(hh)(2).

The commenter states that it is not clear what would be required by this expansion of the term “EDMGs.” Per the rule language, the EDMGs must address firefighting, operations to mitigate fuel damage, and actions to minimize radiological release.

The commenter suggested that the NRC should explain that it is not expanding the requirements currently set forth in 10 CFR 50.54(hh)(2). [NEI TC-30]

**NRC Response:**

The NRC agrees with this comment. The NRC concludes that there is a lack of clarity as to the different uses of the term EDMGs in the MBDBE rule and in the underlying industry guidance document, NEI 06-12. The SOC for the final MBDBE rule has been modified to address this comment. In addition, the NRC concludes that the use of the discussion of secondary containment in the decommissioning provisions of paragraph 50.155(a) contributed to the potential confusion on whether the requirements of paragraph 50.54(hh)(2) were being modified as a result of the movement into paragraph 50.155(b)(3). In order to alleviate this potential confusion, the NRC has modified the final MBDBE rule to remove the discussion of secondary containment from the rule text for the decommissioning provisions of paragraph 50.155(a).

**SOC Comment 9:**

One commenter noted that the first paragraph, fifth sentence, of the FRN, page 70,621, reads, “For example, functional integration of the strategies, guidelines and procedures would ensure that transition points are explicitly identified and conflicts between strategies are eliminated to the extent practical.”

The commenter suggests revising this sentence to better clarify the expectations for procedure and guideline integration. Given the unbounded nature of BDB event sequences, there should be some reasonable limit on the expected work directed at eliminating “conflicts.” Replace “practical” with “practicable” to better characterize the scope of effort (i.e., feasible, or able to be done or put into practice successfully).

The commenter suggests the following:

For example, functional integration of the strategies, guidelines and procedures would ensure that transition points are explicitly identified and readily apparent conflicts between strategies are eliminated to the extent practicable.

[NEI TC-32]

**NRC Response:**

The NRC disagrees with this comment. As described in NUREG-1379, Revision 2, "NRC Editorial Style Guide," Section 8, "Word Usage," there are pairs of words that are frequently misused or confused. One of these pairs, practical and practicable, is discussed on page 35 of that document as follows:

According to Webster's II New College Dictionary, "*Practicable* refers to something that can be put into effect. *Practical* refers to something that is also sensible and worthwhile.

Modifying the discussion in the SOC as suggested by the commenter would have the opposite effect from that desired by the commenter, as expressed in the statement that "there should be some reasonable limit on the expected work directed at eliminating 'conflicts.'" The use of the word "practicable" in this sentence would not allow for a reasonable limit as desired by the commenter. The NRC recognizes that there is a lack of clarity in the SOC on the subject and has modified it to improve the clarity.

**SOC Comment 10:**

One commenter noted that, in the FRN on page 70,622, Section IV.D, "Integrated Response Capability," states:

Specifically, this damage state was implemented through the assumption of the ELAP to the onsite emergency ac buses, but did allow for ac power from the inverters to be assumed available in order to establish event sequence and the associated times for when mitigation actions would be assumed to be required. To address the Order EA-12-049 requirement for an actual loss of all ac power, including ac power from the batteries (through inverters), contingencies are included in the mitigation strategies to enable actions to be taken under those circumstances.... Nevertheless, in this proposed rule the NRC is requiring that the strategies and guidelines be capable of implementation during a loss of all ac power.

The commenter notes that the paragraph on page 70,623 in this same section that starts with "the principal regulatory objective of § 50.63 was..." also states that an ELAP is a loss of all ac power (including ac from inverters), which similarly is not consistent with the approved and implemented definition of an ELAP.

The wording of this section and others can easily lead to the conclusion that the mitigating strategies implemented by the industry did not properly consider a loss of all ac power in that the assumptions and initial conditions allowed for the availability of ac power from batteries through inverters.



Even though the paragraph in question expressly states there is no intent to either relax or impose new requirements, the overall message of the paragraph is that a loss of all ac power includes the loss of ac power from batteries through inverters. This is inconsistent with the definition of ELAP from the NRC-endorsed industry guidance in NEI 12-06, which defines an ELAP as a loss of offsite power, emergency diesel generators and any alternate ac source but not the loss of ac power from buses fed by station batteries through inverters. To even infer anything different from this definition will create the potential for improper interpretation of the required capabilities by future inspectors. The last sentence of the paragraph clearly implies that the rule is requiring something different than what was implemented under the Order. The mitigating strategies do provide contingencies for the loss of ac power from inverters but those contingencies are not the same as assuming a loss of ac power from inverters at the start of the event.

The commenter suggests that the NRC revise the statements to clarify the explanation. Suggested wording: “Nevertheless, in this proposed rule the NRC is requiring that the strategies and guidelines be capable of implementation during an ELAP with contingencies to address actions during a loss of all ac power.”

The language in 10 CFR 50.155(b)(1) should be changed to eliminate the word “all” from extended loss of ac power in order maintain consistent terminology. [NEI TC-33]

**NRC Response:**

The NRC agrees in part with this comment. The intent of this rulemaking is, in part, to make generically applicable the requirements that were imposed under Order EA-12-049. As described in the NRC response to Rule Comment 37 and SOC Comment 1, this includes addressing the loss of all ac power, including ac power from inverters fed by batteries or dc power directly from batteries as follows:

- An extended loss of ac power and loss of normal access to the ultimate heat sink (or loss of access to the normal heat sink for passive designs) is assumed for the purposes of developing the supporting analysis, determining the resultant conditions, and establishing times for key actions that support the development and implementation of mitigation strategies providing additional capability for beyond-design-basis external events.
- To address conditions more severe than the assumed conditions discussed above (i.e., potentially including loss of power from batteries) and thereby provide a set of regulatory guidance that implements the loss of all ac power requirement of the MBDBE rule, the mitigation strategies contain contingencies. These contingencies involve sending personnel to locally and manually operate non-ac driven core cooling pumps (e.g., a turbine driven auxiliary feedwater or reactor core isolation cooling pump) to maintain or restore core cooling. These contingencies include the capability to obtain instrument readings using portable multimeters at locations that do not rely on the functioning of intervening installed electrical equipment.

The staff notes there are limitations to what instruments can be repowered by a portable multimeter. While it is possible to repower, and obtain readings from, an RTD or a T/C, there are many types of sensors that would need a more specialized type of equipment to accomplish the repowering and measurement. The choice of instrument readings to obtain through these contingencies should allow a licensee to diagnose the symptoms and verify system response to confirm the success of actions taken or to select actions that should be taken in response to the symptoms. Engineering evaluations and/or calculational aids needed to facilitate the interpretation of readings from such instrumentation when taken under the MBDBE conditions expected should be performed as part of the planning process for the mitigating strategies, and should identify constraints and limitations of such capabilities, including uncertainties in the results.

The NRC disagrees with the suggestion to eliminate the word “all” from the rule language in 10 CFR 50.155(b)(1) because doing so would relax the requirements for the contingencies described in paragraph 2, immediately above.

Based on the feedback received from this commenter, the commenters in Rule Comment 36, and the commenter in SOC Comment 1, the NRC concluded that the clarity of the of the final rule and the supporting explanation of the method used to address the potential for a loss of all ac power could be improved. The word “extended” is removed from 10 CFR 50.155(b)(1) because the NRC concludes that it contributes to the confusion regarding the requirement. The regulations in 10 CFR 50.155(b)(1) require that a loss of all ac power be assumed, and that the strategies be capable of maintaining or restoring the key safety functions, indefinitely or until the mitigation strategies are no longer needed, and this includes the acquisition of offsite resources to sustain those functions. As such the regulations are clearly requiring a capability to address an “extended” loss of ac power, and the word “extended” is not necessary in (b)(1). Additionally, changes have been made to the discussion of the Integrated Response Capability to address this comment.

**SOC Comment 11:**

One commenter noted that, in the FRN, on page 70,623, there is an editorial error in the final paragraph in the second column. The apostrophe after “containment” in “(core cooling, containment’ and spent fuel pool cooling)” should be a comma. [NEI TC-34]

**NRC Response:**

The NRC agrees with this comment. The SOC for the final MBDBE rule was modified in response to this comment.

**SOC Comment 12:**

One commenter noted that, in the FRN on page 70,623, the paragraph that starts with “The mitigation strategies and guidelines implemented under NRC Order EA-12-049...” concludes

with, “The NRC considers the development of timelines for the proposed mitigating strategies using the maximum heat load for either the reactor core or the spent fuel pool to be appropriate. While establishing the capability to mitigate the maximum heat load for both simultaneously would be compliant with the proposed requirement, it would not be necessary.”

The paragraph implies that the timelines for strategy deployment for SFP cooling and core cooling both must assume the maximum heat load simultaneously. This is not what the guidance requires. The timeline for the SFP strategy is not required to use the maximum heat load in the SFP for the at-power condition. NEI 12-06, in Section 3.2.2.14 states, “The sizing of FLEX equipment used to cool the SFP should be based on the maximum design basis heat load for the site. For the purposes of determining the response time for the SFP strategies when fuel is in the reactor vessel, the rate of inventory loss of the SFP should be calculated based on the worst case conditions for SFP heat load assuming the plant is at power.” (Emphasis added.)

The timeline for the SFP strategies for the at-power case may assume a heat load that is less than the full core offload heat load.

The commenter suggests that the NRC should clarify that the timeline for the SFP strategies for the at-power case may assume a heat load that is less than the full-core offload heat load. [NEI TC-35]

**NRC Response:**

The NRC agrees with the comment that the guidance in NEI 12-06 does not require that licensees assume the maximum heat load in the SFP for the at-power condition when developing their timelines for the SFP strategies. The NRC modified the SOC for the final MBDBE rule in response to this comment.

**SOC Comment 13:**

One commenter noted that, in the FRN on page 70,625, in the third column, under “Staffing,” the FRN does not include a reference to “Summary of February 19, 2013, Public Meeting to Discuss Framework of Phase 1 Staffing Submittals Related to Issues Associated with Near-Term Task Force Recommendation 9.3” (ADAMS Accession No. ML13065A048), and the associated information regarding considerations for a BDB event staffing analysis that uses security personnel. This information was the basis for creating the NEI White Paper, “Generic Basis for Responses to Staffing Assessment Questions Related to Use of Security Personnel During a BDB Event Response,” included in the comment below (see “EP Text Change 1” below). [NEI TC-36, EP Text Change 1]

The commenter suggested a complete rewrite of the “Staffing” discussion that begins on FRN page 70,625 as follows:

Staffing

The NRC proposes to require licensees to provide the staffing necessary for having an integrated response capability to support implementation of the FSGs and EDMGs. To be effective, staffing ~~for an expanded response capability~~ should include the trained and qualified individuals who would be relied upon to analyze, recommend, authorize, and implement the mitigating strategies. The staffing must directly support the assessment and implementation of a range of mitigation strategies intended to maintain or restore the functions of core cooling, containment, and spent fuel pool cooling.

The staffing analyses required by proposed appendix E, section VII, should determine the required staff necessary for responding to a beyond design basis external event that affects all units on a site. A staffing analysis must confirm that sufficient personnel are available to implement FSGs within the timeframes necessary to when personnel performing expanded response functions should report to the site, within a timeframe sufficient to support implementation of the strategies that are not assigned to the on-shift staff. This would ensure that the functions of core cooling, containment, and spent fuel pool cooling are continuously maintained or are promptly restored. The analysis will consider the availability of both on-shift and augmenting responders and, for multi-unit sites, an expanded emergency response organization that enables performance of unit-specific accident assessment and mitigation functions.

The NRC has endorsed the industry guidance for conducting staffing analyses, NEI 10-05, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities," Revision 0, and NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0, and the NRC has issued Interim Staff Guidance (ISG), NSIR/DPR-ISG-01, "Emergency Planning for Nuclear Power Plants," that provides the requisite details for determining the staffing levels and for which positions, as well as which beyond design basis external events, the applicants and licensees should evaluate. The NRC has also reviewed and concurred with related guidance presented in NEI White Paper, "Generic Basis for Responses to Staffing Assessment Questions Related to Use of Security Personnel During a BDB Event Response."

The recommended minimum positions and staffing levels for emergency plans were initially provided in NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." Following the September 11, 2001, events, the NRC issued Enhancements to Emergency Preparedness Regulations (EP final rule) (76 FR 72560) to amend 10 CFR part 50, appendix E, to address, in part, concerns about the assignment of tasks or responsibilities to on-shift emergency response organization (ERO) personnel that would potentially overburden them and prevent the timely

performance of their functions under the emergency plan. Licensees must have enough on-shift staff to perform specified tasks in various functional areas of emergency response 24 hours a day, 7 days a week. This proposed rule would address the staffing requirements for the expanded response capabilities for on-shift response and the ERO, including an expanded response capability for multi-unit sites.

This proposed rule would require adequate staffing to implement the FSGs and EDMGs with the EOPs without requiring further analysis to supplement analyses that were completed as a result of post-Fukushima orders, responses to the § 50.54(f) request for information of March 12, 2012, or the EP final rule. Staffing levels should be established to ensure that if strategies are executed there would be no delays in completing them caused by the lack of qualified personnel. The NRC expects that the use of drills, existing training analyses and other methods would verify sufficient staffing levels.

**NRC Response:**

The NRC agrees that the revised text provided with the comment is accurate and more completely describes how staffing analyses support the MBDBE rule requirements. The SOC for the final MBDBE rule has been modified in response to this comment, recognizing that the final MBDBE rule has removed the proposed Section VII requirements from Appendix E and relocated them to 10 CFR 50.155. This discussion now forms part of the basis for the staffing requirement in 10 CFR 50.155.

**SOC Comment 14:**

The commenter in SOC Comment 13 noted that, with respect to the FRN on page 70625, in the third column, under “Staffing,” in reference to EROs, the term “expanded” is used incorrectly, and the NRC should revise the FRN to align with usage in NEI 12-01, which is the source document (i.e., the term applies only to EROs at multiunit sites). The commenter also noted that the description of the staffing analyses performed to respond to the 10 CFR 50.54(f) letter is not entirely accurate; the NRC should revise the language to better reflect the purpose and methodology of the analysis. Also, the commenter suggested that the NRC include a reference to the NEI white paper on the use of security personnel in a staffing analysis.

The commenter suggests a revision in “EP Text Change 1,” as shown above in SOC Comment 13. [NEI TC-37]

**NRC Response:**

The NRC agrees with the comment as discussed in the NRC response to SOC Comment 13. The SOC for the final MBDBE rule has been modified in response to this comment.

**SOC Comment 15:**

One commenter noted that, in the FRN text at page 70,625, in the second column, regarding “4. Licensees identify and resolve conflicts between the strategies, guidelines and procedures,” this sentence should be revised to better clarify the expectations for procedure and guideline integration. The commenter stated that, given the unbounded nature of BDB event sequences, there should be some reasonable limit on the expected work directed at identifying and resolving “conflicts.” The NRC should replace “practical” with “practicable” to better characterize the scope of effort (i.e., feasible, or able to be done or put into practice successfully).

The commenter suggests the following:

“4. Licensees identify and resolve readily apparent conflicts between the strategies, guidelines and procedures to the extent practicable.”

[NEI TC-38]

**NRC Response:**

The NRC disagrees in part with this comment. The text cited by the commenter does not include the use of the word “practical,” and as previously discussed in reference to a similar comment from the same commenter (see SOC Comment 9, above), modifying the discussion in the SOC as suggested by the commenter would have the opposite effect from that desired by the commenter as expressed in the statement that “there should be some reasonable limit on the expected work directed at identifying and resolving ‘conflicts.’” The NRC agrees that there should be a reasonable limit on the expected work and recognizes that there is a lack of clarity in the SOC on the subject and has modified it to improve the clarity.

**SOC Comment 16:**

One commenter suggested revising the FRN on page 70,625, in the second column, in the text reading “5. Licensees identify competing considerations when using the strategies, guidelines and procedures and eliminate or address them in guidance” to better clarify the expectations for procedure and guideline integration. Given the unbounded nature of BDB event sequences, there should be some reasonable limit on the expected work directed at addressing “competing considerations.”

The commenter suggests the following:

5. Licensees identify readily apparent competing considerations when using the strategies, guidelines and procedures and eliminate or address them in guidance.

[NEI TC-39]

**NRC Response:**

The NRC agrees with this comment, in terms of the need to provide greater clarity to the supporting SOC and thereby better enable future stakeholders to understand the meaning and intent of the subject requirements. The SOC for the final MBDBE rule has been revised in response to this comment.

**SOC Comment 17:**

One commenter noted that, in the FRN, on page 70,627, in Section IV.D., “Equipment,” first column, the paragraph that starts with, “The underlying proposed requirements...,” includes a sentence that reads, “This proposed rule would require reasonable protection for the equipment relied on for the mitigation strategies to a hazard level as severe as that originally determined for the facility under GDC-2 or the applicable PDC unless the reevaluated hazards stemming from the March 12, 2012, NRC letter issued under § 50.54(f), as assessed by the NRC show that increased protection is necessary.”

The commenter noted that the equipment being addressed in that FRN paragraph is plant equipment, as opposed to FLEX equipment, and it should be so specified. In accordance with the NRC-endorsed implementing guidance, reasonable protection only applies to FLEX equipment. For plant equipment to be considered for use in a mitigating strategy, it must meet the current plant design basis for the applicable external hazard(s) or the reevaluated seismic and flooding hazards. The paragraph should use this terminology for plant equipment. [NEI TC-40]

**NRC Response:**

The NRC disagrees with this comment, but does agree that there is a lack of clarity in this portion of the SOC. The MBDBE rule’s meaning and intent for reasonable protection of equipment is not limited to equipment based upon its classification as either FLEX equipment or plant equipment in the underlying guidance. This is demonstrated by the lack of any definition within the MBDBE rule text of the term “plant equipment.” The intent of the use of the term “equipment” in the sentence, as it was drafted in the proposed rule SOC at 80 FR 70627, was to encompass both FLEX equipment, as the term is defined in the guidance, and plant equipment (or SSCs), as the term is used in the guidance. The guidance of NEI 12-06 provides specific criteria for reasonable protection of FLEX equipment and specifies that plant equipment (or SSCs) should be “robust,” if relied upon in the mitigating strategies. NEI 12-06, Revision 0, Appendix A, defines “robust (designs)” as meaning that “the design of an SSC either meets the current plant design basis for the applicable external hazard or has been shown by analysis or test to meet or exceed the current design basis,” which is sufficient to provide reasonable protection of the SSCs from the applicable external hazard.<sup>4</sup>

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<sup>4</sup> NEI 12-06, Revision 2, updates this definition to allow use of the current NRC design guidance for the applicable hazard (e.g., RG 1.76, Revision 1, “Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants”). Additionally, NEI 12-06, Revision 2, Appendix G, Section G.4.1, provides that the flooding hazard levels from the March 12, 2012, request for information (RFI) issued under 10 CFR 50.54(f) should be used in place of the design-basis flood for the purposes of consideration of robustness of plant

Of particular note, the sentence limits the equipment for which the reasonable protection requirement would apply to “equipment relied on for the mitigating strategies.” This phrase is intended to set the scope of items subject to the reasonable protection requirement as those items that are used in a specific set of strategies and guidelines for the hazard in question. As a result, a licensee could have a strategy to address an external flooding event that relied upon a variety of plant equipment and FLEX equipment that includes an ac-power independent pump, such as a TDAFW pump or RCIC pump, and transitions to the use of a portable FLEX pump. In such a circumstance, the reasonable protection requirement would apply to the TDAFW/RCIC pump and the FLEX pump because they are both relied on for the strategy. There would be independent requirements for protection of the TDAFW/RCIC pump based upon its design-basis functions. If the strategy for addressing the hazard as developed under the endorsed guidance is an alternate mitigating strategy that relies upon a demonstration that there is no loss of offsite power or loss of emergency diesel generators, such that the reliance is upon ac-powered auxiliary feedwater pumps or feed and condensate pumps rather than the TDAFW/RCIC pump and FLEX pumps, then the reasonable protection requirement would apply to the internal power distribution system, the ac power source (either offsite power or emergency diesel generators), and the pumps actually relied upon for the strategy in question, but the reasonable protection requirement would not apply to the FLEX pumps for that particular hazard (e.g., the reevaluated flood hazard stemming from the RFI dated March 12, 2012).

The SOC for the final MBDBE rule has been revised in response to this comment.

**SOC Comment 18:**

One commenter noted that the FRN, page 70,626, in Section IV.D, “Equipment,” contains two paragraphs referring to COMSECY-14-0037 that do not correctly capture the commenter’s understanding of the sequence of events in the development of the mitigation strategies. These paragraphs imply that NEI 12-06 always reflected the intent to update the mitigating strategies based on the reevaluated hazards. The mitigation strategies were developed based on the design-basis hazards that had been documented at the time of Order EA-12-049. The first paragraph says that, as a result of COMSECY-14-0037, Order EA-12-049 included a requirement to reasonably protect equipment from the reevaluated hazards and that these “principles” are reflected in NEI 12-06.

The commenter states that use of the term “most recent flood analysis” in NEI 12-06 did not mean what is implied in these two paragraphs. It meant to select the most recent design-basis flood analysis applicable to the site in question and use that for developing the strategies. It was not referring to the ongoing activities under NTTF Recommendation 2.1, because otherwise the licensees could not have complied with the Order in the time required. The commenter agrees that the COMSECY did direct addressing the reevaluated flood and seismic hazards

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equipment, and NEI 12-06, Appendix H, includes a demonstration of seismic robustness for the seismic hazard levels resulting from that RFI. These provisions extend the reasonable protection of plant equipment (or SSCs) to the hazard levels resulting from the RFI.



through a mitigating strategies approach, which is, in fact, what is being done through the inclusion of Appendices G and H in NEI 12-06.

The commenter suggests that to correctly reflect how the reevaluated flooding and seismic hazards came to be included in the rulemaking, this section of the FRN should be revised to remove statements suggesting that NEI 12-06 contained a requirement to reasonably protect equipment from the reevaluated hazards. [NEI TC-41]

**NRC Response:**

The NRC agrees that the SOC could be clarified regarding the issue raised by the commenter. However, the NRC notes that NEI 12-06 does not contain any requirements because it is an industry guidance document. The requirement that the original version of NEI 12-06 was intended to provide guidance in meeting was the requirement of Order EA-12-049, Attachments 2 and 3, that “Licensees...must provide reasonable protection for the associated equipment from external events.” The meaning and intent of that requirement were clarified by the Commission’s statement in SRM-COMSECY-14-0037 that “licensees for operating nuclear power plants need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events.” The NRC concludes that there is a lack of clarity in this portion of the SOC and has modified it in response to this comment.

**SOC Comment 19:**

In the FRN, on page 70,628, in Section IV.D., “Training,” the last sentence of the second paragraph in this section states, “Licensees would be required to use the SAT process for newly identified training requirements supporting the effective use of the strategies and guidelines that would be required by this proposed rule.”

This statement is made at the end of the discussion regarding other training programs that do not use the SAT process. The NRC concludes that such programs do not need to be revised to use the SAT process. However, the sentence in question would imply that new training requirements that would be implemented under such programs would need to be developed using the SAT process. The penultimate sentence in this paragraph would then only grandfather existing elements of these programs as not needing to use the SAT process. Since this training will, in large part, have been completed prior to the rule becoming effective, the rule should not impose a new requirement (i.e., for newly identified training to use the SAT process) retroactively. [NEI TC-42, NEI Training Text Change 1]

**NRC Response:**

The NRC disagrees with this comment. The endorsed industry guidance document, NEI 12-06, Revision 0, included guidance for development of training needed to meet the requirements of Attachments 2 and 3 to Order EA-12-049 that “Full compliance shall include procedures, guidance, training, and acquisition, staging, or installing of equipment needed for the strategies.” NEI 12-06, Revision 0, Section 11.6.1, provides guidance that includes the use of the SAT. The later version of NEI 12-06, Revision 2, as endorsed by JLD-ISG-2012-01, Revision 1, expands

on this to state that “Training materials, delivery methods and frequencies, and evaluation techniques should be developed using established processes that address the [SAT] elements listed in 10 CFR 55.4.” No licensees of operating reactors have identified alternative approaches to the development of training under NEI 12-06, leading the NRC to conclude that there would be no need to redevelop or reperform training that had been accomplished under other programs.

In conjunction with this comment, the commenter provided a revised version of the industry guidance document NEI 13-06, “Enhancements to Emergency Response Capabilities for Beyond Design Basis Events and Severe Accidents,” which addresses training as follows in Section 3.3.1:

Training materials, delivery methods and frequencies, and evaluation techniques should be developed using established processes that address the [SAT] elements listed in 10 CFR 55.4, except for elements already covered under other NRC regulations. Training on these common elements can be addressed in a non-SAT training program that is acceptable for meeting regulatory required training (e.g., 10 CFR part 50, appendix E, section IV.F).

Following this industry guidance document’s recommended actions for training would not result in a need to redevelop or reperform training based upon the text of the SOC discussion in the rule.

Underlying the NRC’s decision to allow for reliance on existing training programs to equip staff to accomplish tasks that would be common to both the mitigating strategies and guidelines (e.g., deploying a fire hose for firefighting or deploying a flexible hose for delivery of makeup water for the mitigating strategies) is the existing basis for the regulatory acceptability of the non-SAT-based training program. In the case of firefighting, the basis for acceptability of the training program would be reliance on National Fire Protection Association (NFPA) standards on the subject. With respect to newly identified tasks for which training would be necessary for the mitigating strategies and guidelines, unless there is an equivalent existing common element within the NFPA standards or other NRC-accepted standards or regulations that provides the foundational basis for the acceptability of the existing training program, no basis would exist to allow for a conclusion that the training program is appropriate to provide the staff with the knowledge and abilities to accomplish the new task.

The NRC further notes that the modifications suggested by the commenter would not support compliance with the final MBDBE rule, which requires, in 10 CFR 50.155(d), that “The training and qualification on these activities must be developed using the systems approach to training as defined in § 55.4 of this chapter except for elements already covered under other NRC regulations.”

No changes were made to the SOC based on this comment.

**SOC Comment 20:**

One commenter noted that, in the FRN on page 70,628, the training description should be revised to better reflect how licensees would implement the new training requirement. A licensee would first need to assess all job tasks necessary to perform mitigating strategies in order to identify training gaps or future modifications. These gaps or modifications would then be addressed in the appropriate training program, a SAT-based program or, for common elements, a non-SAT program currently acceptable for meeting regulatory required training. Also, this section should address expectations for initial training that was delivered prior to the effective date of the rule's training requirements. [NEI TC-43, NEI Training Text Change 1]

**NRC Response:**

The NRC disagrees with this comment for the reasons outlined in the NRC response to SOC Comment 19. No changes were made to address this comment.

**SOC Comment 21:**

One commenter noted that, in the FRN on page 70,629, under "Onsite and offsite communications capability," there is no reference to the licensee communications assessments that were performed in response to the 10 CFR 50.54(f) RFI of March 12, 2012. These assessments provided the bases for changes implemented by licensees to add communications capabilities for events that result in extended loss of ac power onsite, or potential destruction of offsite communications infrastructure. Each facility's assessment was the subject of a review performed by the NRC staff; the staff's reviews typically concluded that the assessment for communications was reasonable, and the interim measures, analyzed existing systems, and proposed enhancements would help to ensure that communications are maintained.

The commenter suggests that this section of the FRN should recognize the communications assessments (similar to what was done with staffing) and that implementation of NRC-reviewed proposed changes is sufficient to meet the intent of the proposed requirement in 10 CFR Part 50, Appendix E, Section VII. [NEI TC-44]

**NRC Response:**

The NRC agrees with the comment that a more fulsome discussion of the communications enhancements should include the communications assessments performed in response to the March 12, 2012, RFI and has modified the SOC in response to this comment. Also, the final MBDBE rule has been significantly revised and simplified to move the staffing and communications requirements that were proposed as Section VII to 10 CFR Part 50, Appendix E, into 10 CFR 50.155. This revision provides a more direct integration of the staffing and communications capabilities with the mitigation strategies requirements and, furthermore, ensures that changes to the mitigation strategies give proper consideration to impacts on staffing and communications, such that staffing and communication capabilities are maintained over time. In addition, this modification of the rule has removed the requirement for the communications assessment, leaving the performance of the assessment at the level of

regulatory guidance to meet the performance-based requirement to provide communications capabilities.

**SOC Comment 22:**

One commenter noted that, in the FRN on page 70,629, under “Staffing Assessment,” as used in this section, “EDMGs” are improperly conflated with the staffing assessment conducted under the RFI of March 12, 2012, that was developed to align with the requirements included in Order EA-12-049, and the proposed new staffing assessment requirement in 10 CFR Part 50, Appendix E, Section VII. The reference to EDMGs should be deleted from this paragraph. [NEI TC-45, NEI EP Text Change 2]

**NRC Response:**

The NRC agrees with this comment because the staffing assessment portion of the RFI of March 12, 2012, was limited to implementation of the licensees’ emergency plans during a large-scale natural event, and has modified the SOC in response to this comment. The final MBDBE rule has been significantly revised and simplified to move the staffing and communications requirements that were proposed as Section VII to 10 CFR Part 50, Appendix E, into 10 CFR 50.155. This provides a more direct integration of the staffing and communications capabilities with the mitigation strategies requirements and, furthermore, ensures that changes to the mitigation strategies give proper consideration to impacts on staffing and communications, such that staffing and communication capabilities are maintained over time. In addition, this modification of the rule has removed the requirement for the staffing assessment, leaving the performance of the assessment at the level of regulatory guidance to meet the performance-based requirement to provide sufficient staffing.

**SOC Comment 23:**

One commenter noted that, in the FRN on page 70,632, in the second column, in the paragraph starting with, “The proposed § 50.155(b)(1) would limit the requirements for mitigation strategies to...,” the last sentence refers to equipment being reasonably protected.

The commenter states that reasonable protection only applies to FLEX equipment and not to plant equipment. This section is referring to both sets of equipment; therefore, reasonable protection is the incorrect terminology. [NEI TC-46]

**NRC Response:**

The NRC disagrees with this comment for reasons similar to the discussion in the resolution of SOC Comment 18. The requirement for reasonable protection of equipment is aligned with 10 CFR 50.155(b)(1) and (b)(2), as a function of whether the calculated reevaluated hazards exceed the current external design-basis hazards, and specifically addressed in 10 CFR 50.155(c)(2) and (c)(3). For example, the requirement in 10 CFR 50.155(c)(2) is as follows: “The equipment relied on for the mitigation strategies required by paragraph (b)(1) of this section must be reasonably protected from the effects of natural phenomena that are

equivalent to the design basis of the facility.” There is no limitation of that requirement to the equipment that is defined as “FLEX equipment” within the industry guidance document, NEI 12-06, so that requirement applies to all equipment that is relied on for the mitigation strategies required by paragraph (b)(1), which would include equipment referred to as “plant equipment” in NEI 12-06. As a result, any plant equipment used as part of a licensee’s mitigating strategies, such as the TDAFW pump in a PWR or the RCIC pump in a BWR, would be subject to the reasonable protection requirement as a separate requirement from any other protection requirements for those pieces of equipment. The NRC concludes that the SOC lacks clarity on this subject and has modified it in response to this comment.

**SOC Comment 24:**

One commenter noted a typographic error in the FRN on page 70,632, in the first column, third paragraph: The citation at the end of the paragraph is incorrect. The citation at the end of the paragraph should be to 10 CFR 50.155(f) not 10 CFR 50.155(g). [NEI TC-47]

**NRC Response:**

The NRC agrees with this comment because it reflects the actual paragraph of the rule text referenced by this portion of the FRN, and has corrected the SOC for the final MBDBE rule.

**SOC Comment 25:**

One commenter suggested revising the FRN on page 70,633, in the first column, to clarify the application of 10 CFR 50.155 (b)(1) and (b)(2) requirements, i.e., (b)(1) applies to all “on-site units” consistent with Order EA-12-049 and, for the current 10 CFR 50.54(hh)(2) requirement, the “affected unit” consistent with industry implementation of NRC-endorsed guidance in NEI 06-12. [NEI TC-48, NEI EP Text Change 3]

**NRC Response:**

Consistent with the response to Rule Comment 39, the NRC agrees with this comment that the language could be clarified and has revised the SOC in response to the comment.

**SOC Comment 26:**

One commenter noted that, in the FRN on page 70,634, in the second column, under “Proposed § 50.155(e) Drills and Exercises,” in the first sentence of the first paragraph, the second “and” should be changed to “or” to align this sentence with the rest of the description contained in this section and the proposed rule wording in 10 CFR 50.155(e). [NEI TC-50]

**NRC Response:**

The NRC agrees with this comment. The final MBDBE rule text has been revised to use the word “or,” and the supporting SOC has been revised, where applicable, to address the concerns raised by the commenter.

**SOC Comment 27:**

One commenter noted that, in the FRN on page 70,634, in the second column, under “Proposed § 50.155(e) Drills and Exercises,” the third sentence of the first paragraph describes the use of the term “integrated.”

The term “integrated” is not used in proposed 10 CFR 50.155(e), so it is unclear how it can be introduced here in the Section-by-Section Analysis to describe a drill or exercise. The sentence should be reworded such that it is stating the expected attributes (scope) of a drill or exercise demonstrating the integrated use of strategies or guidelines in 10 CFR 50.155(b)(1) and (2). Revised wording is suggested to improve the clarity of the expected drill/exercise scope, and “practical” with “practicable” to better characterize the scope of effort (i.e., feasible, or able to be done or put into practice successfully). Note that the concept of “integrated,” as it pertains to capabilities, procedures, and guidelines demonstrated in a drill or exercise, is correctly addressed in the second and fourth sentences of this paragraph.

The commenter suggests the following:

These drills or exercises should demonstrate usage of the procedures, guidelines, staffing and supporting organizational structure during a performance enhancing experience to the extent practicable given a set of initiating conditions and within the bounds of a drill or exercise scenario.

[NEI TC-51]

**NRC Response:**

The NRC agrees with the aspect of this comment regarding the use of the term “integrated” and has modified the SOC in response to the comment. With respect to the use of the term “practicable” rather than “practical,” the NRC disagrees with the comment for the reasons stated in the responses to SOC Comments 10 and 16 (i.e., modifying the discussion in the SOC as suggested by the commenter would have the opposite effect from that desired by the commenter).

**SOC Comment 28:**

One commenter recommended changing “appropriate centers, work groups, strike teams, or individuals” in the first sentence of the second paragraph of FRN page 70,634, to “the appropriate emergency facilities, teams and support groups” to align with standard industry terminology (e.g., in emergency plans and NEI 99-02). This will improve understanding of rule expectations. [NEI TC-52]

**NRC Response:**

The NRC agrees that this comment would improve the clarity of the SOC and has modified it in response to the comment.

**SOC Comment 29:**

One commenter suggested changing the first “and” to “or” in FRN page 70,635, first paragraph, second sentence, which reads, “This would require that the drills and exercises performed to demonstrate this capability include transitions from other procedures and guidelines, as applicable, and the use of communications equipment that would be required by proposed 10 CFR part 50, appendix E, section VII,” to align this sentence with the rest of the description contained in this section, and the proposed rule wording in 10 CFR 50.155(e). [NEI TC-53]

**NRC Response:**

The NRC agrees with this comment and has modified the SOC in response to the comment. The final MBDDBE rule has been significantly revised and simplified to move the staffing and communications requirements that were proposed as Section VII to 10 CFR Part 50, Appendix E, into 10 CFR 50.155. This provides a more direct integration of the staffing and communications capabilities with the mitigation strategies requirements and, furthermore, ensures that changes to the mitigation strategies give proper consideration to impacts on staffing and communications, such that staffing and communication capabilities are maintained over time.

**4. Comments on the Questions Requesting Stakeholder Feedback****Question 1:**

*Change Control.* The provisions governing change control in proposed § 50.155(f) do not contain a criterion or a set of criteria that would establish a threshold beyond which prior NRC review and approval would be necessary to support a proposed change to the facility impacting the beyond-design-basis aspects of this proposed rulemaking and its supporting implementation guidance. For example, a set of criteria that asks whether a proposed facility change adversely impacts the capability to maintain and restore core cooling, containment, and spent fuel pool cooling capabilities, in conjunction with a criterion that asks whether the proposed facility change adversely impacts the supporting equipment requirements in proposed paragraph (c) might be sufficient for judging whether changes to the facility that impact the implementation of the mitigation strategies of proposed (b)(1) require prior NRC review and approval. What are stakeholders’ views on this proposed change control structure, and what do stakeholders suggest for revising the change control process to contain criteria for determining the need for prior NRC review and approval?

**Question 1 Comment 1:**

A commenter recommended that the NRC include a change control criterion that would require licensees to evaluate and document changes to the 10 CFR 50.155 mitigation strategies, when such changes extend beyond endorsed guidance, to demonstrate the proposed changes do not

“reduce the effectiveness” of the mitigation strategies. If such proposed changes could reduce the effectiveness, then the rule would require that the changes receive prior NRC review and approval. The commenter also recommended that such approval should be a letter approval, rather than a 10 CFR 50.90 license amendment. The commenter expressed concern that without such a criterion, licensees could weaken and/or eliminate many of the provisions that were put in place to implement the mitigation strategies order in accordance with endorsed guidance.

Another commenter also suggested that the NRC include a change control criterion, noting that the NRC reviewed licensees’ submittals outlining their intentions for achieving compliance with the NRC’s post-Fukushima orders, which are being made generically applicable by this rulemaking. The commenter noted that the NRC asked many questions of licensees about their plans, sometimes resulting in changes in what the licensees intended to do or how they planned to do it. The commenter noted that these interactions demonstrated that it took an iterative process for the NRC and its licensees to reach a common understanding of what constituted acceptable measures. The commenter concluded that the record is very clear that licensees have not clearly understood when they can make safety changes to their plants and procedures under 10 CFR 50.59 without prior NRC review and approval. (See ADAMS Accession No. ML13094A257 for a 68-page listing of NRC sanctions for 50.59 violations.) The final rule must contain a threshold defining when prior NRC approval is required before licensees can change their MBDBE measure. [Bamford-1, UCS-3]

**NRC Response:**

The NRC disagrees with these comments. The NRC concluded that the final MBDBE rule would not have a “prior NRC review and approval” type of change control criterion and instead, would follow the same approach contained in the proposed MBDBE rule. The suggestion for use of a “reduction in effectiveness” criterion was understood to be an example of a criterion, and the NRC considered both that specific example and any others that it could identify. First, the NRC concluded that use of a “reduction in effectiveness” or an equivalent type of change control criterion would not clearly differentiate significant changes from changes not warranting prior review, in large measure due to the fact that “effectiveness” does not have a quantifiable direct link to public health and safety, nor to continuing to maintain the intended all-hazard mitigation capability that was first imposed by Order EA-12-049, which constitutes the majority of the mitigation strategies requirements in the MBDBE rule. Additionally, due to the deterministic nature of the criteria used for development and implementation of the strategies under the order, many potential changes could have aspects that tend to reduce the effectiveness, combined with other aspects that tend to improve the effectiveness of the mitigating strategies. For example, replacing a portable diesel-driven pump with a similar one of a larger size could improve the effectiveness by allowing for greater flow rates of makeup water but reduce the effectiveness due to having a higher fuel usage rate and a concomitantly shorter run time without refueling.

The only comparable set of requirements addressing BDB events containing provisions that address the control of changes is 10 CFR 50.150, “Aircraft impact assessment.” Reviewing that



requirement, and noting that 10 CFR 50.150 requires that changes meet the assessment requirements contained within 10 CFR 50.150, the NRC concluded that the proposed approach for 10 CFR 50.155(f) was well aligned with the 10 CFR 50.150 change control because the NRC is requiring that changes be demonstrated to satisfy the requirements of 10 CFR 50.155. The NRC notes that other BDB provisions in 10 CFR 50.62, 10 CFR 50.63, and 10 CFR 50.54(hh) do not contain change control requirements. Based on that review and consideration of the feedback provided, the NRC did not find a suitable criterion (or criteria) that the NRC judged would result in a substantial improvement over what was proposed for addressing changes in the proposed MBDBE rule, and accordingly, the final MBDBE rule continues with the same approach (i.e., licensees must demonstrate that the proposed change will result in continued compliance with the requirements of 10 CFR 50.155, that documentation of those changes be maintained, and that the NRC will then be able to oversee the changes, through inspection, and take enforcement action as appropriate). Notwithstanding this conclusion, the NRC did conclude that it could improve the supporting SOC for this provision to clarify its meaning and intent. In this regard, the NRC concluded that the changes that would be most difficult to judge whether they are acceptable are those that do not fall within endorsed guidance or are not NRC-approved alternative approaches taken at another licensed facility that can be demonstrated to apply to the licensee's facility. The supporting SOC has been clarified as to what the NRC would find meets a condition of demonstrated compliance for such changes.

The feedback from both commenters in response to Question 1 also implied that the significant level of interaction between the NRC and licensees that was needed to establish the mitigation strategies indicates a lack of clear understanding on the part of licensees that would result in poor change control. The NRC acknowledges the complexity of the mitigation strategies, and that an individual licensee might be challenged with regard to some potential changes, but does not agree this applies across the board to all licensees and to all changes, thus warranting a prior review and approval change control approach. It is understandable that it took extensive interactions to establish an acceptable approach for compliance, given the nature of this requirement to establish an additional capability to mitigate undefined BDB external events. The interactions between the NRC and licensees established an acceptable approach for implementing the requirements of Order EA-12-049, which, although similar to the strategies implemented for 10 CFR 50.54(hh)(2), were in many respects, first-of-a-kind requirements. Once implemented with supporting endorsed guidance that contains lessons learned, this set of information can be used to make informed judgments on acceptable changes to the implementation of the requirements.

The NRC disagrees with the second commenter's interpretation of the document cited regarding 10 CFR 50.59 findings and noncited violations (NCVs) (ADAMS Accession No. ML13094A257). This document was created during the NRC's examination of the use of 10 CFR 50.59 evaluations and represented a listing of all findings and NCVs under that rule for a 12-year period. The results of this review are documented in the February 25, 2015, memorandum, "10 CFR 50.59; The Process, Application to Substantial Modifications to Licensee Facilities, and NRC Staff Assessment of Licensee Implementation" (ADAMS Accession No. ML13066A237). This memorandum concluded that licensees continue to correctly apply 10 CFR 50.59 to

changes in their facilities. The commenter provides no new information to change the staff's conclusions on the subject. The NRC further concludes that this is not directly relevant to whether there needs to be a "prior review and approval" type of change control requirement for this BDB regulatory application. Accordingly, this feedback did not cause the NRC to revise its approach. Instead, the NRC concludes that the updates to the endorsed guidance, and the considerable level of interaction with licensees concerning the implementation of the mitigation strategies requirements, have resulted in substantially more information that can be used by licensees to make informed judgments of whether changes are acceptable. The NRC concludes that licensees have obtained a much better understanding of what changes would result in compliance with 10 CFR 50.155. As discussed in response to other feedback concerning change control, the final SOC for the MBDBE rule is enhanced to address changes that would not be consistent with "demonstrated compliance."

**Question 1 Comment 2:**

A commenter stated that licensees are required to periodically notify the NRC about changes to commitments (RIS 2000-017) and safety (10 CFR 50.59(d)(2)), and that the final rule must require licensees to periodically notify the NRC about changes to its MBDBE measures. [UCS-4]

**NRC Response:**

The NRC does not agree with the comment. Licensees will not need to report changes to the mitigation strategies; rather, licensees will be required to maintain documentation of changes and they will be evaluated as part of the NRC's planned oversight activities through the inspection and enforcement programs under the ROP. A requirement for reporting such changes to the NRC would be an unnecessary burden because of the beyond-design-basis nature of the requirements and the lack of a potential enhancement to safety from the periodic reporting. Reports of changes affecting safety under 10 CFR 50.59(d)(2) allow the NRC additional notice of the existence of changes affecting safety that will be subject to a later sampling inspection under the ROP and have an input into the sampling choices made. Reports of commitment changes cover subject matter that is not subject to the baseline ROP. In contrast to these items, changes to the strategies and guidelines under the MBDBE rule are documented by licensees and will be subject to the ROP.

**Question 1 Comment 3:**

A commenter notes that, among the upgrades taken in response to the events of September 11, 2001, the NRC revised its regulations to integrate evaluations conducted for safety changes with those conducted for security changes (see RG 5.74 at ADAMS Accession No. ML091690036). This integration sought to avoid a safety change from inadvertently undermining security measures and vice versa. The final MBDBE rule must integrate evaluations of proposed MBDBE changes with safety and security changes.

To illustrate the need for integrated evaluations, the commenter suggested an example where a licensee evaluates a proposed change that removes a check valve from a makeup line or modifies a motor-operated valve in the line to fail-open on loss of power. The evaluation conducted under 10 CFR 50.59 and 73.58 concludes that the proposed change does not undermine safety or security. But consider if the location of the valve is upstream of the connection point for FLEX equipment intended to provide makeup water to the reactor vessel during a BDB event. The change might create a pathway for water supplied by FLEX to flow places other than the reactor vessel.

As a minimum, the commenter proposed that the final rule require that licensees include MBDBE items in design control checklists (see ADAMS Accession No. ML993340213 for an example) that review proposed modifications for potential adverse impacts on areas such as high-energy line break analyses; radiation protection, fire protection, and in-service inspection programs; and SBO.

The nuclear industry and the NRC have expended considerable resources upgrading response capabilities for BDB events. Change control measures are prudent to ensure these investments are not undermined or eroded unintentionally by future changes. The NRC imposed requirements on its licensees as a result of the Fukushima accident and its lessons. Change control is essential in ensuring these mandated measures remain as effective in the future as they are today. [UCS-6]

**NRC Response:**

The NRC agrees with this comment. The final MBDBE rule requires that changes meet the requirements of 10 CFR 50.155(f), and to the extent that such changes affect other areas of the facility and, as a result, are subject to other governing requirements and change control processes, those other changes control processes must also be applied. The basic requirement to develop, implement, and maintain the mitigation strategies requirements, in conjunction with the change control requirements, provides assurance that licensees will control these changes within their existing configuration management programs. As the commenter notes, it is also important for licensees to recognize that the requirements of 10 CFR 73.58 must be satisfied, such that changes to the mitigation strategies must ensure that there are not adverse impacts to security and vice versa; the proposed rule SOC discussed that issue, and the NRC continues with that discussion in the final MBDBE rule. These requirements are supported at the guidance level in NEI 12-06, Section 11.8.2, which specifies that “Existing plant configuration control procedures will be modified to ensure that changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies.”

**Question 1 Comment 4:**

One commenter expressed an understanding that the intent of proposed 10 CFR 50.155(f) is to allow the licensee to make changes in the implementation of the requirements in 10 CFR 50.155 and 10 CFR Part 50, Appendix E, Section VII, without NRC approval, as long as

the licensee continues to meet the provisions of 10 CFR 50.155 and 10 CFR Part 50, Appendix E, Section VII. This is an appropriate change control standard for these BDB event requirements. The commenter proposed the following minor clarification to 10 CFR 50.155(f)(1):

(f) Change Control. (1) A licensee may make changes in the implementation of the requirements in this section and 10 CFR part 50, appendix E, section VII, without NRC approval, provided that before implementing each such change, the licensee ~~performs an evaluation demonstrating~~ demonstrates that the provisions of this section and 10 CFR part 50, appendix E, section VII, continue to be met.

[NEI SR-1]

**NRC Response:**

The NRC agrees that the commenter's suggestion improves the language and has revised the final MBDBE rule accordingly. Also, the final MBDBE rule has been significantly revised and simplified to move the staffing and communications requirements that were proposed as Section VII to 10 CFR Part 50, Appendix E, into 10 CFR 50.155. This provides a more direct integration of the staffing and communications capabilities with the mitigation strategies requirements and, furthermore, ensures that changes to the mitigation strategies give proper consideration to impacts on staffing and communications, such that staffing and communication capabilities are maintained over time.

**Question 1 Comment 5:**

Two commenters expressed similar views that the associated guidance for the proposed regulation will be key to understanding that the proposed change control provision is intended to allow such changes without NRC approval. In accordance with the endorsed change control guidance in NEI 12-06, the licensee need not obtain prior NRC approval to make a change, provided that the licensee's assessment determines that the provisions of 10 CFR 50.155 and 10 CFR Part 50, Appendix E, Section VII, continue to be met. The commenters also noted that the supplementary information seemed to contradict this by stating that "the proposed change control provisions may result in licensees seeking NRC review and approval of proposed changes that do not follow current regulatory guidance for this proposed rulemaking potentially *through a license amendment.*" The commenters indicated that, under the plain language of both proposed 10 CFR 50.155(f) and NEI 12-06, a licensee would not need a license amendment to implement strategies that are not approved in regulatory guidance, if the licensee performs a documented assessment demonstrating that the change continues to meet applicable regulatory requirements. [NEI SR-2, FENOC-8]

**NRC Response:**

The NRC agrees that the quoted language on page 70,628 of the FRN, in the third column, third paragraph, under "Change Control," could be misleading. The NRC did not intend to imply that licensees must submit changes for prior NRC review and approval. Instead, the intent was to

recognize the practical reality that some licensees may want to make changes that are not within the approved guidance, and not an approved alternative that can be demonstrated to be applicable to their facility, but do not wish to take the risk that the NRC may inspect later, after the change has been implemented, and find the change does not ensure compliance and take enforcement action. Under such circumstances, the licensee may wish to voluntarily confer with the NRC on the prospective change, and this may, in turn, result in an NRC review of the change. Again, this is neither required nor necessary but, instead, was intended to reflect the potential. The final MBDBE rule SOC was clarified to address this concern.

**Question 2:**

*Application of Other Change Control Processes.* Proposed § 50.155(f)(3) contains a requirement for licensees to use all applicable change control processes for facility changes, and not simply apply proposed paragraph (f) (i.e., the proposed change control process of paragraph (f) is only applicable to facility changes with respect to their beyond-design-basis aspects and to the extent that such changes impact implementation of the requirements of proposed § 50.155 or the proposed 10 CFR part 50, appendix E, section VII) to the exclusion of other change control processes. This recognizes that facility changes can impact multiple aspects of the plant having different applicable requirements, and being subject to different change control requirements. For example, a licensee may want to make a facility change (e.g., a physical connection device) to support implementation of the beyond-design-basis external event mitigation strategies, and this change might impact safety-related SSCs. In addition to applying the new change control provision to ensure beyond-design-basis aspects of the proposed change result in continued compliance with the new requirements of this proposed rule, the licensee would also need to apply 10 CFR 50.59 to ensure that the facility change does not, due to its impact on safety-related SSCs, require prior NRC approval. The NRC requests feedback on the need for this proposed provision, or suggestions on how it might be improved.

**Question 2 Comment 1:**

One commenter stated that a new 10 CFR 50.155(f)(2) should be added to explicitly and clearly address the application of “Other Change Control Processes,” given that facility changes can affect multiple aspects of the plant, which can have different applicable requirements and be subject to different change control requirements. The rule and associated guidance should consistently differentiate between design-basis conditions and BDB conditions by clarifying that other change control processes, such as 10 CFR 50.59, 10 CFR 50.54(p), 10 CFR 50.54(q), and fire protection change controls are not applied to changes affecting only implementation of the strategies and guidelines required by 10 CFR 50.155(b). This would reflect the NRC staff position stated in an NRC letter from William M. Dean, Director, Office of Nuclear Reactor Regulation, to Joseph E. Pollock, Vice President, Nuclear Operations, Nuclear Energy Institute,

dated April 17, 2015 (ADAMS Accession No. ML14147A073). Specifically, this letter states the following:

Provided that such changes do not also involve changes to the plant or procedures as described in the UFSAR, the associated guidance in NRC endorsed documents such as NEI 96-07, "Guidelines for [10 CFR 50.59] Implementation," and NEI 97-04, "Design Basis Program Guidelines," would support "screening out" those changes and not needing to evaluate them in accordance with the regulatory processes associated with the UFSAR (i.e., 10 CFR 50.59 and 50.71). The same is true for other key licensing basis documents such as the security plan and emergency plan, and their related change control and reporting requirements, provided the changes being evaluated impact only mitigating strategies for [BDB external events] and do not affect the content of the other licensing basis documents.

As noted, the NRC-endorsed documents allow the determination that 10 CFR 50.59 does not apply to changes that are **not** described in the UFSAR. In the same manner and based on the applicability determination made under 10 CFR 50.59, other change control processes for the security plan, emergency plan, and fire protection plan would not be applicable to changes affecting only implementation of the strategies and guidelines required by 10 CFR 50.155(b).

In this regard, the commenter suggested the following change control language for 10 CFR 50.155(f)(2):

(f)(2) Changes in implementation of requirements in this section and 10 CFR part 50, appendix E, section VII are not subject to change control processes other than paragraph (f)(1) provided the changes being evaluated impact only mitigation of beyond-design-basis events.

Alternatively, the regulation could contain a provision that allows licensees to deem acceptable a change evaluated through these other change processes, provided the change affects only the implementation of the strategies and guidelines required by this section. The suggested provisions would be particularly relevant to streamlining the assessment of potential change impacts on programmatic requirements associated with security, emergency preparedness, and fire protection that would only be implemented during an actual BDB event.

To accommodate this new paragraph, the commenter noted that the current paragraph (f)(2) should be renumbered as (f)(3). [NEI CL-2, NEI SR-3, NEI SR-4] Two other commenters supported this commenter's comments. [SCE&G-2, FENOC-4, FENOC-10]

**NRC Response:**

The NRC agrees with the comments. The comments suggest inserting a new paragraph 10 CFR 50.155(f)(2) to state that changes to implementation of the MBDBE rule are not subject to other change control processes, provided that the changes affect only mitigation of BDB

events. This is intended to achieve the same regulatory objective as the proposed rule's language of ensuring a licensee applies all applicable change control processes, depending on the extent of the facility change, by indicating what is not applicable, rather than what may be applicable. As such, this is a simpler and more understandable approach than that in the proposed MBDBE rule, and the final MBDBE rule was revised consistent with this feedback.

The NRC revised the supporting SOC for this provision to reflect the information provided in this response. Finally, the NRC also discussed in greater detail the impacts to programmatic requirements associated with security, emergency preparedness, and fire protection to clarify the implementation of change control for the BDB requirements of the MBDBE rule.

**Question 3:**

*Reasonable Protection.* This proposed rule contains a requirement in proposed § 50.155(c)(2) that equipment supporting the proposed mitigation requirements of paragraph (b)(1) be "reasonably protected" from the effects of natural phenomenon including both those in the current plant design basis as well as the reevaluated hazards under the March 12, 2012, § 50.54(f) request concerning flooding and seismic hazards. As a practical matter, implementation of Order EA-12-049 began before the reevaluated hazard information was available. The NRC recognizes that licensees were mindful of the hazard information, and attempted to address it during implementation. The NRC requests feedback concerning any costs and impacts that licensees would expect to occur as a result of this proposed requirement to include such things as rework or changes to previously implemented mitigation strategies.

**Question 3 Comment 1:**

One commenter stated that the estimates provided in response to this question are based on the guidance for Mitigating Strategies Assessment (MSA) contained in NEI 12-06, a document that has been endorsed by the NRC. The commenter's interpretation of the proposed rule's requirements for an MSA differs from the guidance in NEI 12-06. Specifically, the language in 10 CFR 50.155(c)(2) seems to focus the assessment on the protection of mitigating strategies equipment, whereas the guidance allows the use of alternate mitigating strategies to cope with the hazards. The commenter proposed changes to the rule language to address this discrepancy in its response to Question 9. If the final rule precludes these alternate mitigating strategies, industry compliance costs would be significantly greater than reflected here, without any corresponding safety benefit. With that caveat, the commenter offered the following feedback on the costs and impacts licensees expect to occur because of a new requirement to address the reevaluated hazards within their mitigation strategies for BDB external events.

The commenter indicated that, in December 2015, NEI sent a survey to utilities to obtain information related to the NRC's request. The survey characterized its questions as follows.

The purpose of this survey is to collect cost and implementation information that may support some of the industry comments on the rulemaking package and allow NEI to submit a response to these questions that summarizes industry input.

The questions below provide some task details that will help answer the NRC's questions. The cost or implementation schedule estimates provided should be based on the evaluations and changes that will be necessary under the new rule, the estimates should not include the costs or time associated with implementing the existing Orders or any previous rulemaking but may include costs associated with response to the NRC 50.54(f) letter to the extent they are being used in support of mitigating strategies.

With respect to estimating mitigating strategies changes to address the reevaluated seismic and flooding hazards, we recognize that Mitigating Strategies Assessments (MSAs) have not been completed, but the guidance has been issued (see NEI 12-06 rev 2) and you probably know the difference between the FLEX DB hazard and the reevaluated hazard results. As a result, you may have an idea of what changes you need to make to accommodate these differences. Your best estimate of the cost and implementation schedule is all that is requested.

The questions asked in the survey were the following.

- A. Please provide man-hour or cost estimates for the following (indicate which is provided):
1. Completion of a flooding MSA per NEI 12-06 rev 1 Appendix G
  2. Indicate what strategy will be used for the flooding MSA (FLEX OK, mod FLEX, Alternate Mitigating Strategy (AMS), or Targeted Hazard Mitigating Strategy (THMS))
  3. Completion of a seismic MSA per NEI 12-06 rev 1 Appendix H
  4. Indicate what path will be used in the seismic MSA (Path 1, 2, 3, 4, or 5)
  5. Complete NRC submittal of flooding and seismic MSA results
  6. Revise FLEX program and OIP or FIP documents to reflect MSA results
  7. Revise FLEX Support Guidelines, if necessary, to reflect MSA results
  8. Train staff on revised FLEX Support Guidelines
  9. Completed plant modifications, if necessary, to address results of MSA
- B. Please provide a brief summary of the modifications to mitigating strategies and the plant that you expect to have to make, and how long (in terms of years or RFOs [refueling outages]) it will take to design and implement the changes. Also briefly indicate what is driving the schedule.

There are several key assumptions and observations related to interpreting the results of the survey.



- All costs are on a per site basis.
- The guidance for completing an MSA was not final at the time of the survey. The survey referred to Revision 1 of NEI 12-06. Revision 2 had just been completed at the time of the survey; the utilities may not have been fully aware of its contents or the changes since Revision 1, especially in the seismic area.
- MSA guidance may be affected by NRC comments during the endorsement process.
- No utility had actually completed an MSA at the time of the survey. As a result:
  - The effort required to complete an MSA is a best estimate.
  - The effort required to implement any changes to plant programs and procedures and complete any necessary training is dependent on the results of the MSA. Since these results are not known, estimates have a large uncertainty.
  - The extent of any plant modifications is dependent on both the mitigating strategy used and the results of the evaluation as compared to existing plant design. Both of these factors have a very large effect on estimate uncertainty.
- One of available seismic strategies uses a probabilistic approach. The cost of developing the underlying seismic probabilistic risk assessment (SPRA) is not included in the estimates.
- Costs of maintaining configuration control for the resulting programs, procedures, and modifications were not included in the estimates.
- NRC review fees are not included in the estimates. Experience indicates that the review fees for some submittals can be close to the development costs for the information.
- Some utilities responded with man-hour estimates, some with cost. An assumption of \$100 per man-hour was used to consolidate the information.

Because of all of these uncertainties, the information provided below will use averages or ranges.

### **Survey Results**

The commenter received responses from approximately 60 percent of the sites. For those that responded:

#### **MSA Cost**

The average effort necessary to complete a flooding MSA may be approximately:

- 690 man-hours if the existing FLEX strategy is okay (~two-thirds of responding sites)

- 2,450 man-hours if the FLEX strategy needs to be modified (~one-third of responding sites)
- 1,550 man-hours if an AMS is used (~one-tenth of responding sites)
- 2,500 man-hours if a THMS is used

The average effort necessary to complete a seismic MSA may be approximately:

- 60 man-hours for path 1 (~one-third of responding sites)
- 450 man-hours for path 2 (~one-seventh of responding sites)
- 3,800 man-hours for path 3 (~one-seventh of responding sites)
- 7,300 man-hours for path 4 (~one-fifth of responding sites)
- 10,000 man-hours for path 5 (~one-fifth of responding sites)

#### Implementation Cost

Implementation costs depend on the combination of flooding and seismic strategies adopted, and, of course, how much the existing FLEX implementation plans would need to change. For the reasons mentioned above, the estimates varied widely. The information below is presented in man-hour ranges per site for those that expect to perform implementation tasks. Note that some sites expect zero costs for programs, procedures, or training efforts, if no changes are expected.

- MSA submittal costs ranged from approximately 400 to 1,000 man-hours
- Program revision costs ranged from approximately 100 to 700 man-hours
- Procedure development and revision costs ranged from approximately 50 to 1,500 man-hours
- Training costs ranged from approximately 50 to 1,500 man-hours

#### Modification Cost

The estimates of plant modification costs varied tremendously between sites; in fact, many respondents submitted a very broad range for the potential modification efforts at a given site. This is due to the fact that licensees do not yet have a good picture of what plant changes will be necessary. Individual plant estimates ranged from zero (no modifications expected) to tens of millions of dollars for sites that may need to enhance their flood protection features. The average anticipated potential modification cost for the respondents was 4.5 million dollars. This cost is in addition to the other implementation costs discussed above. [NEI SR-5, FENOC-11]

#### **NRC Response:**

The NRC appreciates this information and considered it in developing the final regulatory analysis accompanying the final MBDBE rule.

**Question 4:**

*Mitigation of Beyond-Design-Basis Events Staffing Analysis.* Proposed 10 CFR part 50, appendix E, section VII, would require an analysis for the staffing necessary to support mitigation of a beyond-design-basis external event. This requirement would supplement the separate staffing analysis requirement that already exists in 10 CFR part 50, appendix E, section IV.A.9. The reason for the two separate staffing analysis requirements is related to the historical imposition of the requirements for the staffing analyses in the emergency preparedness rulemaking of 2011 and the March 12, 2012, Request for Information under 10 CFR 50.54(f). The NRC is seeking feedback on whether it would be more efficient in practice for the two staffing analyses and their corresponding requirements to be combined, particularly for future reactor applicants. Would there be any unintended consequences to keeping the analyses separate or combining them? Is there a better way of achieving the underlying purpose of this requirement?

**Question 4 Comment 1:**

Although there should be a clear demarcation between response planning and capabilities described in a site emergency plan associated with the requirements of 10 CFR Part 50, Appendix E, and those for BDB events governed by proposed 10 CFR 50.155, only one staffing analysis should be required. Requiring two separate staffing analyses requires additional redundant work and cost. If a site can demonstrate readiness to deal with a BDB undefined event at a specific staffing level, that staffing level has to be sufficient to respond to a design-basis event. Therefore, the proposed 10 CFR Part 50, Appendix E, Section VII, staffing analysis should supersede, not supplement, the existing staffing analysis requirement currently located in 10 CFR Part 50, Appendix E, Section IV.A.9. [FENOC-12]

**NRC Response:**

The NRC agrees with the comment that staffing sufficient to respond to a BDB external event that affects an entire reactor site also would be sufficient for a design-basis event. Although the NRC's regulations contain different staffing requirements, the NRC does not require an applicant to perform a separate staffing analysis for each requirement, and instead, applicants are free to perform analyses that can be used to meet multiple requirements when it is practical to do so. In response to SOC Comment 38, the NRC moved the staffing and communication requirements in proposed 10 CFR Part 50, Appendix E, Section VII, into 10 CFR 50.155. This change will also serve to provide separation between the staffing analysis requirements of 10 CFR Part 50, Appendix E, Section IV, and the staffing required to support implementation of 10 CFR 50.155.

**Question 4 Comment 2:**

One commenter stated that the industry prefers that the two staffing analyses—one for the proposed 10 CFR Part 50, Appendix E, Section VII, and the other for 10 CFR Part 50,

Appendix E, Section IV—and their corresponding requirements not be combined. In general, there should be a clear demarcation between response planning and capabilities described in a site emergency plan, associated with the requirements of 10 CFR Part 50, Appendix E, and those for BDB events governed by proposed 10 CFR 50.155. This separation facilitates better understanding of the underlying requirements and planning bases for various program elements, and the application of change control processes. [NEI SR-7]

**NRC Response:**

The NRC agrees that the two staffing analyses requirements should be separate. To address another stakeholder comment (see NRC response to SOC Comment 38), the NRC moved the staffing and communication requirements in proposed 10 CFR Part 50, Appendix E, Section VII, into 10 CFR 50.155. This change will also serve to provide separation between the staffing analysis requirements of Appendix E, Section IV, and the staffing required to support the implementation of 10 CFR 50.155.

**Question 5:**

*Training Requirements.* Section 50.155(d) of this proposed rule would require licensees to provide for the training and qualification of personnel that perform activities in accordance with the strategies and guidelines identified in paragraphs (b)(1) and (b)(2) (i.e., mitigation strategies for beyond-design-basis external events and extensive damage mitigation guidelines) using the SAT process as defined in § 55.4. The NRC notes that whereas many individuals at licensee facilities that would be subject to this proposed rule are trained under the SAT process (e.g., individuals specified under § 50.120), some individuals (e.g., firefighting and emergency preparedness personnel) may be currently trained under programs that are not required by NRC regulation to use the SAT process (e.g., [NFPA] standards for training and 10 CFR Part 50, Appendix E). It is not the NRC's intent to extend the requirement for SAT-based training to the entirety of such programs. Rather, the intent of the proposed requirement would be to ensure that any training that is not currently part of existing programs but would be needed for performing activities in accordance with the strategies and guidelines identified in paragraphs proposed § 50.155(b)(1) and (b)(2) be identified and provided for in accordance with the SAT process. The NRC requests comment on potential unintended consequences of the proposed rule language for programs not currently required to be SAT-based and if unintended consequences are identified, proposed alternative language for requiring the necessary amendments to such programs.

**Question 5 Comment 1:**

One commenter agreed with the proposed rule change as presented but believes that the comments provided by NEI need to be added to the FRN text to clarify the intent and to reduce the potential for unintended consequences. [FENOC-13]

**NRC Response:**

The NRC disagrees with the comment that the comments submitted by NEI (NEI TC-42 and NEI TC-43) need to be added to the FRN. The NRC addressed NEI's comments in the NRC's responses to SOC Comments 20 and 21.

**Question 6:**

*Drill or Exercise Frequency.* Proposed § 50.155(e)(3) and (e)(4) would require that following an initial drill or exercise, licensees would be required to conduct subsequent drills, exercises, or both, that collectively demonstrate a capability to use at least one of the strategies and guidelines in each of proposed § 50.155(b)(1) and (b)(2) in succeeding 8-year intervals. This would require that the drills or exercises performed to demonstrate this capability include transitions from other procedures and guidelines as applicable, and the use of communications equipment that would be required by proposed 10 CFR Part 50, Appendix E, Section VII, and that licensees shall not exceed 8 years between any consecutive drills or exercises. These requirements would be separate from the 8-year emergency preparedness exercise cycle requirements in 10 CFR Part 50, Appendix E, Section IV.F. The NRC is seeking feedback on whether the drill or exercise frequency proposed by § 50.155(e)(3) and (e)(4) is appropriate.

**Question 6 Comments:**

Two commenters agreed with the proposed rule change as presented. Personnel performing activities in accordance with FLEX and EDMG strategies and guidelines will receive training developed by the SAT process or other processes used by training programs that are acceptable for meeting regulatory required training (e.g., 10 CFR Part 50, Appendix E, Section IV.F, "Training"). These processes and training programs have proven effective in preparing individuals for job performance. In addition, many of the job tasks/skills that emergency response personnel would perform during a BDB event response drill are the same as, or similar to, those performed during EP Program drills and exercises conducted to meet the requirements of 10 CFR Part 50, Appendix E. The proposed BDB drill or exercise frequency provides sufficient performance enhancing opportunities in light of the new training requirements, and responder participation in more frequent EP program drills and exercises. [FENOC-14, NEI SR-8]

Another commenter expressed a preference for a drill or exercise frequency of 1 or 2 years for EVERY operating crew, not one every 8 years. [Gurdziel2-1]

**NRC Response:**

The NRC disagrees with the comment that the drill frequency should be 1 or 2 years. The NRC concludes that the proposed 8-year drill frequency aligns better with the level of regulatory

assurance needed for BDB regulation than the suggested frequency because the suggested frequency would result in an excessive diversion of resources from activities having greater importance to plant safety than the BDB event drills or exercises.

With regard to the other two comments, which focused on the use of a drill and the proposed frequency, the NRC proposed the drill frequency at 8 years, in part, to provide licensees with flexibility to perform these drills in conjunction with emergency preparedness exercises. The feedback provided indicates agreement with the proposed frequency. For both of the reasons provided in this response, the NRC will maintain the drill frequency at 8 years for the final MBDBE rule.

**Question 7:**

*Equipment Requirements.* Proposed § 50.155(c)(1) would require the capacity and capability of the equipment relied on for the mitigation strategies required by proposed § 50.155 (b)(1) to be sufficient to simultaneously maintain or restore core cooling, containment, and spent fuel pool cooling capabilities for all the power reactor units within the site boundary. Additionally, proposed § 50.155(c)(3) would require the equipment relied on for the mitigation strategies in proposed § 50.155(b)(1) to receive adequate maintenance such that the equipment is capable of fulfilling its intended function. The intent of these two proposed provisions is to make elements of Order EA-12-049 generically applicable. Order EA-12-049 did not contain a specific maintenance requirement, but instead contained a performance-based requirement “to develop, implement and maintain strategies,” and failure to perform adequate maintenance would likely lead to a failure to meet this more general requirement, which is also contained in proposed § 50.155(b)(1). Additionally, the supporting guidance for this proposed rule for proposed § 50.155(b)(1) carries forward the same approach that was used for implementation of Order EA-12-049, and contains a number of programmatic controls that in an analogous fashion to the maintenance provision in proposed § 50.155(c)(3), if not followed, would likely lead to a loss of equipment capacity and capability and result in a failure to comply with the proposed § 50.155(b)(1). Therefore, the NRC would like stakeholder views on the need for a separate maintenance provision.

**Question 7 Comment 1:**

Two commenters did not see a need for a separate maintenance provision in 10 CFR 50.155(c)(3) for the 10 CFR 50.155(b)(1) equipment. One commenter noted that the more general maintenance requirement of 10 CFR 50.155(b)—that maintenance be performed “such that the equipment is capable of fulfilling its intended function”—is sufficient to ensure that appropriate maintenance is performed without introducing a subjective evaluation of whether maintenance that enables equipment to perform its intended function is or is not “adequate,” if it does not meet an inspector’s observations. The other commenter stated that the maintenance

requirement of 10 CFR 50.155(b), along with the guidance in NEI 12-06, as endorsed by JLD-ISG-2012-01 for Order EA-12-049 and proposed to be endorsed in DG-1301/RG 1.226, adequately addresses equipment maintenance. [FENOC-15, NEI SR-9, NEI SR-10]

**NRC Response:**

The NRC agrees with the comments that the provision for maintenance in proposed 10 CFR 50.155(c)(3) is unnecessary and redundant with the requirement in 10 CFR 50.155(b) that licensees shall maintain the integrated response capability and that the final rule can be improved and simplified through the removal of that provision. The final MBDBE rule was revised in response to these comments.

**Question 7 Comment 2:**

One commenter expressed a preference for spot, unannounced inspections at ANY time by the NRC onsite inspectors (or above) and a CREDIBLE NRC enforcement program with big (financial) fines. [Gurdziel2-2]

**NRC Response:**

This comment is outside of the scope of Question 7. The following information is nevertheless provided to address the commenter's expressed preferences. The NRC's ROP includes unannounced inspections by resident inspectors, including inspections conducted after hours. (See the discussion in IMC 2515, "Light-Water Reactor Inspection Program—Operations Phase," Section 2515-11, "Inspector Policy" (ADAMS Accession No. ML16006A284).) As part of the ROP, performance deficiencies would be assigned a significance category and be considered as part of the NRC's overall assessment of plant performance. With respect to potential fines, the NRC would follow its Enforcement Policy and Enforcement Manual to determine whether the assessment of civil penalties through traditional enforcement would be warranted. On July 1, 2016, the NRC amended its regulations to adjust the maximum civil monetary penalties it can assess under statutes enforced by the agency to conform to the Federal Civil Penalties Inflation Adjustment Act of 1990, as amended by the Federal Civil Penalties Inflation Adjustment Act Improvements Act of 2015 (81 FR 43019; July 1, 2016). These adjustments resulted in the current maximum civil monetary penalties rising from \$140,000 per day to \$280,469 per day.

**Question 8:**

*Equipment Protection Implementation Deadline.* The NRC is proposing to require licensees to reasonably protect the equipment relied upon to implement the mitigation strategies required by proposed § 50.155(b)(1). That equipment would need to be reasonably protected from the effects of natural phenomena that are, at a minimum, equivalent to the design basis of the facility. This proposed rule would require each licensee that received the March 12, 2012, NRC letter issued under § 50.54(f) to provide reasonable protection against that reevaluated seismic or flooding hazard(s) by 2 years following the effective date

of the final rule, if the reevaluated hazard exceeds the design basis of its facility. This is based on the anticipated completion dates for the licensees' hazard reevaluations and their confirmation by the NRC and the potential need for planning and implementing modifications during refueling outages. The NRC recognizes that certain licensees may need input into their analyses of reevaluated hazards from other government agencies, without any certainty of when that input would be provided. This reliance on information from other entities could remove from the licensee's control the ability to comply with the rule by a specific date. The NRC requests comments on the proposed implementation schedule, including suggestions for the criteria that licensees would need to satisfy to extend the schedule.

**Question 8 Comments:**

Two commenters did not agree with the requirement that each holder of an operating license comply with all provisions of this section no later than 2 years following the effective date of the rule. They explained that the degree to which the reevaluated seismic or flooding hazard(s) may impact the implementation of mitigating strategies varies widely across the operating reactor fleet, and the various evaluations necessary to prepare for any necessary modifications are in different stages of completion, with the following examples:

- Some sites have not yet finished their flooding hazard reevaluations. These situations are due to work that must be completed by the U.S. Army Corps of Engineers. Even for sites that have received the expected information, the U.S. Army Corps of Engineers does not release the basis behind the information, which could lead to additional requests and additional waiting periods.
- Some sites have simple evaluations. A number of sites have reevaluated hazards that are bounded by the design basis of the facility and the level of effort to demonstrate compliance with the proposed rule may be complete in advance of the effective date of the rule.
- Some sites will need to complete additional evaluations. These sites have reevaluated hazards that exceed the design basis of the facility. They must perform detailed MSAs to evaluate the effect of the external hazard on their mitigating strategies.
- Some sites still must develop the methodology needed to perform their MSAs. For example, the input for seismic MSAs that use Path 5 ((ground motion response spectrum (GMRS)) greater than twice the safe-shutdown earthquake (SSE)) may be risk-informed based upon an SPRA, which is currently in progress. A 2-year implementation timeline would not provide adequate time for review of the SPRA results by the NRC staff prior to completion of modifications under the rule.



Completion of the engineering, design, planning, and installation of any identified modifications or other plant changes is a complex process; sufficient time should be provided to completed the work efficiently, with the following examples:

- Utilities will not start the modification process until their MSAs have been approved by the NRC (note that utilities will not start this process when their hazard report results have been approved, as stated on page 70,634 of the FRN, because it is the MSA that will determine the results of the hazard on mitigating strategies, not the hazard report). At this point, they will need to prepare, plan, and implement the necessary modifications or procedure changes and train their staff. Some of the plant modifications will require access to plant equipment or spaces that are not available except during outages.
- If greater than minor modifications are indicated, a 2-year implementation window would tend to require that the modifications be performed at risk or fast-tracked, where engineering/design would be performed in parallel with installation of the change. This is inefficient and unnecessarily increases the risk for errors and rework.

A process that allows each licensee to develop and submit to the NRC a unit-specific implementation schedule would allow for more precise implementation schedules that could account for this variation. Under this approach, some licensees would accelerate their implementation quicker than required by the proposed rule when, for example, their reevaluated hazards are bounded by the design basis of the facility. On the other hand, this approach would accommodate other licensees that cannot address their reevaluated hazards within the time that would have been required by the proposed rule because, for example, they are still awaiting input from other government agencies. Therefore, the commenters suggest that each holder of an operating license submit a schedule for achieving full compliance with the requirements of 10 CFR 50.155 within 90 days of the effective date of the rule. [NEI SR-6, NEI SR-11, FENOC-16]

Another commenter stated that the compliance date should be set as July 4, 2016, and indicated that too much time has been spent already. [Gurdziel2-3].

**NRC Response:**

First, with regard to the proposal to set the compliance date on July 4, 2016, the NRC disagrees with this comment because it would set the compliance date for the rule before the effective date of the rule, and as such is clearly not practicable.

Regarding the other two comments, the NRC agrees that the current status of implementation of post-Fukushima regulatory actions varies widely across the industry. The NRC also recognizes that addressing the reevaluated hazard information will likely be the limiting activity in terms of schedule implementation. The proposal to allow each licensee to submit an implementation schedule to the NRC is an approach that has been used for past regulations, and the NRC agrees that it should enable sufficient flexibility to both address potential CER issues and to avoid schedule exemptions. The final MBDBE rule is revised in response to these comments.

**Question 9:**

*Methodology for addressing reevaluated hazards.* In SRM-COMSECY-14-0037, the Commission affirmed that: 1) licensees for operating nuclear power plants need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events; and 2) licensees 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. The NRC is proposing to require licensees for operating nuclear power plants to address the reevaluated flooding hazard levels by reasonably protecting the mitigating strategies equipment to those levels if they exceed the design-basis flood level for the facility. Alternatively, the NRC could: 1) place this requirement within § 50.155(b)(1) as a condition the associated strategies and guidelines must be capable of addressing; or 2) include a separate requirement for targeted or scenario-specific mitigating strategies as an option to address the reevaluated flooding hazards. The NRC seeks comment on whether the first of these options would be a better means to communicate the need for a licensee's strategies and guidelines to be capable of execution in the context of the new flooding hazard levels than including the requirement in § 50.155(c)(2). The NRC seeks additional comment on whether it would be appropriate to allow further flexibility in the licensee's strategies and guidelines by establishing an alternative means of compliance that does not include the surrogate condition of a loss of all alternating current power for specific beyond-design-basis conditions such as the reevaluated flooding hazards. For example, if a licensee could protect their internal power distribution system and emergency diesel generators from the reevaluated flooding hazard, it may not be necessary for the licensee to assume the loss of all alternating current power.

**Question 9 Comment 1:**

One commenter stated that the need for a licensee's strategies and guidelines to be capable of execution in the context of the reevaluated flooding and seismic hazards should be addressed in 10 CFR 50.155(b)(1) rather than 10 CFR 50.155(c)(2) for the following two reasons.

- (1) The intent is to mitigate the effects of the reevaluated hazards in a manner similar to the strategies that have been developed by the industry for FLEX. The inclusion of the reevaluated hazards requirement into 10 CFR 50.155(c)(2)(i) applies reasonable protection to all the equipment covered by the proposed rule (both plant equipment and FLEX equipment); however, reasonable protection should only apply to FLEX equipment.

- (2) Including the reevaluated hazard requirement in 10 CFR 50.155(c)(2)(i) only applies the reevaluated hazard requirement to equipment; it does not achieve the intended objective of applying the reevaluated flood and seismic hazards to mitigating strategies in general.

[NEI CL-3]

**NRC Response:**

See NRC response below to Question 9 Comment 2.

**Question 9 Comment 2:**

One commenter stated that the need for a licensee's strategies and guidelines to be capable of execution in the context of the reevaluated flooding and seismic hazards' information should be addressed in 10 CFR 50.155(b)(1) rather than 10 CFR 50.155(c)(2). Consistent with NRC-endorsed guidance, the reasonable protection concept only applies to FLEX equipment and is an element of a viable mitigating strategy but is not in itself a mitigating strategy. As proposed, the incorporation of the reevaluated hazards into 10 CFR 50.155(c)(2)(i) would expand the reasonable protection concept beyond FLEX equipment and yet still not achieve the intended objective of developing mitigating strategies for the reevaluated flood and seismic hazards. Rather than focus narrowly on the reevaluated hazards in 10 CFR 50.155(c)(2), the NRC should place this requirement in 10 CFR 50.155(b)(1). Doing so would require that licensees consider the reevaluated hazards more broadly in the context of developing mitigation strategies, as directed by the Commission in the SRM issued on March 30, 2015, for COMSECY-14-0037. This would allow further flexibility in the licensee's strategies and guidelines for addressing the reevaluated hazards by (1) establishing an alternative means of compliance that does not include the surrogate conditions of a loss of all ac power and loss of normal access to the ultimate heat sink, and (2) providing different success criteria for targeted or scenario-specific mitigating strategies (i.e., namely, requiring core cooling and SFP cooling but not the containment capability to be maintained). Order EA-12-049 required maintaining or restoring core cooling, containment, and SFP cooling capabilities. Allowing the containment capability to not be maintained for targeted hazard strategies when addressing the reevaluated hazard is acceptable because the reevaluated hazards were not considered by the Order. Rather, the SRM issued on March 30, 2015, for COMSECY-14-0037 addressed the use of a mitigating strategies approach when the Commission approved the staff recommendation "to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events."

The commenter stated that the rule should also allow the use of other approaches, including the use of risk insights. The rule should allow for the use of risk insights to demonstrate that licensees can reasonably address the mitigation of BDB seismic events. The seismic safety of a facility involves both the site seismic hazard and the capacity of individual SSCs. The SPRA is the best tool to use to make an overall assessment of the level of protection provided by the as-built plant. The NRC has requested that SPRAs be performed for plants with the greatest potential for the design capacity to be exceeded (i.e., those plants with the greatest GMRS to

SSE ratio). The results of the SPRA can be used to identify the areas of greatest potential for safety enhancement. [NEI SR-12, NEI SR-13, NEI SR-14, NEI CL-4, NEI CL-5]

**NRC Response:**

The NRC agrees that addressing the reevaluated hazards in 10 CFR 50.155(b) provides greater flexibility to address these hazards and more closely aligns with the guidance supporting the rule. Accordingly, the NRC has revised the final rule to move the reevaluated hazard requirement into paragraph (b), consistent with the feedback provided.

While the NRC supports risk-informed approaches to addressing these requirements, it nonetheless does not see a need to incorporate language into 10 CFR 50.155(b) to allow for risk-informed proposals. The NRC concludes that such approaches are likely to be followed for addressing the seismic reevaluation hazard information. Accordingly, the NRC will need to have guidance to support these approaches, but after such guidance is in place, the NRC concludes that the final MBDBE rule provisions for addressing reevaluated hazards can be satisfied without additional regulatory language. Specifically, such approaches would provide acceptable alternatives for meeting the final MBDBE rule provisions that allow for alternate means for addressing the plant-specific consequences caused by reevaluated hazards under 10 CFR 50.155(b).

To clarify this conclusion and provide clarity for the final MBDBE rule, the NRC revised the supporting SOC discussing how a risk-informed approach to address seismic reevaluated hazards, that can include reliance on an SPRA, can be used to satisfy the requirements of 10 CFR 50.155(b).

The feedback on this question is similar to SOC Comment 26 with regard to the application of “reasonable protection” to FLEX equipment versus safety-related equipment that is used during the initial response to a BDB external event. Refer to the NRC response to SOC Comment 26 for a discussion of that issue.

The NRC disagrees with the commenter’s proposal for including a provision that allows for alternate approaches or assessments to satisfy the reevaluated hazards requirements, as determined by the NRC. This proposed provision is too ambiguous as proposed, does not provide a minimum set of criteria for judging such proposals, and could introduce a requirement that undermines other portions of the regulation. It appears to be a proposal for a licensee to take a completely different approach than envisioned by the MBDBE rule. For such circumstances, licensees should follow 10 CFR 50.12 because that provision’s intended purpose is to address such proposals.

**Question 9 Comment 3:**

One commenter suggested the following modification of the rule language:

*(c) Equipment.*

(1) ~~The capacity and capability of the equipment relied on for the mitigation strategies required by paragraph (b)(1) of this section must be have sufficient capacity and capability to simultaneously respond to the event described in paragraph b(1) or restore core cooling, containment, and spent fuel pool cooling capabilities for all the power reactor units within the site boundary.~~

(2) The equipment relied on for the mitigation strategies required by paragraph (b)(1) of this section must be ~~reasonably~~ protected from the effects of natural phenomena ~~that are equivalent to the design basis of the facility.~~

~~(i) Each licensee that received the March 12, 2012, NRC letter issued under § 50.54(f) concerning reevaluations of seismic and flooding hazard levels, shall provide reasonable protection against that reevaluated seismic or flooding hazard(s) if it exceeds the design basis of its facility.~~

[NEI SR-15 and NEI SR-16]

**NRC Response:**

The NRC agrees in part with this proposal. It agrees that the suggested revision to 10 CFR 50.155(c)(1) provides greater clarity, except the deletion of the functional portion of the requirement regarding core cooling, containment, and SFP cooling capabilities. The NRC does not agree with the later portion of this same proposed language, since it concludes that rule language linked to the functional capabilities is more explicit and provides greater clarity, when compared with the proposed words “respond to the event in paragraph (b)(1).”

The NRC disagrees with the removal of the word “reasonable” from 10 CFR 50.155(c)(2). The language “protected from external events” would result in different words to describe the same basic regulatory approach of “reasonable protection” that has been underway for implementation of Order EA-12-049. The NRC concludes that the word “reasonable” is important and enables more flexibility for the BDB regulatory regimes to which the requirement applies, and additionally, its continued use avoids the potential confusion that may be introduced by the use of new language to mean the same approach as Order EA-12-049 implementation. The final MBDBE rule was revised, in part, as noted in this response, due to these comments.

**Question 9 Comment 4:**

One commenter endorsed the comments provided by NEI in regard to this question (see Question 9, Comments 1 and 2). In addition, the commenter particularly urges the NRC not to include the loss of all ac power for specific BDB conditions, such as the reevaluated flooding hazards, as this would represent an expensive expansion from Order EA-12-049 without a commensurate improvement in safety, as described in the NEI response. [FENOC-17]

**NRC Response:**

See the NRC response to Question 9 Comment 2.

**Question 9 Comment 5:**

One commenter stated that equipment that is going to be needed will need to be protected to the now-expected flood level, whatever it is, or it needs to be installed on a barge that will float. The commenter asked how long is the NRC going to put off addressing this problem. [Gurdziel2-4]

**NRC Response:**

The NRC disagrees with this comment. The MBDBE rule requires that licensees have strategies to address floods that exceed the external design basis of the facility, when the reevaluated hazard information indicates the potential of such an occurrence. The final MBDBE rule is structured to allow licensees to address these hazards through a combination of both protection and adjustments to the strategies, including alternate strategies. The NRC concludes that such a regulatory approach more broadly addresses these hazards, and in a more risk-informed manner than the commenter's suggested approach. The final MBDBE rule requires that licensees be in compliance with the rule's requirements within 2 years of the effective date of the rule, unless the licensee requests a revised schedule and the NRC agrees.

Furthermore, the commenter makes reference to a "now-expected flood level." The NRC does not agree this is a proper characterization of the reevaluated flooding hazards being pursued as part of the regulatory efforts stemming from NTF Recommendation 2.1. The reevaluated flooding hazards developed for that effort used current methods that were developed to support the siting and design of power reactors to meet 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 2, "Design Bases for Protection against Natural Phenomena," which requires appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. As a result, the reevaluated flooding hazards are bounding and conservative and should not be viewed as "expected levels."

No changes were made to the final MBDBE rule as a result of this comment.

**Question 10:**

*Command and Control.* Requirements for command and control and organizational structures currently exist in numerous locations, including 10 CFR part 50, appendix E, section IV.A, as well as within the typical administrative controls portions of technical specifications for power reactor licensees. These requirements do not plainly limit the scope of the roles, responsibilities and authorities to events within the design or licensing basis of the facility, although past NRC practice has been to treat these requirements in that manner. This proposed rule includes a further requirement on the subject in order to clarify the scope of what is required for organizational structures at power reactor licensees. Alternatively, the NRC is considering whether the expansion of scope of regulatory oversight of the organizational structures would require imposition of a new requirement or the expansion of scope would be better accomplished by communicating the understanding that the scope of the existing requirements covers the full spectrum of events that would be included in this rulemaking. The latter method of accomplishing this would have the potential advantage of leaving the requirements for command and control and organizational structures in a single regulation (i.e., 10 CFR part 50, appendix E, section IV.A). The NRC seeks stakeholder input on this subject.

**Question 10 Comment 1:**

Two commenters agreed that the expansion of scope of regulatory oversight of the organizational structures should be accomplished through the imposition of a new requirement, as the NRC proposed. One commenter preferred that approach instead of communicating the understanding that the scope of the existing requirements covers the full spectrum of events that would be included in this rulemaking. The commenter stated that, in general, there should be a clear demarcation between response planning and capabilities described in a site emergency plan, associated with the requirements of 10 CFR Part 50, Appendix E, and those for BDB events to be governed by the proposed 10 CFR 50.155. The commenter said that this separation facilitates better understanding of the underlying requirements and planning bases for various program elements, and the application of change control processes. [NEI SR-17, FENOC-18]

**NRC Response:**

The NRC agrees that separation between current 10 CFR Part 50, Appendix E, requirements and the new BDB capabilities facilitates better understanding of the requirements. The NRC agrees that separation would enhance clarity, and the final MBDBE rule supports this objective through both a continuation of the command and control requirement that was proposed and through a consolidation of requirements into 10 CFR 50.155, as discussed in response to feedback suggesting relocation of staffing and communications requirements into 10 CFR 50.155.

**Question 10 Comment 2:**

One commenter stated that the Tokyo Electric Power Company/Fukushima Dai-ichi Emergency Director, in an interview after the accident, stated that his biggest regret was not knowing that the isolation condensers need water replenishment if they have been operating. But here is the problem: there was in place as the head of the site organization, a person not knowledgeable in installed safety system operational needs. And, he was not relieved, or refused relief, after a reasonable time on duty. The commenter viewed these as major shortcomings and had not heard in the Fukushima steering committee meetings that they have been identified, much less addressed. The NRC needs to be the one to say, these are the experiences and skills and knowledge and training that a competent Site Emergency Director must have, or there will be very big financial fines to be paid right now. The NRC must state how many of these highly-qualified individuals need to be available for each site. Additionally, having one organization (the NRC) determine the qualifications for the Site Emergency Director, instead of every site, has to be a lot more cost effective. [Gurdziel2-5]

**NRC Response:**

The NRC agrees with the comment's emphasis on the importance of personnel training. Training is a key component to successfully mitigating a BDB external event. As such, the MBDBE rule is supported with training requirements, as well as drill requirements. Specifically, for training for the emergency director, the supporting guidance for the MBDBE rule contains ultimate decisionmaker training that addresses the commenter's issue. No changes were made to the final MBDBE rule as a result of this comment.

**5. Comments on the Cumulative Effects of Regulation Questions****CER Comment 1:**

One commenter recommended that the development of the final rule also include companion inspection guidance (made available for stakeholder input) for the provisions of the new rule as well as the regulatory oversight of severe accident management. While the NRC has published the draft regulatory guidance for stakeholder comment, this does not necessarily represent the methodology for conducting periodic inspections of licensee compliance with the rule and the voluntary commitment. [Lutz-2]

**NRC Response:**

The Commission removed the SAMG requirements from the proposed rule by its SRM dated August 27, 2016, on SECY-15-0065. While the NRC has not developed inspection guidance for the final MBDBE rule, it is inspecting the implementation of ongoing post-Fukushima regulatory actions (which the MBDBE rule makes generically applicable) using Temporary Instruction 2515/191, "Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans" (ADAMS Accession No. ML15257A188). Future inspection of the MBDBE requirements will be under the NRC's ROP, changes to which are frequently discussed in public meetings and, when appropriate, incorporate stakeholder feedback.



**CER Comment 2:**

One commenter stated that the rule language in 10 CFR 50.155(g)(1) would require that each holder of an operating license comply with all provisions of this section no later than 2 years following the effective date of the rule. This timeframe is not adequate. The degree to which the reevaluated seismic or flooding hazard(s) may impact the implementation of mitigating strategies varies widely across the operating reactor fleet, and the various evaluations necessary to prepare for any necessary modifications are in different stages of completion, for example:

- Some sites have not yet finished their flooding hazard reevaluations. These situations are due to work that must be completed by the U.S. Army Corps of Engineers.
- Some sites have simple evaluations. A number of sites have reevaluated hazards that are bounded by the design basis of the facility and the level of effort to demonstrate compliance with the proposed rule may be complete in advance of the effective date of the rule.
- Some sites will need to complete additional evaluations. These sites have reevaluated hazards that exceed the design basis of the facility. They must perform detailed MSAs in order to evaluate the effect of the external hazard on their mitigating strategies.
- Some sites still must develop the methodology needed to perform their MSAs. For example, the input for seismic MSAs that use Path 5 (GMRS greater than twice the SSE) may be risk-informed based upon an SPRA, which is currently in progress. A 2-year implementation timeline would not provide adequate time for review of the SPRA results by the NRC staff prior to completion of modifications under the rule.
- Completion of the engineering, design, planning, and installation of any identified modifications or other plant changes is a complex process; sufficient time should be provided to completed the work efficiently, for example:
- Utilities will not start the modification process until their MSAs have been approved by the NRC (note that utilities will not start this process when their hazard report results have been approved, as stated on page 70,634 of the FRN, because it is the MSA that will determine the results of the hazard on mitigating strategies, not the hazard report). At this point they will need to prepare, plan, and implement the necessary modifications or procedure changes and train their staff. Some of the plant modifications will require access to plant equipment or spaces that are not available except during outages.
- If greater than minor modifications are indicated, a 2-year implementation window would tend to require that the modifications be performed at risk or fast-tracked, where engineering/design would be performed in parallel with installation of the change. This is inefficient and increases the risk for errors and rework.

The commenter suggests that each holder of an operating license submit a schedule for achieving full compliance with the requirements of 10 CFR 50.155 within 90 days from the effective date of the rule. [NEI CER-1]

**NRC Response:**

The NRC agrees that the current state of implementation of the ongoing post-Fukushima regulatory actions that the MBDBE rule makes generically applicable is very plant/site specific, and varies considerably across the industry. Accordingly, the NRC also agrees that a single implementation schedule under these circumstances does not provide sufficient flexibility and instead would likely lead to resource-intensive schedule exemption requests, as occurred following issuance of the Power Reactor Security rulemaking in 2009 (which was a key driver for the development of the CER process). The proposal for licensees to submit a schedule that the NRC then reviews and approves is a sound proposal. The final MBDBE rule was revised consistent with the suggested approach.

**CER Comment 3:**

To address the potential for rule compliance date issues for new plants, one commenter suggested revising proposed 10 CFR Part 50, Appendix E, Section VII.1.b, as follows:

- a. A holder of a combined license issued under 10 CFR part 52 before the Commission has made the finding under § 52.103(g) of this chapter shall perform this analysis and submit it to the NRC under § 52.3 of this chapter ~~at least~~ 2 years before the date specified for completion of the last inspections, tests, and analyses in the inspections, tests, analyses, and acceptance criteria (ITAAC) completion schedule required by § 52.99(a) of this chapter for the plant OR [DATE 365 DAYS AFTER EFFECTIVE DATE OF THE FINAL RULE], whichever is later.  
[NEI CER-2]

**NRC Response:**

With the relocation of the proposed requirements in 10 CFR Part 50, Appendix E, Section VII, into 10 CFR 50.155 for the final MBDBE rule, the particular proposed schedule requirement that this comment was directed to is no longer in the final MBDBE rule.

**CER Comment 4:**

One commenter stated that the circumstances of each plant in implementing the proposed rule requirements will be unique and there will be instances where additional time for full implementation of rule requirements will be necessary. In these instances, it is incumbent upon the licensee to request modification of implementation dates through existing processes (e.g., 10 CFR 50.12 and 10 CFR 50.90) with sufficient supporting basis for the change. It is equally important, as directed by the Commission in its response to SECY-15-0050,

“Cumulative Effects of Regulation Process Enhancements and Risk Prioritization Initiative,” that the NRC apply risk-informed decisionmaking in its review of such relief requests. [NEI CER-3]

**NRC Response:**

The NRC agrees with the comment’s description of the general approach that licensees must take when rules contain schedular requirements that cannot be met. This is one of the principal reasons for the 10 CFR 50.12 exemption provisions, since it is not always possible to address each plant-specific circumstance in a rulemaking. However, based on the CER feedback received, the NRC adopted a flexible schedule approach for the final MBDBE rule that is intended to address plant-specific circumstances and mitigate resource-intensive efforts that can be expended on such schedular exemption requests. Notwithstanding this flexibility, the NRC does recognize that unique circumstances can occur and that licensees may need to seek exemptions. In such circumstances, the NRC continues to be supportive of risk-informed submittals, and the NRC itself would apply risk-informed decisionmaking processes to the review of such submittals.

**CER Comment 5:**

One commenter stated that there likely will be instances where conflicts will arise in the implementation of the proposed rule’s requirements. In these cases, it will be important for the NRC to allow licensees the latitude to resolve the conflicts in a manner that best meets the objectives of safety and security. Plants should be allowed to prioritize regulatory activities where conflicts in schedule are identified or provide alternative means for compliance in instances where conflicts require an alternative to be established. The NRC should review and approve such requests through existing processes. [NEI CER-4]

**NRC Response:**

The NRC agrees that conflicts can arise as suggested by this comment, but these conflicts should be identified during the ongoing implementation efforts. However, should such conflicts arise, a licensee can submit exemption or license amendment requests, and the NRC is supportive of requests that prioritize and resolve conflicts giving priority to safety.

**CER Comment 6:**

One commenter stated that there may be unintended consequences that result from the proposed new requirements, if the NRC does not set forth a transparent transition from Orders EA-12-049 and EA-12-051 to 10 CFR 50.155. Some licensees have already achieved compliance with Orders EA-12-049 and EA-12-051, in accordance with JLD-ISG-2012-01, Revision 0, and JLD-ISG-2012-03, Revision 0, and their associated NEI guidance documents. Regulations in 10 CFR 50.155 and the RGs associated with DG-1301 and DG-1317 may specify actions that are additional to, and/or different from, the actions required by the JLDs to achieve compliance with the NRC Orders. Regulations in 10 CFR 50.155 and the associated RGs may also specify actions that are less restrictive than the corresponding actions needed for compliance with the orders. It is not clear if and when compliance with Orders EA-12-049 and

EA-12-051 will no longer be required following issuance of 10 CFR 50.155 and the associated RGs. To avoid unintended consequences associated with two similar—but potentially not identical—sets of requirements, the NRC should rescind Orders EA-12-049 and EA-12-051 once 10 CFR 50.155 becomes effective. (See, for example, 78 FR 16922 (March 19, 2013) (discussing the rescission of orders following issuance of 10 CFR Part 37)). For the same reasons, the NRC should formally close out its 10 CFR 50.54(f) information requests and eliminate license conditions that duplicate requirements currently in 10 CFR 50.54(hh)(2). [NEI CER-5]

**NRC Response:**

The NRC agrees that there may be potential for unintended consequences when implementing the MBDBE rule requirements along with ongoing activities in response to lessons learned from the accident at Fukushima Dai-Ichi. In large measure, many of the changes to the final MBDBE rule were made to remove inconsistencies with these ongoing activities to preclude the unintended imposition of new requirements. The NRC also agrees that removal of the post-Fukushima order requirements, after the MBDBE rule goes into effect, will support achieving this same objective. The final MBDBE rule contains requirements that are intended to support a smooth transition from order requirements and license conditions to the requirements of the MBDBE rule and reduce the potential for unintended consequences. Under the new 10 CFR 50.155(i), the orders will be rescinded, and the license conditions will be removed from applicable licensees.

**6. Comments on the Supporting Regulatory Analysis**

**RA Comment 1:**

One commenter stated that the U.S. post-Fukushima response has addressed many of the recommendations in the American Society of Mechanical Engineers' "Forging a New Nuclear Safety Construct," issued June 2012. But the overarching recommendation has not been fully addressed in the U.S. response:

Protection of public health and safety from radiological releases has been and continues to be the primary focus of nuclear safety. The present body of knowledge, including lessons from severe reactor accidents, establishes the importance of maintaining that focus, yet brings out a relevant fact: The major consequences of severe accidents at nuclear plants have been socio-political and economic disruptions inflicting enormous cost to society.

The accepted methodology (e.g., NUREG/BR-0184) for determining costs for the "Backfit Rule" does not include some costs that have been identified for the Fukushima accident, including the many aspects of temporary and permanent relocation of the population around a nuclear facility. It is noted that the NRC staff is in the process of updating the methodology, as discussed in SECY-14-0002. However, in reviewing the regulatory analyses that documented the NRC staff's cost effectiveness conclusions for this rulemaking, it is evident to the commenter that

even considering these societal costs would not have changed the NRC conclusions relative to this rulemaking. [Lutz-6]

**NRC Response:**

This comment suggests no changes to the MBDBE rule. The NRC notes that, while its regulatory analyses do consider a broad range of costs and benefits to support the Commission in making an informed regulatory decision, the determination of whether the NRC should impose a new requirement on power reactor licensees is informed by the Backfit Rule in 10 CFR 50.109 and the issue finality provisions in 10 CFR Part 52. Consideration of changes to the methodologies used for regulatory analyses, the Backfit Rule, and the issue finality provisions supporting decisions on the imposition of new requirements on power reactor licensees is outside the scope of this rulemaking. No changes were made to the final MBDBE rule as a result of this comment.

**RA Comment 2:**

One commenter stated that it is imperative the NRC begin to incorporate population demographics, plant operational history, and the risk of terror attack into both risk analysis and regulatory framework construct. Indian Point warrants exceptionally heightened level of concern, given the fact that it sits in the most densely packed and highest population area of any nuclear site in the nation and the fact that the New York City metropolitan area has been repeatedly targeted for terrorist action. Indeed, as far as we are aware, Indian Point remains the only reactor site which has been specifically considered as a terror target. [IPSEC 2]

**NRC Response:**

The commenter's feedback is directed towards the NRC's methods and approach for considering risk, particularly the risk associated with malicious attacks. In this regard, this feedback does not directly pertain to the MBDBE rule, and the NRC directs the stakeholder to the NRC's ongoing efforts to improve the regulatory analysis discussed in SECY-14-002 and SECY-14-0143. The final MBDBE rule has not imposed requirements in the rule that were not previously imposed and implemented as part of Orders EA-12-049 and EA-12-051. Accordingly, the final MBDBE rule did not use the regulatory analysis methods to revise or amend the post-Fukushima regulatory actions. Furthermore, as discussed in response to other feedback, issues associated with malicious attacks were not part of the regulatory scope of the MBDBE rule. No changes were made to the final MBDBE rule as a result of this comment.

**RA Comment 3:**

One commenter stated that the Commission properly concluded that the imposition of SAMG requirements is unwarranted and that SAMGs should continue to be implemented through a voluntary industry initiative. The industry agrees with the Commission's decision against including requirements that would, in essence, codify the industry initiative on SAMGs. [NEI SR-18]

**NRC Response:**

No response to this comment is necessary because it does not propose any changes to the final MBDBE rule.

**RA Comment 4:**

One commenter stated that, although the draft regulatory analysis properly rejects the option of including a SAMG requirement in the regulations, it contains statements that could mislead the public on the status and strength of industry's SAMG initiative. Specifically, the draft regulatory analysis claims that "new" information reveals that the industry's SAMG initiative "was not entirely successful." According to the draft regulatory analysis, this means that "the NRC cannot have a sufficient level of regulatory assurance that SAMGs will be updated and maintained over time and that licensees will maintain their capability to effectively implement SAMGs" absent a regulatory requirement for SAMGs. This conclusion is incorrect and fails to mention post-Fukushima improvements to the industry's approach to SAMGs. By letter dated October 26, 2015, the industry informed the NRC that NEI's NSIAC recently approved an industry initiative on SAMGs. Under this new initiative, each licensee will perform timely updates of its site-specific SAMGs based on revisions to each Owners Group's generic severe accident technical guidelines. Licensees will also ensure that SAMGs are considered within plant configuration management processes, integrated with other emergency response guideline sets and symptom-based EOPs, and validated. To begin implementation of this industry initiative, each licensee has sent a letter to the NRC docketing their site-specific commitments. To ensure the final regulatory analysis is accurate, the NRC should accurately reflect the current status of the industry initiative on SAMGs.

The commenter also noted that in a May 11, 2015, letter, the industry expressed its generic concern with the misuse of qualitative information to support regulatory decisions and provided a detailed discussion of how the proposal to incorporate SAMGs into the proposed rule exemplified such misuse. The Commission's decision not to include the SAMG requirement in the proposed rule strikes the appropriate balance in considering the available quantitative information, as well as qualitative considerations.

The Commission's decision is consistent with the agency's internal guidance on management of industry commitments, which is provided in NRR Office Instruction LIC-105, "Managing Regulatory Commitments Made by Licensees to the NRC," Revision 5 (September 5, 2013). As explained in the FRN soliciting public comment on the proposed rule, although not required by NRC regulations, "SAMGs are well established guidance documents that have been developed by the nuclear power industry with substantial NRC involvement, have been implemented by every operating nuclear power reactor licensee for decades, and are the subject of a license condition for combined licenses." Further, the industry has committed to strengthening its SAMG program since the Fukushima accident. [NEI SR-19]

**NRC Response:**

The NRC disagrees with the comment's suggestion to include in the final rule's SOC the interactions that occurred after the NRC staff provided the Commission with the proposed MBDBE rule on April 30, 2015. Because neither the proposed rule nor final rule includes a requirement for licensees to develop, implement, or maintain SAMGs, the NRC has no reason to include a discussion of SAMGs in the final rule SOC.

**7. Comments on the NRC Backfit Analysis****Backfit Comment 1:**

One commenter stated that the NRC has failed to justify invoking the "adequate protection" backfit exception to impose the new multiple source term dose assessment requirement. The commenter states the following (footnotes omitted):

The proposed rule and regulatory analysis properly recognizes that the new requirement to monitor and assess multiple source terms constitutes a backfit. But rather than perform a systematic and documented analysis demonstrating that this new requirement will result in a cost-justified substantial increase in safety, the NRC invoked the backfit exception in 10 CFR 50.109(a)(4)(ii) for regulatory actions that are "necessary to ensure that the facility provides adequate protection to the health and safety of the public." As discussed below, the draft regulatory analysis fails to demonstrate that this proposed new requirement warrants invoking the adequate protection exception.

An NRC decision to invoke the adequate protection exception is an extremely significant decision. Because NRC's regulations are presumed to ensure adequate protection, "that presumption can be overcome only by significant new information or some showing that the regulations do not address some significant safety issue" [(53 FR 20608; June 6, 1988)]. Such occurrences should be rare and only after careful deliberation by the Commission.

While the operating experience at Fukushima Dai-ichi demonstrated that the ability to assess multiple source terms could help plant personnel prioritize emergency actions after a beyond-design-basis external event, the draft regulatory analysis does not show that the absence of such capabilities during the Fukushima accident contributed in any way to radiological consequences. Given the extensive, required actions that licensees are already taking in the name of adequate protection to mitigate beyond-design-basis external events, the NRC should not use this exception to tack on an additional, less significant requirement. To be sure, the industry decided after Fukushima to voluntarily implement multiple source term dose assessment capabilities. But this voluntary action does not give the NRC a "free pass" to lower the threshold for an adequate protection decision. Yet, the draft regulatory analysis fails to explain why this new

requirement, on top of the extensive required and voluntary actions already being undertaken to address beyond-design-basis external events, is necessary to ensure adequate protection. Instead of providing a reasonable justification for invoking the adequate protection exception, the draft regulatory analysis discusses existing emergency preparedness requirements. It then claims that this new requirement “is considered to be part of the essential emergency preparedness regulatory infrastructure that is required to meet current emergency preparedness regulatory objectives, and as such, is considered part of the set of emergency preparedness requirements to provide reasonable assurance of adequate protection of public health and safety, consistent with the regulatory basis for emergency preparedness that has existed for more than three decades.” These unsupported, conclusory statements about meeting “current emergency preparedness regulatory objectives” are insufficient to support an adequate protection finding.

In summary, the draft regulatory analysis fails to overcome the presumption that current regulations and orders currently ensure adequate protection because it identifies no significant safety issue that is going unaddressed. On top of the extensive, required actions that licensees are already taking, the industry is voluntarily implementing multiple source term dose assessment capabilities to assist in the mitigation of remote, yet potentially serious beyond-design-basis external events. Rather than place these actions in their proper context, the draft regulatory analysis offers generic platitudes about meeting existing emergency preparedness regulatory objectives. Accordingly, the NRC has not justified using the adequate protection exception and should not impose this new requirement absent an analysis demonstrating that it will result in a cost-justified substantial increase in safety.

[NEI SR-20, NEI CL-6, SCE&G-4, FENOC-6]

**NRC Response:**

The NRC agrees that it did not adequately justify imposing the proposed multiple source term dose assessment requirements. The following explanation provides the NRC’s analysis and conclusions.

The Commission has stated many times that compliance with the current regulations, orders, and implementing guidance is presumed to ensure adequate protection of public health and safety. See “Revision of Backfitting Process for Power Reactors; Final Rule” (53 FR 20603–20611, 20606; June 8, 1988). However, the Commission has also stated that this presumption may be overcome by, for instance:

new information which indicates that improvements are needed to ensure adequate protection. ... Such new information may reveal an unforeseen significant hazard or a substantially greater potential for a known one, or



insufficient margins and backup capacity. Engineering judgement may, in light of such information, conclude that restoration of the level of protection presumed by the regulations requires more than compliance. [53 FR 20606].

Thus, to invoke an adequate protection exception in 10 CFR 50.109(a)(4), the NRC must provide a basis for why compliance with the current regulations, orders, and implementing guidance does not maintain adequate protection and that the imposition of new requirements is necessary to restore, or continue to have, reasonable assurance of adequate protection. As the commenter indicates, this circumstance would typically require that a significant safety issue be identified that is going unaddressed by compliance with current regulations, orders, and supporting implementation guidance.

Accordingly, the NRC reviewed the existing regulatory framework, including the existing regulations of 10 CFR 50.47 and 10 CFR Part 50, Appendix E, Section IV.B (which, although written broadly, was implemented through NRC-endorsed guidance and methods as monitoring and assessing the reactor source term); the recently imposed mitigation strategies requirements stemming from the issuance of Order EA-12-049, which is being broadly implemented to include enhanced onsite emergency response capabilities; and the industry's voluntary implementation of multiple source term dose assessment capability. Additionally, the NRC researched whether any new information identified a significant safety issue that is going unaddressed by the aforementioned regulatory framework and determined there was no such safety issue. The NRC concludes that operating licensee compliance with the current requirements and guidance, including monitoring and assessment requirements and guidance, ensures adequate protection, and that there is not sufficient basis to conclude that a significant safety issue exists warranting imposition of new requirements for multiple source term dose assessment through invocation of the adequate protection backfit exception under 10 CFR 50.109(a)(4)(ii).

Furthermore, the NRC considered whether, for the provisions under consideration (i.e., multiple source term dose assessment requirements), it can impose these requirements under the cost-justified substantial additional protection portion of the NRC backfitting requirements (i.e., 10 CFR 50.109(a)(3)). The NRC concludes, based on available information, that the imposition of the proposed multiple source term dose assessment requirements would not provide a substantial increase in the protection of public health and safety for the following four reasons:

- (1) For the multiple source term dose assessment requirements to have substantial benefit to the public health and safety, there must be a substantial level of risk associated with events that lead to conditions where multiple source terms are substantially challenged (i.e., events that, for a single unit site, significantly challenge both the reactor source term and the SFP source term, or, for multiple unit sites, events that significantly challenge multiple reactor source terms and/or SFP source terms).
- (2) The events that would challenge multiple source terms are extremely rare events, and as a result, the risk associated with such events is a very small portion of the total plant

risk. Furthermore, these events became more unlikely to challenge source terms following implementation of the mitigation strategies requirements of Order EA-12-049, which provides a substantially greater mitigation capability for these events and lowers the probability that such extreme events will lead to core damage or SFP challenges. These requirements constitute a significant portion of the MBDBE rule.

- (3) In support of this conclusion, a review of the recent work to understand plant risk, including both the state-of-the-art reactor consequence analysis and the work performed for the containment protection and release reduction regulatory effort, causes the NRC to conclude that plant risk, particularly after implementation of the mitigation strategies of Order EA-12-049 and implementation of the requirements of Order EA-13-109, is very small.
- (4) Further, the NRC concludes that the portion of this risk, which is already understood to be extremely low, that is associated with the extremely rare events that might challenge multiple source terms, is also extremely low. As a result, this limits the potential safety benefit associated with multiple source term dose assessment.

Accordingly, the NRC concludes, based on its current knowledge, that there is not sufficient risk associated with events that challenge multiple source terms to conclude that substantial additional protection to public health and safety could be achieved through the imposition of the subject requirement. Consequently, the backfitting provisions of 10 CFR 50.109(a)(3) cannot be satisfied.

Finally, while it is clearly not viable to impose the multiple source term dose assessment capability under the NRC's backfitting provisions, the existing operating plants have installed this multiple source term dose assessment capability and have committed to maintaining the capability. This installed capability for multiple source dose assessment is a computer capability installed in the existing emergency preparedness infrastructure that is transparent to the user and also serves to meet the existing requirements to monitor and assess the reactor source term. The NRC recognizes that an operating reactor licensee is not likely to reduce the multiple source term dose assessment capability, as doing so would result in expenditure of resources and deviation from their commitments. The NRC concludes that the optimal regulatory approach for operating licensees is to continue to maintain the multiple source term dose assessment as a voluntary initiative following the endorsed guidance that supports this rule.

The final MBDBE rule was revised to remove the multiple source term dose assessment requirement that was in the proposed MBDBE rule, and the supporting backfit analysis was revised to reflect this response.

**Backfit Comment 2:**

One commenter notes that the MBDBE rulemaking codifies the new regulatory requirements under Orders EA-12-049, EA-12-050, and EA-12-051 that were based on "ensuring adequate

protection” of the health and safety of the general public. Orders EA-12-049 and EA-12-051 added new requirements for prevention of severe accidents (i.e., core melt accidents). Order EA-12-050 (later replaced by EA-13-109) was the only new requirement dealing with the mitigation of the potential consequences of core damage accidents and only applied to Mark I and Mark II BWR containment types. The commenter states the opinion that the overall scope of the rulemaking, which in large part codifies the new regulatory requirements under the Orders, is entirely consistent with long-standing U.S. regulatory policies and procedures, including the Backfit Rule (10 CFR 50.109) and the Safety Goal Policy. As such, the proposed rule provides a significant enhancement to nuclear safety that is based on the lessons learned from the March 2011 Fukushima accident and that are cost effective. The commenter states that, in this respect, the United States is not completely consistent with the post-Fukushima international approach to accident management, wherein regulatory requirements have been established by many European and Asian regulatory bodies for severe accident mitigation equipment (filter containment vents and hydrogen control equipment for both PWRs and BWRs), severe accident instrumentation, and severe accident procedures; these European and Asian regulatory bodies are not subject to policies and procedures similar to the U.S. Backfit Rule or Safety Goal Policy. However, the proposed rulemaking represents a cost-effective approach to addressing the lessons learned from the Fukushima accident. [Lutz-5]

**NRC Response:**

The NRC agrees in part with the comment. Order EA-12-049 was issued under the adequate protection provisions of 10 CFR 50.109(a)(4)(ii). Order EA-12-051 was issued after the Commission exempted itself from the 10 CFR Part 50 backfitting provisions (i.e., the Order EA-12-051 requirements could not be shown to satisfy either the adequate protection exception or the cost-justified substantial additional protection provisions of 10 CFR 50.109). Order EA-13-109 replaced Order EA-12-050, and as a result, there are two different backfitting justifications applicable to the requirements in Order EA-13-109: the hardened vent requirement portion met the adequate protection provisions of the backfitting requirements (based on the decision for Order EA-12-050), while the severe-accident-capable requirements of EA-13-109 met the cost-justified substantial additional protection requirements of 10 CFR 50.109. Also the NRC notes that the Mark I and Mark II BWR containment requirements of Order EA-13-109 are not within the scope of the MBDBE rule.

The NRC agrees with the commenter that the regulation of the use of nuclear materials in the United States differs significantly from the regulatory frameworks of other countries, most notably including the existence of backfitting provisions. Notwithstanding these differences, the NRC concludes that, as a result of the lessons learned from the Fukushima accident and implementation of the post-Fukushima regulatory actions, many of which are being made generically applicable through issuance of the MBDBE rule, public health and safety has been significantly enhanced.

**8. Comments on the Supporting Draft Regulatory Guidance**

- A. Draft Regulatory Guide (DG)-1301, “Flexible Mitigation Strategies for Beyond-Design-Basis Events”

**DG-1301 Comment 1:**

One commenter suggested deleting the last sentence of the second paragraph on the first page, which reads: “Additionally, this RG provides guidance in areas that are not covered in NEI 12-06, for meeting the regulations in 10 CFR 50.155.” This is to reflect the addition of the mitigating strategies assessment guidance in later versions of NEI 12-06. [NEI TC-1]

**NRC Staff Response:**

The NRC staff disagrees with the comment because the underlying guidance of NEI 12-06, Appendix E, Section E.6.1, limits the use of the validation process to reactive time-sensitive actions within the first 24 hours of the event. RG 1.226 provides additional guidance that would allow the use of the validation process of NEI 12-06, Appendix E, to conform to the endorsed guidance of NEI 12-06, Section 3.2.1.7.6, which specifies that licensees should provide a basis for claiming that the time can be reasonably be met for strategies that have a time constraint without limit to the timeframe in which this basis should be provided. No changes were made to RG 1.226 in response to this comment.

**DG-1301 Comment 2:**

One commenter indicates that the discussion of the replacement of the existing JLD-ISG-2012-01 with RG 1.226 is inappropriate because the two documents have different purposes. JLD-ISG-2012-01 provides guidance for compliance with Order EA-12-049, while DG-1301 is for the MBDBE rulemaking. The commenter suggests describing the process for rescinding Order EA-12-049 following issuance of the MBDBE rule. [NEI TC-2]

**NRC Staff Response:**

The NRC staff agrees that these discussions are incorrect because of the different sources of the requirements underlying the guidance of the ISGs and has edited the final version of RG 1.226 to reflect this. The NRC response to CER Comment 6 describes the relaxation of orders and removal of license conditions.

**DG-1301 Comment 3:**

One commenter noted that DG-1301 includes references to JLD-ISG-2012-01, Revision 0, rather than JLD-ISG-2012-01, Revision 1, and recommends updating the references. [NEI TC-22]

**NRC Staff Response:**

The NRC staff agrees that the final version of RG 1.226 should reflect the then-current version of JLD-ISG-2012-01 upon its issuance. This will include any revisions to the ISG subsequent to the comment period for the MBDBE rulemaking. RG 1.226 has been revised to reflect the state

of guidance for Order EA-12-049 and any modifications necessary to align it with the final MBDBE rule.

**DG-1301 Comment 4:**

One commenter noted a typographic error on page 4 of DG-1301 in the use of the word “determine.” [NEI TC-3]

**NRC Staff Response:**

The NRC staff agrees that there was a typographic error in the sentence and has edited it in RG 1.226 to correct the error.

**DG-1301 Comment 5:**

One commenter suggested that the reference to a specific revision of NEI 12-06 on page 4 be removed because the historical discussion is a general one rather than referring to a specific version. [NEI TC-4]

**NRC Staff Response:**

The NRC staff agrees that the discussion is general rather than version-specific and has modified RG 1.226 to reflect this.

**DG-1301 Comment 6:**

One commenter suggested that, rather than updating the guidance to reflect advanced designs such as NuScale’s design, NuScale could develop a design-specific appendix to NEI 12-06 for NRC endorsement. The commenter noted that further discussions would be needed to clarify the comments and ascertain the impacts to the NuScale design certification application. [NuScale CL-3]

**NRC Staff Response:**

The NRC staff agrees that this is a potential method to address the guidance for this particular advanced design. The NRC staff notes that the design certification process will provide the opportunity for further resolution of this subject and has made no changes to RG 1.226 pending further development of that process.

**DG-1301 Comment 7:**

One commenter suggested that staff position 1.1.a and Section 1.2 of DG-1301 are unnecessary because the MBDBE rule addresses an extended loss of ac power rather than a loss of all ac power. [NEI TC-6]

**NRC Staff Response:**

The NRC staff disagrees with this comment for the reasons stated in the NRC response to Rule Comment 36. The NRC staff agrees that there is a need for better clarity in the discussions of the assumed damage state and the contingencies necessary for a loss of all ac power and has modified RG 1.226 to improve this discussion.

**DG-1301 Comment 8:**

One commenter suggested that staff position 1.1.b regarding the maintenance of guidance and strategies with respect to plant conditions following facility changes such as modification or equipment outages is unnecessary due to the industry guidance in NEI 12-06, Section 11.8, for configuration control. [NEI TC-7]

**NRC Staff Response:**

The NRC staff agrees that the industry guidance on configuration control is sufficient for compliance with the MBD BE rule and has modified RG 1.226 in response to this comment. This reflects changes that were made in JLD-ISG-2012-01, Revision 1.

**DG-1301 Comment 9:**

One commenter noted that Section E.5.1.2 of NEI 12-06, Revision 2, was clarified to address the need for a limitation of Level C validation methods to tasks, manual actions, and decisions that do not have time constraints in order to address DG-1301 staff position 1.1.d)1. This was resolved in response to a similar comment on Revision 1 to JLD-ISG-2012-01. [NEI TC-8]

**NRC Staff Response:**

The NRC staff agrees that the modification of Section E.5.1.2 appropriately addresses the draft staff position as was documented in JLD-ISG-2012-01 and has modified RG 1.226 in response to this comment.

**DG-1301 Comment 10:**

One commenter noted that NEI 12-06, Revision 2, Footnote 17 on page 97, has been modified to address staff position 1.1.d)2 in DG-1301. This was resolved in response to a similar comment on Revision 1 to JLD-ISG-2012-01. [NEI TC-9]

**NRC Staff Response:**

The NRC staff agrees that the modification of Footnote 17 appropriately addresses the draft staff position as was documented in JLD-ISG-2012-01 and has modified RG 1.226 in response to this comment.

**DG-1301 Comment 11:**

One commenter expressed concerns with the final sentence of DG-1301, staff position 1.1.d)2, regarding the integrated review of validation results. This was resolved in response to a similar comment on Revision 1 to JLD-ISG-2012-01. [NEI TC-10]

**NRC Staff Response:**

The NRC staff agrees that the resolution of this issue in JLD-ISG-2012-01 was appropriate and has modified RG 1.226 in response to this comment.

**DG-1301 Comment 12:**

One commenter noted a typographic error in the third line of DG-1301, page 8. [NEI TC-11]

**NRC Staff Response:**

The NRC staff agrees that there was a typographic error on the third line of DG-1301, page 8, and has modified RG 1.226 in response to this comment.

**DG-1301 Comment 13:**

One commenter suggested adding a clarification to the endorsement of NEI 12-06, Section 3.2.2, Guideline 13, regarding passive plants that do not require reactor pressure vessel makeup in order to provide additional flexibility for such plants. [NuScale TC-1]

**NRC Staff Response:**

The NRC staff agrees with the suggestion that there is a benefit to allowing flexibility in licensees' approaches to achieving compliance with the MBDDBE rule. This is reflected in the recognition that RG 1.226 represents only one acceptable method of achieving compliance. In the absence of a fully-developed approach for passive plants not requiring reactor pressure vessel makeup to maintain or restore core cooling, containment, and SFP cooling capabilities, the NRC concludes that there is insufficient information available to fully develop such guidance. As discussed in the NRC staff response to DG-1301 Comment 6, the NRC staff agrees that there would be a benefit to fully developing an acceptable approach for individual plant designs in the future. No changes were made to RG 1.226 in response to this comment.

**DG-1301 Comment 14:**

One commenter suggested changing the discussion of "installed" and "portable" equipment in Sections 1.1.1.1-3 of DG-1301 to "plant equipment" and "FLEX equipment" to match the usage in NEI 12-06. [NEI TC-12]

**NRC Staff Response:**

The NRC staff agrees that there is a need for greater clarity in the discussion of the phased approach and the equipment relied upon in the different phases. This is because, as a result of lessons learned in the implementation of Order EA-12-049, the NRC staff has found certain approaches used by licensees that rely upon additional equipment for the mitigating strategies

that is newly installed rather than portable for events that have specific characteristics that would be better addressed with installed equipment (e.g., reevaluated flooding hazards). However, the NRC staff notes that the phrase “plant equipment” is not defined in NEI 12-06 and could create additional confusion in the future because the newly installed equipment could be interpreted to be plant equipment in the future by operators or other observers that are not familiar with the evolution of this requirement. The NRC staff concludes that the use of the phrase “SSCs relied upon for protection against design-basis events” would provide greater clarity than the use of the term “plant equipment.”

Similarly, using the term “FLEX equipment” could result in confusion with respect to the use by some licensees of equipment that has a primary purpose unrelated to the MBDBE rule but is relied upon for compliance with the MBDBE rule when that equipment is not relied upon for protection against design-basis events. This is because the NEI 12-06 definition of FLEX equipment limits its scope to equipment with a primary purpose to support the FLEX strategies. Similar to the discussion underlying the NRC response to SOC Comment 17, a more appropriate term could be “equipment relied upon for the mitigating strategies.”

The NRC staff has modified RG 1.226 in response to this comment to improve the clarity.

**DG-1301 Comment 15:**

One commenter suggested adding a clarification to DG-1301 to allow a transition from the use of installed equipment to using equipment from offsite, rather than specifying the use of onsite equipment. [NuScale TC-2]

**NRC Staff Response:**

The NRC staff agrees with the comment’s premise that, in some circumstances, a direct transition from mitigating strategies using installed equipment to using portable equipment is an acceptable approach to achieving compliance with the MBDBE rule, as was discussed in the NRC response to Rule Comment 3. The NRC staff has modified RG 1.226 in response to this comment.

**DG-1301 Comment 16:**

One commenter suggested adding a clarification to RG 1.226 regarding the potential for a passive plant design with a sufficiently long coping duration (i.e., more than 30 days) to avoid needing to have detailed plans for acquiring offsite support. [NuScale TC-3]

**NRC Staff Response:**

The NRC staff agrees that there may be future designs that do not need further mitigating strategies planning beyond their approach to design-basis functions. However, in the absence of a fully developed design and mitigating strategies, the NRC disagrees with the need to incorporate specific criteria for these designs. As discussed in the NRC responses to DG-1301 Comments 6 and 13, the NRC staff agrees that there would be a benefit to fully developing an



acceptable approach for individual plant designs in the future. No changes were made to RG 1.226 in response to this comment.

**DG-1301 Comment 17:**

One commenter stated that, for new plants with a passive failsafe design, there may be no need or possibility for local manual initiation of a safety function. The commenter suggested including the statement that no manual actions are required to initiate passive failsafe SSCs to Section 1.2. [NuScale TC-4]

**NRC Staff Response:**

The NRC staff agrees that there may be future designs that include passive failsafe designs for which local manual action is not necessary. However, in the absence of a fully developed design with mitigating strategies to consider, the NRC disagrees with the need to incorporate specific criteria for these designs. As discussed in the NRC responses to DG-1301 Comments 6 and 13, the NRC staff agrees that there would be a benefit to fully developing an acceptable approach for individual plant designs in the future. No changes were made to RG 1.226 in response to this comment.

**DG-1301 Comment 18:**

One commenter stated that the word “reasonably” should be deleted from the first sentence of Section 3 of JLD-ISG-2012-01 on page 11. This would be to reflect changes to the rule language suggested by the commenter, as discussed in Question 9 Comment 2. [NEI TC-13]

**NRC Staff Response:**

The NRC staff disagrees with this comment for the reasons discussed in the NRC responses to Rule Comment 41, SOC Comments 17 and 23, and Question 9 Comment 2. No changes were made to RG 1.226 in response to this comment.

**DG-1301 Comment 19:**

One commenter stated that DG-1301 includes guidance for what appears to be inconsistent levels of protection for different hazards, with protection from high winds to the 1-million-year event and lower levels of protection from flooding and seismic events, allowing some plants to provide marginal performance for a 10,000-year event. The commenter recommends establishing common performance goals for mitigation strategies to ensure plants can cope with a 100,000-year event. The commenter further recommends that the mitigation strategies be more robust than existing safety equipment in order to provide effective defense in depth. [Stein 1]

**NRC Staff Response:**

The NRC staff disagrees with this comment for the reasons stated in the NRC response to General Comment 9. No changes were made to RG 1.226 in response to this comment.

**DG-1301 Comment 20:**

One commenter noted that there is a typographic error in the reference to NEI 12-06, Section 11.5.3 in DG-1301, Section 3.4. The commenter notes that the correct reference should be to Section 11.5.4. [NEI TC-14]

**NRC Staff Response:**

The NRC staff agrees that the improper section number from NEI 12-06 was used in DG-1301, Section 3.4, and has modified RG 1.226 in response to this comment.

**DG-1301 Comment 21:**

One commenter states that the discussion on equipment maintenance in DG-1301, Section 4, should be modified to delete the word “adequate” from the discussion of the requirements of 10 CFR 50.155(c)(3) to reflect changes made in response to comments made in response to a specific request for comment on Question 7. [NEI TC-15]

**NRC Staff Response:**

The NRC staff agrees that this section of the guidance should be edited to reflect the final MBDBE rule for reasons discussed in the NRC response to Question 7 comments. The NRC staff has modified RG 1.226 in response to this comment.

**DG-1301 Comment 22:**

One commenter stated that the first sentence of DG-1301, Section 6, should be modified to reflect changes in the treatment of reevaluated hazards under the final MBDBE rule. [NEI TC-16]

**NRC Staff Response:**

The NRC staff agrees that this section of the guidance should be edited to reflect the final MBDBE rule for reasons discussed in the NRC response to Question 9 comments. The NRC staff has modified RG 1.226 in response to this comment.

**DG-1301 Comment 23:**

One commenter stated that the guidance for the MBDBE rule should include formal treatment of the uncertainties associated with the reevaluated hazards. The commenter noted that consideration of uncertainties would inform the mitigation strategies to ensure they provide equal and creditable protection for nuclear plants. [Stein 2]

**NRC Staff Response:**

The NRC staff agrees that uncertainties associated with the reevaluated hazards should be considered. The March 12, 2012, 10 CFR 50.54(f) RFI specified that the reevaluations were to

be accomplished using updated seismic and flooding hazard information and present-day regulatory guidance and methodologies. The present-day regulatory guidance and methodologies referred to in this effort are used for siting new reactor plants with respect to their compliance with 10 CFR Part 50, Appendix A, Criterion 2. This criterion addresses uncertainty in the development of the design bases by requiring that licensees include “appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.” Because the present-day regulatory guidance and methodologies include consideration of uncertainties associated with the reevaluated hazards in the determination of conservative and bounding hazard levels, the NRC staff concludes that further treatment of the same uncertainties in RG 1.226 would be inappropriate. No changes were made to RG 1.226 in response to this comment.

**DG-1301 Comment 24:**

One commenter stated that RG 1.226 should include guidance for the treatment of the reevaluated seismic risk using an SPRA and notes that industry guidance for that was under development at the time of the comment period. [NEI TC-17]

**NRC Staff Response:**

The NRC staff agrees with the concept of using a risk-informed approach to treatment of seismic risk. RG 1.226 was modified to reflect the industry guidance that resulted from the effort discussed by the commenter.

**DG-1301 Comment 25:**

One commenter noted that, subsequent to the publication of DG-1301 for comment, industry completed NEI 12-06, Appendix H, to provide guidance for the treatment of the reevaluated seismic hazard (except for SPRA treatment). This guidance was endorsed by the NRC in JLD-ISG-2012-01, Revision 1. The commenter stated that RG 1.226 should reflect this guidance. [NEI TC-18]

**NRC Staff Response:**

The NRC staff agrees that RG 1.226 should reflect the current state of guidance for consideration of the reevaluated seismic hazard. RG 1.226 has been revised in response to this comment.

**DG-1301 Comment 26:**

One commenter noted a typographic error in the second sentence of Section 6.1.2.b, which used the phrase “flooding mechanism” where the subject matter was the seismic hazard. [NEI TC-19]

**NRC Staff Response:**

The NRC staff agrees that this sentence should refer to seismic rather than flooding hazard. RG 1.226 has been revised in response to this comment.

**DG 1301 Comment 27:**

One commenter suggested that Sections 6.2.1 through 6.2.3 should be revised to reflect changes in the rule text resulting from comments on the treatment of reevaluated hazards. [NEI TC-20, NEI C-21]

**NRC Staff Response:**

The NRC staff agrees that these sections should reflect the final MBDBE rule text. RG 1.226 has been revised in response to this comment.

**DG-1301 Comment 28:**

One commenter noted that subsequent to the issuance of DG-1301 for comment, the NRC issued Revision 1 to JLD-ISG-2012-01. The commenter stated that RG 1.226 should reflect the current state of JLD-ISG-2012-01. [NEI TC-22]

**NRC Staff Response:**

The NRC staff agrees that RG 1.226 should reflect the current version of the referenced documents. RG 1.226 has been revised in response to this comment.

**DG-1301 Comment 29:**

One commenter noted that the discussion of the phased approach on page 5 of DG-1301 does not match the text in the latest version of NEI 12-06, which is Revision 2. The commenter recommends that the text be edited to match the wording in NEI 12-06. [NEI TC-5]

**NRC Staff Response:**

The NRC staff agrees that the description of the phased approach in RG 1.226 should reflect the wording used for it in NEI 12-06 and has modified RG 1.226 in response to this comment.

B. DG-1317, "Wide-Range Spent Fuel Pool Level Instrumentation"

**DG-1317 Comment 1:**

One commenter stated that the discussion in DG-1317 of the replacement of the existing JLD-ISG-2012-03 with RG 1.227, as well as the replacement of JLD-ISG-2012-01 with RG 1.226, was inappropriate because these two ISGs provide methods of complying with Orders EA-12-051 and EA-12-049, rather than the MBDBE rule. The commenter suggests that clarification is needed for the transition from the orders to the rule and the process for their rescission. [NEI TC-23]

**NRC Staff Response:**

The NRC staff agrees that these discussions are incorrect because of the different sources of the requirements underlying the guidance of the ISGs and has edited the final version of RG 1.227 to reflect this. The NRC response to CER Comment 6 describes the relaxation of orders and removal of license conditions.

**DG-1317 Comment 2:**

One commenter noted the potential for confusion between the MBDBE rule requirements and the Order EA-12-051 requirements in the discussion on page 3 of DG-1317. [NEI TC-24]

**NRC Staff Response:**

The NRC staff agrees that there is a potential for confusion and has revised the discussion in the background section of RG 1.227 to clarify this.

**DG-1317 Comment 3:**

One commenter suggested modifying the discussion on page 4 of DG-1317 to state that “These regulations require that licensees install reliable means of remotely monitoring wide-range SFP levels to support the mitigation strategies required by 10 CFR 50.155(b)(1) and effective prioritization of event mitigation and recovery....” [NEI TC-25]

**NRC Staff Response:**

The NRC staff notes that this comment is in conflict with the commenter’s discussion in comment NEI CL-7, discussed in DG-1317 Comment 5. The NRC staff disagrees with this comment for the reasons stated in the NRC Staff Response to DG-1317 Comment 5 and in the NRC response to Rule Comment 40. No changes were made to RG 1.227 in response to this comment.

**DG-1317 Comment 4:**

One commenter suggested including a parenthetical example of hand-held devices in the discussion of portable instrument channel components on page 6 of DG-1317. [NEI TC-26]

**NRC Staff Response:**

The NRC staff agrees that the provision of an example would improve the clarity of the discussion of the exception taken to NEI 12-02, Revision 1, and has revised RG 1.227 to include the suggested example, which had been the subject of discussion in public meetings with stakeholders during the development of JLD-ISG-2012-03.

**DG-1317 Comment 5:**

One commenter noted that the purpose for the SFPI requirement in Order EA-12-051 that is being made generically applicable in the MBDBE rulemaking is for prioritization of event response and mitigation following a BDB event and not for the strategies under Order EA-12-049. The commenter states that the rule language, regulatory guides, and related supporting information must keep them separate. [NEI CL-7]

**NRC Staff Response:**

The NRC staff agrees with the commenter for the reasons stated in the NRC response to Rule Comment 40. RG 1.227 had been edited to reflect the different sources of the requirements that originated in Orders EA-12-049 and EA-12-051 and the manner in which they have been incorporated in the final MBDBE rule.

C. DG-1319, "Integrated Response Capabilities for Beyond-Design-Basis Events"

**DG-1319 Comment 1:**

One commenter noted that, since the submittal of NEI 13-06 and NEI 14-01, there have been a number of further developments that resulted in a need to make changes to that document. The commenter provided revised versions of NEI 13-06 and NEI 14-01. [NEI TC-62 and NEI TC-63]

**NRC Staff Response:**

The NRC staff agrees that the changes to NEI 13-06 and NEI 14-01 accurately reflect the developments in the proposed MBDBE rule and the final version of the MBDBE rule. RG 1.228 has been revised to reflect these new revisions.