

**PREDECISIONAL  
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AND NOT TO SOLICIT EXTERNAL STAKEHOLDER FEEDBACK**

**[7590-01-P]**

**NUCLEAR REGULATORY COMMISSION**

**10 CFR Parts 50 and 52**

**[Docket Nos. PRM-50-97 and PRM-50-98; NRC-2011-0189 and NRC-2014-0240]**

**RIN 3150-AJ49**

**Mitigation of Beyond-Design-Basis Events**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Final rule.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations that establish regulatory requirements for nuclear power reactor applicants and licensees to mitigate beyond-design-basis events. The NRC is making generically applicable the requirements in NRC orders for mitigation of beyond-design-basis events and for reliable spent fuel pool instrumentation. This rule establishes regulatory requirements for an integrated response capability, including supporting requirements for command and control, drills, training and documentation of changes. This rule also establishes requirements for enhanced onsite emergency response capabilities. Finally, this rule addresses a number of petitions for rulemaking (PRMs) submitted to the NRC following the March 2011 Fukushima Dai-ichi event. This rulemaking is applicable to power reactor licensees, power reactor license applicants, and decommissioning power reactor licensees.

**DATES:** The final rule is effective on **[INSERT DATE 60 DAYS AFTER THE DATE OF PUBLICATION]**.

**ADDRESSES:** Please refer to Docket ID NRC-2014-0240 when contacting the NRC about the availability of information for this action. You may obtain publicly-available information related to this action by any of the following methods:

- **Federal Rulemaking Web Site:** Go to <http://www.regulations.gov> and search for Docket ID NRC-2014-0240. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; e-mail: [Carol.Gallagher@nrc.gov](mailto:Carol.Gallagher@nrc.gov). For technical questions, contact the individuals listed in the FOR FURTHER INFORMATION CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly-available documents online in the ADAMS Public Documents collection at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "[ADAMS Public Documents](#)" and then select "[Begin Web-based ADAMS Search](#)." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov). For the convenience of the reader, instructions about obtaining materials referenced in this document are provided in the "Availability of Documents" section.

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

**FOR FURTHER INFORMATION CONTACT:** Timothy Reed, Office of Nuclear Reactor Regulation, telephone: 301-415-1462, e-mail: [Timothy.Reed@nrc.gov](mailto:Timothy.Reed@nrc.gov); or Eric Bowman, Office of Nuclear Reactor Regulation, telephone: 301-415-2963, e-mail: [Eric.Bowman@nrc.gov](mailto:Eric.Bowman@nrc.gov). Both are staff of the U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

## **SUPPLEMENTARY INFORMATION:**

### **EXECUTIVE SUMMARY:**

#### **A. Need for the Regulatory Action**

The NRC is amending its regulations to establish regulatory requirements for nuclear power reactor applicants and licensees to mitigate beyond-design-basis events. This rule makes NRC Order EA-12-049, “Order Modifying Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events” (Mitigation Strategies Order), and Order EA-12-051, “Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation” (SFPI Order), generically applicable; establishes regulatory requirements for an integrated response capability, including supporting requirements for command and control, drills, training and documentation of changes; includes requirements that enhance onsite emergency response capabilities; and addresses a number of PRMs submitted to the NRC following the March 2011 Fukushima Dai-ichi event. This rule is applicable to operating power reactor licensees, power reactor license applicants, and decommissioning power reactor licensees. The NRC conducted this rulemaking to amend the regulations to reflect requirements imposed on current licensees by order and to reflect the lessons learned from the Fukushima accident.

#### **B. Major Provisions**

Major provisions of this rule include amendments or additions to parts 50 and 52 of title 10 of the *Code of Federal Regulations* (10 CFR) that:

- Revise the 10 CFR parts 50 and 52 “Content of applications – general information” and “Content of applications – technical information” requirements to reflect the additional information that would be required for applications.
- Add § 50.155, which contains beyond-design-basis mitigation requirements that make the Mitigation Strategies and SFPI Orders generically applicable; requires an integrated response capability for beyond-design-basis events that includes the integration of the guidelines, strategies, and alternative approaches of § 50.155(b) with the existing emergency operating procedures; and includes training requirements, drills or exercise requirements, staffing and communications requirements, and the documentation of change control requirements.

### C. Costs and Benefits

The NRC prepared a regulatory analysis to determine the expected costs and benefits of this Mitigation of Beyond-Design-Basis Events (MBDBE) final rule (MBDBE rule). The analysis examines the costs and benefits of the rule requirements relative to the baseline case (i.e., no action alternative which equates to implementation of the Mitigation Strategies and SFPI Orders without this final rule being issued). The final rule encompasses provisions that are either being implemented at this time (December 2016), or in some cases are currently being implemented via Order EA-12-049 and Order EA-12-051 and related industry initiatives. Because the NRC uses a no action baseline to estimate incremental costs, the total cost of the rule is estimated to be approximately \$1.7 million for the industry per site followed by a recurring annual cost of \$23,000. The net present value of these costs per site is approximately \$2.0 million using a 7-percent discount rate. This incremental cost is primarily attributed to licensees’

efforts to address the reevaluated hazards as required by § 50.155(b)(2) and to a lesser degree to review the rule against the previous implementation of the Mitigation Strategies and SFPI Orders and make any additional changes to plant programs and procedures. The final rule is expected to result in a total one-time cost of approximately \$128 million followed by a total recurring annual cost of \$1.2 million. The net present value of these costs is approximately \$141 million using a 7-percent discount rate even with the MBDBE requirements have largely been implemented prior to the effective date of the rule under the requirements in the Mitigation Strategies Order and the SFPI Order. The regulatory analysis includes estimates associated with the impacts incurred as a result of licensees being required to address the reevaluated hazard information and consequently making changes to mitigation strategies including plant modifications, which if not managed properly could substantially increase costs to complete these activities above the estimates within the regulatory analysis for a small increment of safety improvement.

Based on the NRC's assessment of the costs and benefits of the rule, the NRC has concluded that the MBDBE rule is justified. For more information, please see the regulatory analysis.

As required by 10 CFR 50.109 and 10 CFR 52.98, a backfitting and issue finality assessment was prepared. This document presents the reasons why the MBDBE Rule does not contain any backfits or why the requirements are necessary for adequate protection of the public health and safety or common defense and security.

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## **I. Background**

#### A. Fukushima Dai-ichi

On March 11, 2011, the Great East Japan Earthquake, rated a magnitude 9.0, occurred off the coast of Honshu Island, resulting in the automatic shutdown of 11 nuclear power plants (NPPs) at four sites along the northeast coast of Japan, including three of six reactors at the Fukushima Dai-ichi NPP (the three remaining plants were in outages). The earthquake caused a large tsunami that is estimated to have exceeded 14 meters in height at the Fukushima Dai-ichi NPP. The earthquake and tsunami produced widespread devastation across northeastern Japan, significantly impacting the infrastructure and industry in the northeastern coastal areas of Japan. The earthquake and tsunami disabled the majority of the external and internal electrical power systems at the Fukushima Dai-ichi NPP, creating a significant challenge to operators. In addition, the combination of severe events challenged the implementation of emergency plans and procedures.

#### B. NRC Near-Term Task Force

The NRC Chairman's tasking memorandum, COMGBJ-11-0002, "NRC Actions Following the Events in Japan," established a senior-level task force referred to as the "Near-Term Task Force" (NTTF) to conduct a systematic and methodical review of the NRC's regulations and processes to determine if the agency should make safety improvements in light of the events in Japan. On July 12, 2011, the report of the NTTF (NTTF Report) was provided to the Commission as an enclosure to SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan." The NTTF concluded that continued U.S. plant operation and NRC licensing activities present no imminent risk to public health and safety. While the NTTF also concluded that the current regulatory system has served the NRC and the public well, it found that enhancements to safety and emergency preparedness are warranted and made twelve general recommendations for Commission

consideration. In examining the Fukushima Dai-ichi accident for insights for reactors in the United States, the NTTF addressed protecting against accidents resulting from natural phenomena, mitigating the consequences of such accidents, and ensuring emergency preparedness. The NTTF found that the Commission's longstanding defense-in-depth philosophy, supported and modified as necessary by state-of-the-art probabilistic risk assessment techniques, should continue to serve as the primary organizing principle of its regulatory framework. The NTTF concluded that the application of the defense-in-depth philosophy could be strengthened by including explicit requirements for beyond-design-basis events.

### C. Implementation of the NTTF Recommendations

In response to the NTTF Report, the Commission directed the NRC staff, in Staff Requirements Memorandum (SRM)-SECY-11-0093, to engage with stakeholders to review and assess the NTTF recommendations in a comprehensive and holistic manner and to provide the Commission with fully-informed options and recommendations. The NRC staff provided the Commission with recommendations for near-term action in SECY-11-0124, "Recommended Actions To Be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011. The suggested near-term actions addressed several NTTF recommendations associated with this rulemaking, including NTTF recommendations 4, 8, and 9.3. In SRM-SECY-11-0124, dated October 18, 2011, the Commission directed the NRC staff to, among other things: initiate a rulemaking to address NTTF recommendation 4, Station Blackout (SBO) regulatory actions, as an advance notice of proposed rulemaking (ANPR); designate the SBO rulemaking associated with NTTF recommendation 4 as a high priority rulemaking; craft recommendations that continue to realize the strengths of a performance-based system as a guiding principle; and consider approaches that are flexible



and able to accommodate a diverse range of circumstances and conditions. As discussed more fully in later portions of this notice, the regulatory actions associated with NTTF recommendation 4 evolved substantially from this early Commission direction, and included issuance of Order EA-12-049, "Order Modifying Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (Mitigation Strategies Order), that, as implemented, ultimately addressed all of NTTF recommendation 4 as well as other recommendations.

In SECY-11-0137, "Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011, the NRC staff, based on its assessment of the NTTF recommendations, proposed to the Commission a three-tiered prioritization for implementing regulatory actions stemming from the NTTF recommendations. The Tier 1 recommendations were those actions having the greatest safety benefit that could be implemented without unnecessary delay. The Tier 2 recommendations were those actions that needed further technical assessment or critical skill sets to implement, and the Tier 3 recommendations were longer-term actions that depended on the completion of a shorter-term action or needed additional study to support a regulatory action. On December 15, 2011, the Commission approved the staff's recommended prioritization in SRM-SECY-11-0137.

The NTTF recommendations that provide the initial regulatory impetus for this rulemaking include:

- NTTF recommendation 4: strengthen SBO mitigation capability at all operating and new reactors for design-basis and beyond-design-basis external events;
- NTTF recommendation 7: enhance spent fuel pool makeup capability and instrumentation for the spent fuel pool;

- NTTF recommendation 8: strengthen and integrate onsite emergency response capabilities such as emergency operating procedures (EOPs), Severe Accident Management Guidelines (SAMGs), and extensive damage mitigation guidelines (EDMGs);
- NTTF recommendation 9: require that facility emergency plans address staffing, dose assessment capability, communications, training and exercises, and equipment and facilities for prolonged station blackout, multi-unit events, or both;
- NTTF recommendation 10: pursue additional emergency protection topics related to multi-unit events and prolonged station blackout, including command and control structure and the qualifications of decision makers; and
- NTTF recommendation 11: pursue emergency management topics related to decision making, radiation monitoring, and public education, including the ability to deliver equipment to the site with degraded offsite infrastructure.

In response to input received from stakeholders, the NRC accelerated the schedule originally proposed in SECY-11-0137. On February 17, 2012, the NRC staff recommended in SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned From Japan's March 11, 2011, Great Tōhoku Earthquake and Tsunami," that the Commission issue orders and requests for information.

To address Tier 1 NTTF recommendation 4, the NRC issued the Mitigation Strategies Order on March 12, 2012, requiring all U.S. nuclear power plant licensees to have additional capability to mitigate beyond-design-basis external events through the implementation of strategies and guidelines that enable them to cope without their permanent electrical power sources for an indefinite period of time. These strategies would provide additional capability to maintain or restore reactor core and spent fuel cooling, as well as protect the reactor containment. This order also addressed: portions of NTTF recommendation 9 to require that

facility emergency plans address prolonged station blackouts and multi-unit events; portions of NTTF recommendation 10 to pursue additional emergency protection topics related to multi-unit events and prolonged station blackout; and portions of NTTF recommendation 11 to pursue emergency procedure topics related to decision-making, radiation monitoring, and public education.

To address Tier 1 NTTF recommendation 7, the NRC issued Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (SFPI Order), on March 12, 2012, requiring all U.S. nuclear power plant licensees to have a reliable indication of the water level in associated spent fuel storage pools.

To address Tier 1 NTTF recommendation 8, the NRC issued an ANPR on April 18, 2012 (77 FR 23161), to engage stakeholders in rulemaking activities associated with the methodology for the integration of onsite emergency response processes, procedures, training and exercises.

#### D. Consolidation of Regulatory Efforts

While developing the rulemakings discussed in the previous section, the NRC staff recognized that efficiencies could be gained by consolidating the rulemaking efforts due to the inter-relationships among the proposed changes. The NRC staff recommended to the Commission in COMSECY-13-0002, "Consolidation of Japan Lessons Learned Near-Term Task Force Recommendations 4 and 7 Regulatory Activities," COMSECY-13-0010, "Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned," and SECY-14-0046, "Fifth 6-Month Status Update on Response to Lessons Learned From Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami," the consolidation of rulemaking activities that address NTTF recommendations 4, 7, 8, portions of 9, 10.2, and 11.1. Section II.B of this document contains a more complete discussion of the scope of NTTF recommendations addressed by the MBDBE rule. The Commission approved these

consolidations in the associated SRMs. Consequently, the MBDBE rule combines two NRC activities for which documents have been published in the *Federal Register* - Onsite Emergency Response Capabilities (RIN 3150-AJ11; NRC-2012-0031) and Station Blackout Mitigation Strategies (RIN 3150-AJ08; NRC-2011-0299). The MBDBE rule identification number and regulations.gov docket number is RIN 3150-AJ49 and NRC-2014-0240, respectively.

These consolidations were intended to:

1. Align the regulatory framework with ongoing industry implementation efforts to produce a more coherent and understandable regulatory framework. Given the complexity of these requirements and their associated implementation, the NRC concluded that this was an important objective for the regulatory framework.
2. Reduce the potential for inconsistencies and complexities between the related rulemaking actions that could occur if the efforts remained as separate rulemakings.
3. Facilitate better understanding of the requirements for both internal and external stakeholders, and thereby lessen the impact on internal and external stakeholders who would otherwise need to review and comment on multiple rulemakings while cross-referencing both proposed rules and sets of guidance documents.

## **II. Opportunities for Public Involvement**

As discussed in section I.D of this notice, the MBDBE rule is a consolidation of several regulatory activities, including two previous rulemaking efforts: the Station Blackout Mitigation Strategies rulemaking and the Onsite Emergency Response Capabilities rulemaking. Both of these rulemaking efforts offered extensive external stakeholder involvement opportunities, including public meetings, ANPRs issued for public comment, and draft regulatory basis documents issued for public comment. The major opportunities for stakeholder involvement were:

1. Station Blackout ANPR (77 FR 16175; March 20, 2012);
2. Onsite Emergency Response Capabilities ANPR (77 FR 23161; April 18, 2012);
3. Station Blackout Mitigation Strategies draft regulatory basis and draft rule concepts (78 FR 21275; April 10, 2013). The final Station Blackout Mitigation Strategies regulatory basis was subsequently issued on July 23, 2013 (78 FR 44035); and
4. Onsite Emergency Response Capabilities draft regulatory basis (78 FR 1154; January 8, 2013). The final Onsite Emergency Response Capabilities regulatory basis, with preliminary proposed rule language, was subsequently issued on October 25, 2013 (78 FR 63901).

The NRC described in each final regulatory basis document how it considered stakeholder feedback in developing the respective final regulatory basis, including consideration of ANPR comments and draft regulatory basis document comments. Section 5 of the Station Blackout Mitigation Strategies regulatory basis document includes a discussion of stakeholder feedback used to develop the final regulatory basis. Appendix B to the Onsite Emergency Response Capabilities regulatory basis includes a discussion of stakeholder feedback used to develop that final regulatory basis.

The public has had multiple opportunities to engage in these regulatory efforts. Most noteworthy were the following:

1. Preliminary proposed rule language for Onsite Emergency Response Capabilities made available to the public on November 15, 2013 (78 FR 68774).
2. Consolidated rulemaking proof of concept language made available to the public on February 21, 2014.
3. Preliminary proposed rule language for Mitigation of Beyond-Design-Basis Events rulemaking made available to the public on August 15, 2014.

4. Preliminary proposed rule language for Mitigation of Beyond-Design-Basis Events rulemaking made available to the public on November 13, 2014, and December 8, 2014, to support public discussion with the Advisory Committee on Reactor Safeguards (ACRS).

The NRC issued the MBDBE proposed rule on November 13, 2015 (80 FR 70609), for a 90-day public comment period. The comment period closed on February 11, 2016. During the public comment period, on January 21, 2016, the NRC held a public meeting to provide external stakeholders with a better understanding of the proposed requirements and thereby facilitate more informed feedback. Twenty sets of comments were received in response to the proposed rule. The NRC's consideration of these comments is addressed in section IV of this notice. The NRC staff has had numerous interactions with the ACRS, and in all cases these were public meetings, including the following:

1. The ACRS Plant Operations and Fire Protection subcommittee met on February 6, 2013, to discuss the Onsite Emergency Response Capabilities regulatory basis.
2. The ACRS Regulatory Policies and Practices subcommittee met on December 5, 2013, and April 23, 2013, to discuss the Station Blackout Mitigation Strategies regulatory basis.
3. The ACRS full committee met on June 5, 2013, to discuss the Station Blackout Mitigation Strategies regulatory basis.
4. The ACRS Fukushima subcommittee met on June 23, 2014, to discuss consolidation of Station Blackout Mitigation Strategies and Onsite Emergency Response Capabilities rulemakings.
5. The ACRS full committee met on July 10, 2014, to discuss consolidation of Station Blackout Mitigation Strategies and Onsite Emergency Response Capabilities rulemakings.
6. The ACRS Fukushima subcommittee met on November 21, 2014, to discuss preliminary proposed MBDBE rulemaking language.

7. The ACRS full committee met on December 4, 2014, to discuss preliminary proposed MBDBE rulemaking language.
8. The ACRS Fukushima subcommittee met on March 19, 2015 to discuss the proposed MBDBE rulemaking package.
9. The ACRS full committee met on April 9, 2015 to discuss the proposed MBDBE rulemaking package.
10. The ACRS full committee met on June 10, 2015 to receive a status update on the efforts to develop supporting guidance to implement the MBDBE rule.
11. The ACRS Fukushima subcommittee met on April 22, 2016, to receive an update on the public comments provided on the proposed MBDBE rule.
12. The ACRS Fukushima subcommittee met on August 17, 2016, to discuss the path forward on the substantive public comments provided on the MBDBE rule.
13. The ACRS Fukushima subcommittee met on October 19, 2016, to discuss the final MBDBE rule guidance.
14. The ACRS Fukushima subcommittee met on November 16, 2016, to discuss the final MBDBE rule package.
15. The ACRS full committee met on December 1, 2016, to discuss the final MBDBE rule package.

The NRC held a public meeting on November 10, 2016, to discuss implementation issues associated with the MBDBE final rule as required by its Cumulative Effects of Regulation (CER) process.

### **III. Petitions for Rulemaking**

During development of this rule, the NRC gave consideration to the issues raised in six PRMs submitted to the NRC, five from the Natural Resources Defense Council, Inc. (NRDC) (PRM-50-97, PRM-50-98, PRM-50-100, PRM-50-101, and PRM-50-102), and one submitted by Mr. Thomas Popik (PRM-50-96). The NRDC petitions were dated July 26, 2011, and docketed by the NRC on July 28, 2011. The NRC published a notice of receipt in the *Federal Register* on September 20, 2011 (76 FR 58165) for the NRDC petitions, and did not ask for public comment at that time. The petitions filed by the NRDC use the NTTF Report as the sole basis for the PRMs. The NTTF recommendations that the NRDC PRMs rely upon are: 4.1, 7.5, 8.4, 9.1, and 9.2. This rule addresses each of these recommendations, and therefore it resolves the issues raised by the NRDC PRMs. Accordingly, issuance of the MBDBE rule concludes all planned regulatory activities for the NRDC petitions. The PRM-50-96, filed by Mr. Popik, is still under consideration by the NRC and is not fully addressed at this time, as discussed in greater detail below.

In PRM-50-97 (NRC-2011-0189), the NRDC requested emergency preparedness enhancements for prolonged station blackouts in the areas of communications ability, Emergency Response Data System (ERDS) capability, training and exercises and equipment and facilities (NTTF recommendation 9.2). The NRC considered the issues raised in this PRM as part of the MBDBE rulemaking. The NRC's consideration of the issues raised in PRM-50-97 are reflected in the provisions in § 50.155(c)(4) concerning communications, § 50.155(d) concerning training, and § 50.155(e) concerning drills and exercises. The NRC concludes that consideration of the PRM issues and the underlying NTTF Report recommendations, as discussed in this notice, addresses PRM-50-97. This completes the NRC's consideration of PRM-50-97.

In PRM-50-98 (NRC-2011-0189), the NRDC requested emergency preparedness enhancements for multi-unit events in the areas of personnel staffing, dose assessment



capability, training and exercises, and equipment and facilities (NTTF recommendation 9.1). The NRC considered the issues raised in this PRM as part of the MBDBE rulemaking. The NRC's consideration of the issues raised in PRM-50-98 are reflected in the provisions in § 50.155(b)(5) concerning staffing, § 50.155(c)(4) concerning communications, § 50.155(d) concerning training, and § 50.155(e) concerning drills or exercises. The NRC concludes that consideration of the PRM issues and the underlying NTTF Report recommendations, as discussed in this notice, addresses PRM-50-98. This completes the NRC's consideration of PRM-50-98.

In PRM-50-100, the NRDC requested enhancement of spent fuel pool (SFP) makeup capability and instrumentation for the SFP (NTTF recommendation 7.5). The NRC determined that the issues raised in this PRM should be considered in the NRC's rulemaking process, and the NRC published a document in the *Federal Register* with this determination on July 23, 2013 (78 FR 44034). The NRC's consideration of the issues raised in PRM-50-100 within the MBDBE rulemaking are reflected in the provisions in § 50.155(b)(1) concerning mitigation strategies for maintaining or restoring spent fuel pool cooling capabilities and § 50.155(f) concerning spent fuel pool monitoring. The NRC concludes that consideration of the PRM issues and the underlying NTTF Report recommendations, as discussed in this notice, address PRM-50-100. This completes the NRC's consideration of PRM-50-100.

In PRM-50-101, the NRDC requested that § 50.63, "Loss of all alternating current power," be revised to establish a minimum coping time of 8 hours for a loss of all alternating current (ac) power; establish the equipment, procedures, and training necessary to cope with an extended loss of ac power (72 hours) for core and SFP cooling and for reactor coolant system and primary containment integrity as needed; and preplan/prestage offsite resources to support uninterrupted core and SFP cooling and reactor coolant system and containment integrity as needed (NTTF recommendation 4.1). The NRC determined that the issues raised in this PRM

should be considered in the NRC's rulemaking process, and the NRC published a document in the *Federal Register* with this determination on March 21, 2012 (77 FR 16483). The NRC's consideration of the issues raised in PRM-50-101 within the MBDBE rulemaking is reflected in the provisions in § 50.155(b)(1) concerning mitigation strategies for maintaining or restoring core cooling, containment, and spent fuel pool cooling capabilities, § 50.155(c) concerning equipment, § 50.155(d) concerning training, § 50.155(e) concerning drills or exercises, and § 50.155(g) concerning change control processes. The NRC concludes that consideration of the PRM issues and the underlying NTTF Report recommendations, as discussed in this notice, addresses PRM-50-101. This completes the NRC's consideration of PRM-50-101.

In PRM-50-102, the NRDC requested more realistic, hands-on training and exercises on severe accident management guidelines (SAMGs) and extensive damage mitigation guidelines (EDMGs) for licensee staff expected to implement those guideline sets and make decisions during emergencies (NTTF recommendation 8.4). The NRC determined that the issues raised in this PRM should be considered in the NRC's rulemaking process, and the NRC published a document in the *Federal Register* with this determination on April 27, 2012 (77 FR 25104). The NRC's consideration of the issues raised in PRM-50-102 within the MBDBE rulemaking are reflected in the provisions in § 50.155(d) concerning training and § 50.155(e) concerning drills or exercises. The NRC concludes that consideration of the PRM issues and the underlying NTTF Report recommendations, as discussed in this notice, addresses PRM-50-102. This completes the NRC's consideration of PRM-50-102.

In PRM-50-96, Mr. Thomas Popik requested that the NRC amend its regulations to require facilities licensed by the NRC to assure long-term cooling and unattended water makeup of spent fuel pools (SFPs) in the event of geomagnetic storms caused by solar storms resulting in long-term loss of power. The NRC determined that the issues raised in this PRM should be considered in the NRC's rulemaking process, and the NRC published a document in the *Federal*

*Register* with this determination on December 18, 2012 (77 FR 74788). In that *Federal Register* document, the NRC also closed the docket for this petition. Specifically, the NRC indicated that it would monitor the progress of the MBDBE rule to determine whether the requirements established therein would address, in whole or in part, the issues raised in the PRM. In this context, the requirements in § 50.155(b)(1) and (c) and the associated regulatory guidance, address, in part, the issues raised by the petitioner because these regulations require licensees to establish offsite assistance to support maintenance of the key functions (including both reactor and SFP cooling) following an extended loss of ac power that has been postulated for geomagnetic events. Accordingly, PRM-50-96 remains under NRC consideration.

The issue of geomagnetic storms, as it impacts transmission system protection, is being addressed at a national level by the White House's Office of Science and Technology Policy (OSTP). The 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, the NRC will address PRM 50-96 giving consideration to the NSWAP, the MBDBE rule, requirements recently established by the Federal Energy Regulatory Commission to address geomagnetic disturbances (81 FR 67120; September 30, 2016), and the additional comments that were submitted on this rulemaking that further inform the consideration of geomagnetic disturbances.

## **IV. Public Comments and Changes to the Rule**

### **A. Overview of Public Comments**

The MBDBE proposed rule and draft guidance were published on November 13, 2015 (80 FR 70609), for a 90-day public comment period during which the NRC received 20 comment submissions containing 185 individual comments. In developing the final rule and supporting guidance, the NRC considered all the comments provided in response to the MBDBE proposed rule and draft guidance. The detailed consideration of the public comments is contained in a separate document that is referenced in section XIX, "Availability of Documents," of this notice. While the NRC received many comments that enabled it to significantly improve the MBDBE Rule and its supporting statement of considerations, this section discusses only a subset of those comments that resulted in changes to the MBDBE Rule requirements, changes to the MBDBE Rule supporting statement of considerations, or feedback that NRC considers noteworthy. In this regard, the NRC requested feedback in the proposed rule in both specific questions and through the cumulative effects of regulations questions, and that feedback is discussed within the subject areas discussed below.

### **B. Seismic and Flooding Reevaluated Hazards**

The NRC received comments stating 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 § 50.155(b) rather than § 50.155(c)(2). The commenters noted that addressing the effects of reevaluated hazards on the mitigation strategies in § 50.155(b), rather than (c)(2), provides greater flexibility regarding how a licensee can address the hazard effects through changes to mitigation strategies and guidelines, to include changes to

equipment protection. Additionally commenters indicated that the regulation should allow for alternative approaches that would not necessarily address the damage state assumed for § 50.155(b)(1), nor necessarily assume the same success criteria, and that should also allow for the use of risk-informed approaches.

The NRC agrees with this comment and concludes that including the requirement to address the effects of reevaluated hazards on the mitigation strategies in § 50.155(b), specifically new § 50.155(b)(2), improves the alignment of the regulation with the supporting implementation guidance in Regulatory Guide (RG) 1.226, “Flexible Mitigation Strategies for Beyond-Design-Basis Events,” which provides the flexibility the commenters suggested should be in the rule. The NRC concludes that it is unnecessary to include language in the MBDBE rule to allow for risk-informed approaches because the regulation does not preclude such approaches. To clarify this, the supporting discussion for § 50.155(b)(2) in section VI, “Section-by-Section Analysis,” of this notice states that risk-informed approaches, in addition to deterministic approaches are acceptable for complying with the § 50.155(b)(2) requirements. This is further supported by the supporting guidance in RG 1.226, which addresses the use of risk-informed approaches.

The final rule is revised to address reevaluated hazards in § 50.155(b)(2) rather than in § 50.155(c)(2) as proposed by NRC or in § 50.155(b)(1) as proposed by the commenters. The provisions (i.e., EDMG) that were proposed as § 50.155(b)(2) are now moved to § 50.155(b)(3) in the MBDBE rule.

### C. Reasonable Protection

The NRC received comments that indicated a lack of clarity associated with the proposed requirements for “reasonable protection.” The commenters indicated that there appeared to be conflict regarding the application of the reasonable protection requirement to portable FLEX

(Diverse and Flexible Coping Strategies) equipment versus application to installed structures systems, and components (SSCs) relied on for the response to beyond-design-basis external events (i.e., typically safety-related SSCs relied on in the initial response to a beyond-design-basis external event as well as design-basis events, that as a result of their credited use for such events, have both beyond-design-basis and safety-related functions). Comments suggested that the proposed approach for “reasonable protection” was too limiting because it appeared to restrict what licensees can do to apply the requirement to only equipment protection, and not allow licensees the flexibility to implement changes in protection and/or changes to strategies.

The NRC agrees that the proposed requirements for reasonable protection need to be clarified and revised to provide greater flexibility. First, the reasonable protection requirements in the MBDBE rule are clarified in part, due to relocation of the reevaluated hazards requirements to § 50.155(b)(2). Moving the reevaluated hazards requirement enabled the NRC to directly align the reasonable protection standard, in terms of the magnitude of natural phenomenon that must be considered, with either the current external design basis or the reevaluated seismic or flooding hazard if one or both of those exceeds the current external design basis. Second, the MBDBE rule contains reasonable protection requirements in § 50.155(c)(2) and (c)(3), which cross reference the corresponding requirements in § 50.155(b)(1) and (b)(2), and enables greater flexibility for licensees to make changes in protection and/or changes to strategies and guidelines, or event-specific approaches. Additionally, § 50.155(c)(2) was revised to add “in magnitude to the phenomena assumed for developing” to clarify that what must be equivalent are the magnitude of the effects of the external event relied upon to establish reasonable protection and the magnitude of the effects of the external event used to establish the facility’s external event design basis.

Section VI of this notice is revised to clarify how the concept of “reasonable protection” is applied to establish a degree of assurance that is appropriate for the beyond-design-basis regulatory framework established through the MBDBE rule. This contrasts with the application of special treatment requirements, which are applied to safety-related SSCs, for their design-basis-related functions, to achieve a high level of regulatory assurance appropriate for design-basis requirements.

The NRC also clarifies the confusion that appears to stem from the application of the “reasonable protection” standard to safety-related SSCs that have both design-basis and beyond-design-basis functions. Safety-related SSCs that function initially in response to beyond-design-basis external events have two sets of functions: safety-related functions and beyond-design-basis functions. The NRC imposes extensive, special treatment requirements on these SSCs for their safety-related functions for design-basis events. This framework produces 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,” (69 FR 68008; November 22, 2004).

Through this rulemaking, the NRC places fewer regulatory requirements on these dual-function SSCs and a reduced level of regulatory assurance for their beyond-design-basis functions (i.e., the beyond-design-basis functions that these SSCs perform to maintain or restore core cooling, containment, and SFP cooling capabilities) as compared to their safety-related, design-basis functions. 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 beyond-design-basis regulatory framework that establishes an appropriate level of assurance. The fundamental applicability of the reasonable protection requirement is to equipment that is relied on for the mitigating strategies for beyond-design-basis events without regard to whether the equipment is “FLEX equipment” as defined in NEI 12-06 “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,” or “plant equipment” as that term is used in NEI 12-06. 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 beyond-design-basis function. The level of assurance is established by the function performed by the SSC, not by equipment or SSC alone.

#### D. Loss of All Alternating Current Power

The NRC received comments concerning the loss of all ac power requirement in proposed § 50.155(b)(1). Several commenters indicated that the assumed damage state for developing the mitigation strategies and guidelines for beyond-design-basis external events must include a loss of all power systems including the loss of ac power from batteries through inverters and dc power direct from batteries. The commenters stated that unless this damage state is assumed, the lessons learned from the Fukushima event would not be fully addressed. Another set of commenters stated that the MBDBE proposed rule’s requirements for a loss of all ac power must be revised to align it with the definition of an extended loss of ac power (ELAP) in the industry guidance document developed for the Mitigation Strategies Order. In that ELAP definition, power directly or indirectly from batteries is assumed available. These commenters also suggested that the word “all” should be removed from the MBDBE rule requirements for “loss of all ac power” to align the requirement with the definition of ELAP. Based on this feedback, the NRC concluded that the MBDBE proposed rule language and supporting



statement of considerations lack clarity and therefore revised the final rule as discussed in the next paragraph.

The final rule language and Section V.C of this notice are clarified to better convey that the loss of all ac power condition must be addressed. The first clarification is the deletion of the word “extended” from § 50.155(b)(1) because the NRC concludes that it contributed to the confusion regarding the requirement. Section 50.155(b)(1) requires licensees to assume a loss of all ac power in developing strategies and guidelines capable of maintaining or restoring the key safety functions, indefinitely or until the mitigation strategies are no longer needed, including the acquisition of offsite resources to sustain those functions. As such, the regulation clearly requires a capability to address an “extended” loss of ac power, and the word “extended” is not necessary in § 50.155(b)(1). The deletion of the word “extended” is intended to avoid confusion between the requirement for licensees to address a loss of all ac power and the condition of an ELAP as defined in the industry guidance. The regulatory guidance for the MBDBE rule, RG 1.226, 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 ELAP and loss of normal access to the ultimate heat sink (or loss of access to the normal heat sink for passive power reactor 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. As discussed above, an ELAP is defined in the industry guidance as a loss of ac power sources, but assumes the availability of power directly or indirectly from batteries.
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.<sup>1</sup>

#### E. Multiple Source Term Dose Assessment

The NRC received a public comment concerning its § 50.109 backfitting justification for the proposed multiple source term dose assessment requirements. The comment indicated that while the NRC had correctly identified these requirements as backfits, it had failed to justify their proposed imposition as satisfying the criterion under § 50.109(a)(4)(ii) that these proposed requirements are necessary for adequate protection of public health and safety. The commenter stated that the NRC's analysis failed to overcome the presumption that current regulations and orders ensure adequate protection, and, quoting from the statement of considerations supporting issuance of the backfit rule in 1988, "that presumption can be overcome only by significant new information or some showing that the regulations do not address some significant safety issue." The commenter also noted that beyond the extensive, required actions that licensees are already taking, the industry is voluntarily implementing

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<sup>1</sup> 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.

multiple source term dose assessment capabilities to assist in the mitigation of remote, yet potentially serious beyond-design-basis external events. The commenter stated that the NRC needs to provide a systematic and documented analysis that imposition of the new requirements would result in a cost-justified substantial increase in public health and safety.

The NRC agrees that the backfit justification supporting the proposed multiple source term dose assessment requirements was insufficient. Based on the the current emergency preparedness regulations in appendix E to 10 CFR part 50 and the Mitigation Strategies Order requirements, which were implemented broadly to provide an enhanced onsite emergency response capability, in combination with the fact that nuclear power reactor licensees have voluntarily implemented a multiple source term dose assessment capability, the NRC concludes that there is no evidence of a safety issue that rises to the level of undue risk that would warrant imposition of multiple source term dose assessment requirements as necessary for adequate protection of public health and safety.

The NRC additionally concludes that imposition of the multiple source term dose assessment requirement would not provide a substantial increase in the protection of public health and safety under § 50.109(a)(3). This conclusion is based on the following:

1. For the multiple source term dose assessment requirements to have the potential for a substantial benefit to the public health and safety, there must first be a substantial level of risk associated with events that lead to conditions where the contemplated new requirements to monitor and assess more than a single source term (i.e., events that challenge and significantly degrade more than just the reactor core, to include multiple reactors and/or SFPs) would be used, and therefore shown to substantially benefit public health and safety.
2. The events that would challenge multiple source terms are extremely rare events, and 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 requirements of the Mitigation Strategies Order, which provides a substantially enhanced mitigation capability for these events, and lowers the probability that such extreme events would lead to core damage or SFP challenges. These requirements constitute a significant portion of the MBDBE rule.

3. The NRC concludes that plant risk is very small based upon a review of the recent work to understand plant risk, including both the state-of-the-art reactor consequence analysis (see NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report," November 2012), and the work performed for the containment protection and release reduction regulatory effort (see SECY-15-0085, "Evaluation of the Containment Protection & Release Reduction for Mark I and Mark II Boiling Water Reactors Rulemaking Activities (10 CFR Part 50) (RIN-3150-AJ26)," enclosure entitled, "Containment Protection and Release Reduction (CPRR) Rulemaking: Draft Regulatory Basis"), particularly after implementation of the Mitigation Strategies Order and implementation of the requirements of Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Conditions," dated June 6, 2013.
4. Further, the NRC concludes that the portion of this risk associated with the extremely rare events that might challenge multiple source terms, is extremely low. As a result, the potential safety benefit associated with the multiple source term dose assessment requirements is severely limited.

Accordingly, the NRC concludes, based on its current knowledge, that there is not sufficient risk associated with events that challenge multiple source terms, to find that substantial additional protection to public health and safety could be achieved through the

imposition of the subject requirements. Accordingly, the backfitting provisions of § 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 maintain the capability. This installed capability for multiple source dose assessment is a computer capability installed in the existing emergency preparedness infrastructure and serves to meet the existing requirements in appendix E to 10 CFR part 50 to monitor and assess the reactor source term. The NRC is not suggesting that the licensee will not continue to maintain their commitment to maintaining this capability, but it does also recognize 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 rule was revised to remove the multiple source term dose assessment requirements.

#### F. Relocation and Revision to the Staffing and Communications Requirements

The NRC received public comment that the proposed wording for the 10 CFR part 50, appendix E, section VII staffing and communications requirements could be interpreted by future readers to mean that those proposed requirements must be described in the licensee's emergency plan, notwithstanding the NRC language to the contrary. A commenter noted that the clarity of these proposed provisions could be improved if they were moved into § 50.155.

The commenter proposed that these requirements could be incorporated into § 50.155 as a separate sub-paragraph.

The NRC agrees that relocating the staffing and communications requirements to § 50.155 improves clarity. Additionally, the NRC concludes that the requirements can be improved by directly linking them to the integrated response capability, which acknowledges the importance of staffing and communications to effective implementation of the strategies and guidelines for beyond-design-basis external events, and also results in improved alignment with implementation guidance. The revised and relocated communications and staffing requirements of the final rule more directly align with implementation of the Mitigation Strategies Order. Specifically, successful implementation of the Mitigation Strategies Order requires sufficient staff and sufficient communications capability to successfully mitigate a beyond-design-basis external event that can impact an entire site and adversely impact surrounding telecommunications infrastructure. The staffing requirement was already in § 50.155(b), so the only change needed was to relocate the communications requirements to § 50.155(c)(4), revise it to require a communications capability that is linked to § 50.155(b)(1) and (b)(2).

Staffing for the extensive damage mitigation strategies and guidelines of § 50.155(b)(3) in the final rule had been included in the on-shift staffing analysis requirements of the “Enhancements to Emergency Preparedness Regulations” final rule (76 FR 72559; November 23, 2011) when the requirements of § 50.155(b)(3) were still in § 50.54(hh)(2). The proposed MBDBE requirements for applicants and/or licensees to perform staffing analyses and to make and describe communication systems capabilities, are not included as requirements in the final MBDBE rule, but continue to remain in the supporting guidance. The staffing analyses and communication capability assessments are effective means for initially establishing the staff and communications capabilities for the MBDBE rule. However, for the MBDBE rule,

performance-based requirements that directly link staffing and communications to successful implementation of the mitigation strategies is the better means for making these requirements generically-applicable and provides greater assurance that these capabilities are maintained. While the Commission acknowledges the value of these analyses and assessments for future applicants to initially establish these capabilities, some advanced designs may have much less reliance on staff and communications capabilities, and keeping these analyses in guidance removes the potential need for an exemption for a future design with such attributes.

The NRC concludes that relocating the staffing and communications requirements to § 50.155 improves the clarity of the MBDBE rule by removing the confusion created due to their proposed location in appendix E to 10 CFR part 50. Further, linking these requirements directly to the mitigation strategies facilitates the maintenance of these capabilities as changes are made to the implementation of the MBDBE requirements. Recognizing that the staffing and communications requirements in the MBDBE rule were not explicit requirements in the Mitigating Strategies Order, even though both were considered and addressed as part of implementation of the Order, the NRC addressed these requirements in the supporting backfitting and issue finality assessment.

#### G. Flexible Scheduling Provisions and Cumulative Effects of Regulation Feedback

The NRC was aware that the nuclear industry would be challenged by the proposed 2-year compliance date for the MBDBE rule, and requested feedback focused on whether this provided sufficient time to address the reevaluated hazard information. Additionally, the proposed rule contained the standard CER questions that also sought feedback on whether the implementation of the MBDBE requirements might involve CER.

The feedback that the NRC received indicates that the degree to which the reevaluated seismic or flooding hazards 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. In some cases, this is dependent on work that must be completed by the U.S. Army Corps of Engineers.
- While some sites have simple evaluations where the reevaluated hazards are bounded by the design basis of the facility and compliance with reevaluated hazards can be accomplished in advance of the effective date of the rule, others must complete additional evaluations. For such sites where the reevaluated hazards exceed the design basis of the facility, licensees must perform detailed Mitigating Strategies Assessments (MSAs) in order to evaluate the effect of the external hazard on their mitigating strategies.
- For some sites, there is still a need to develop the methodology needed to perform their MSAs. This situation applies to seismic MSAs that use the “path 5” approach in RG 1.226, where the NRC allows for risk-informed approaches for addressing the seismic reevaluated hazard information, and where there may be a need to base such an approach on a seismic probabilistic risk assessment (SPRA), which is currently in progress. The 2-year implementation timeline would clearly not provide adequate time for review of the SPRA results by the NRC staff prior to completion of the licensee’s modifications under the final rule.

The NRC also received feedback that 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 complete the work efficiently, for example:

- Licensees will not start the modification process until their MSAs have been approved by the NRC.



- If greater than minor modifications are indicated, a two-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.

In light of these concerns associated with addressing the reevaluated hazards information, feedback was provided to the NRC that recommended the MBDBE rule allow each licensee to develop and submit to the NRC a unit-specific implementation schedule to account for this variation. It was suggested that, within 90 days of the effective date of the rule, each holder of an operating license would submit a schedule for achieving full compliance with the requirements of § 50.155.

From a more general perspective, CER feedback indicated that circumstances of each plant's implementation of the final rule requirements would be unique and there may be instances where licensees would need to request additional time for full implementation of the rule. One commenter stated that there will likely be instances where conflicts will arise in the implementation of the MBDBE rule requirements, and that the NRC should allow licensees the latitude to resolve the conflicts in a manner that best meets the objectives of safety and security, including allowing licensees 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 commenter also advocated that the NRC support the use of risk-informed decision-making consistent with the Commission direction on SECY 15-0050 "Cumulative Effects of Regulation Process Enhancements and Risk Prioritization Initiative."

Other CER feedback concerned a potential unintended consequence that may occur if implementation of the MBDBE rule conflicts with the existing order requirements. The commenter said that the NRC should set forth a transparent transition from the Mitigation

Mitigation Strategies and SFPI Orders to § 50.155. Some licensees have already achieved compliance with the orders in accordance with approved guidance (JLD-ISG-2012-01, Rev. 0, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” and JLD-ISG-2012-03, Rev. 0, “Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation”). The MBDBE rule and the supporting regulatory guides can specify actions that are in addition to, or different from, the actions taken by licensees following the approved guidance to achieve compliance with the NRC orders, including actions that can be less restrictive than the corresponding actions needed for compliance with the orders. Further, the NRC received a comment that there is a lack of clarity regarding the difference between compliance with the orders and issuance of § 50.155 and the associated regulatory guides. To avoid unintended consequences associated with two similar—but potentially not identical—sets of requirements, it was commented that the NRC should rescind the Mitigation Strategies and SFPI Orders once § 50.155 becomes effective.

Additionally, stakeholders provided CER feedback concerning a potential schedule conflict for new plants regarding the need to perform analyses that were proposed as section VII to 10 CFR part 50, appendix E and the completion of the inspections, tests, and analyses under the 10 CFR part 52 framework.

Finally, the NRC held a public meeting to discuss CER. During this meeting, a representative of the Boiling-Water Reactor Owners Group pointed out that those licensees that received NRC Order EA-13-109, “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions,” which was issued more than a year after the Mitigation Strategies and SFPI Orders, would have less time after attaining full compliance with Order EA-13-109 than other licensees to complete training and verify that they have completed all preparations to comply with the MBDBE rule.

The NRC agrees that the current state of licensee implementation of post-Fukushima regulatory actions varies widely across the industry. The NRC also understands that addressing the reevaluated hazard information is the limiting activity in terms of 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 enables sufficient flexibility to address both potential CER issues as well as unnecessary resource impacts associated with schedule exemptions. The final rule is revised to provide a flexible schedule option in § 50.155(h)(2).

Recognizing that the schedule flexibility may still not address all situations that arise, the NRC understands that § 50.12 can address such circumstances. In this regard, the NRC reiterates its support for risk-informed approaches for such submittals.

The NRC further agrees that the group of licensees that received Order EA-13-109 would achieve full compliance with the suite of post-Fukushima orders approximately one year after the remaining licensees. In order to alleviate CER for this group of licensees, the final rule is revised to provide an additional year for implementation, giving them the same amount of time after full compliance with the orders to attain compliance with the rule.

The NRC also agrees that redundancy will exist between requirements in the Mitigation Strategies and SFPI Orders and those in the MBDBE rule. The final rule contains language that is intended to ensure a smooth transition between the order requirements and the MBDBE rule to alleviate this issue.

Finally, the schedule issue associated with new reactors was resolved as a result of the relocation of, and revision to the staffing and communication requirements. As a result of the revision made to the MBDBE rule, the scheduling requirements that were of concern, are removed.

Additionally, the NRC received feedback suggesting that licensees that received Order EA-13-109 be allowed an additional year for conducting the initial drill or exercise under paragraph 50.155(e)(4). The initial drill or exercise in the final MBDBE rule is required under this paragraph for holders of an operating license for a power reactor as of the effective date of the rule within four years of that date. During this four year implementation period, holders of operating licenses for power reactors will have conducted two biennial emergency preparedness exercises under 10 CFR part 50, appendix E, section F.2.b. This requirement for biennial exercises includes a requirement to conduct additional drills between the exercises. These drills must involve a combination of some of the principal functional areas of the licensee's onsite emergency response capabilities, which include management and coordination of emergency response, accident assessment, event classification, notification of offsite authorities, assessment of the onsite and offsite impacts of radiological releases, protective action recommendation development, protective action decision making, plant system repair, and mitigative action implementation. In light of the existing, continuing requirements for EP drills and exercises in the 4-year period following the effective date of the final MBDBE rule and the available synergies between the elements of that program and the elements that must be addressed in the initial drill under paragraph 50.155(e)(4), the NRC concludes that there would be minimal CER impact in retaining the requirement for performance within the 4 years following the effective date of the rule. No changes were made to the final MBDBE rule as a result of this feedback.

The NRC also received feedback on CER suggesting that the flexible scheduling provisions of paragraph 50.155(h)(2) be extended to licensees that received Order EA-13-109 for reasons other than addressing reevaluated hazards. As discussed above, the NRC modified the implementation time under paragraph 50.155(h)(1) for licensees that received Order EA-13-109 to allow an additional year for this group of licensees. The NRC concludes that any need

for further scheduler flexibility can be addressed under 10 CFR 50.12, “Specific Exemptions,” on an individual basis if it becomes necessary.

#### H. Change Control Enhancements

The NRC requested and received comments on the proposed MBDBE change control provisions. Commenters suggested that the NRC should consider a “prior review and approval” type of regulatory approach, and cited as an example the “reduction in effectiveness” criterion that is used in several existing change control requirements. The concern expressed by commenters is associated with the potential for licensees to make changes to the implementation of the MBDBE rule requirements that are outside endorsed guidance. Another commenter echoed this concern, citing examples of licensees not properly implementing the mitigation strategies and citing violations associated with the implementation of § 50.59 requirements. The NRC also received a comment recommending a reporting requirement be part of the change control provisions. The NRC received comments concerning the statement of considerations, which confused stakeholders and suggested that prior review and approval may still be required. Finally, the NRC received comments suggesting revisions to the change control requirements that were intended to clarify the requirements.

The NRC finds that its basic approach to change control does not need revision. Specifically, the NRC continues to conclude that it does not need to include reporting requirements or criteria for prior NRC review and approval of changes. The suggestion for use of a “reduction in effectiveness” criterion was understood to be an example of a “prior review and approval” type criterion, and the NRC considered both of those specific examples and any others that it could identify. First, the NRC concluded that use of a “reduction in effectiveness” or equivalent type of change control criterion would not clearly differentiate significant changes (that would warrant NRC prior review) from changes not warranting prior review.

Second, due to the deterministic regulatory approach followed for development and implementation of the strategies under the Mitigation Strategies Order, many potential changes could have aspects that tend to reduce the effectiveness while also having 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 an associated shorter run time without refueling. Judging such changes using a prior review and approval type of approach is challenging at best and would very likely result in a large diversion of licensee and NRC resources to review and approve changes.

Other beyond-design-basis provisions currently applicable to operating reactors in § 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants," § 50.63, "Loss of all alternating current power," and § 50.54(hh) do not contain change control requirements. The only comparable set of requirements addressing beyond-design-basis events containing provisions that address the control of changes is § 50.150, "Aircraft impact assessment," which is applicable to new reactors. Reviewing that requirement, and noting that § 50.150 requires that changes meet the assessment requirements contained within § 50.150, the NRC concluded that the change control provisions in § 50.155(g) are well aligned with the § 50.150 change control because the NRC is requiring that changes be demonstrated to satisfy the requirements of § 50.155.

Finally, the NRC concludes that its regulatory approach that relies on inspection and enforcement will identify any substantial problems with a licensee's MBDBE change control process well before such problems present a safety problem. The NRC concludes that the vast majority of changes, which are not expected to be many, will be within the endorsed guidance or the application of approved alternatives, and very few will be outside of that guidance.

Inspection and enforcement is an effective regulatory approach for identifying and addressing

these situations should they occur. 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 rule, and accordingly the final rule continues with the same approach: licensees must demonstrate that the proposed change will result in continued compliance with the requirements of § 50.155, that documentation of those changes be maintained, and that the NRC will then be able to oversee through inspection the changes and take enforcement action as appropriate.

Notwithstanding this conclusion, the NRC concludes that the concern expressed by commenters needs to be addressed, so the NRC clarified Section VI of this notice. In this regard, the NRC concluded that the changes to the implementation of the § 50.155 requirements that would be most challenging to judge whether they result in continued compliance with § 50.155, are changes that are not addressed 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. Section VI of this notice is clarified to address these changes, specifically to identify changes that the NRC concludes would not result in demonstrated compliance.

The NRC also concludes that a change control reporting requirement is not necessary in the MBDBE rule. Licensees will not need to report changes to the mitigation strategies because of the NRC's planned oversight of the maintenance of the resulting strategies through inspection and enforcement under the Reactor Oversight Process. Such a requirement would be an unnecessary reporting burden, and instead, the MBDBE rule requires licensees to maintain documentation of such changes, which the NRC can inspect.

The NRC agrees that there was confusion created when it described the potential for licensees that may wish to consult with the NRC concerning changes to the implementation of

the MBDBE rule requirements. This was not intended to suggest that the NRC was requiring a prior review of changes, and this notice is revised accordingly.

Finally, the NRC agrees with suggested revisions to the change control provisions that result in clarification of the requirements. The NRC clarified the final requirements to refer to them as “Documentation of Changes,” simplified the provisions by combining two of the proposed provisions, clarified the provision that addresses the application of other change control processes, and removed the word “all” from the rule regarding the need to maintain documentation of changes. As a result, the NRC concludes it is necessary to provide additional description in the statement of considerations to clarify what constitutes a “change” with regard to the documentation that the NRC requires licensees to maintain. Changes to the implementation of the MBDBE requirements that do not result in a significant change to the functional performance of the equipment and also do not significantly impact the strategies and guidelines would not constitute a “change” for this purpose. The NRC recognizes that licensees would maintain all of this documentation as part of their normal procurement and configuration control processes, but for the regulatory purposes of § 50.155(g), these types of changes would not be significant in terms of implementation of the MBDBE requirements. For example, a replacement of a FLEX pump with a pump having the equivalent functional performance (i.e., no significant impact to functional performance), equivalent weight, size, and mobility (i.e., no significant impact to staging and deploying the pump), and equivalent connections would not constitute a “change” for the purposes of § 50.155(g).

#### I. Spent Fuel Pool Instrumentation Requirements

The NRC received several comments that the MBDBE rule must keep the requirements for Spent Fuel Pool Instrumentation (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 noted that while the two orders were in response to lessons-learned from the Fukushima accident, they are distinctly different in underlying purpose and character.

The NRC agrees with these comments and revised the final rule to keep SFPI and mitigation strategies requirements separate. The MBDBE rule provisions in § 50.155(b)(1), which were initially imposed through the Mitigation Strategies Order, require strategies and guidelines to maintain or restore core cooling, containment, and SFP cooling capabilities for beyond-design-basis external events, and these requirements are independent of those initially imposed in the SFPI Order, and now located in § 50.155(f). The SFPI requirements ensure that information regarding the SFP is provided to decision makers to enable the prioritization of resources. The SFPI requirements were not intended to support mitigation action, but to simply provide information. Accordingly, the NRC moved the SFPI requirement to § 50.155(f), and decoupled the requirement from § 50.155(b)(1) to ensure it remains independent of mitigation strategies requirements.

As part of the industry response to the Mitigation Strategies Order, licensees used the SFPI to support mitigation strategies to maintain or restore SFP cooling. Because licensees may use the SFPI to comply with § 50.155(b)(1), then the SFPI would be subject to the requirements of § 50.155(b)(1) and, if applicable, § 50.155(b)(2). This application of § 50.155(b)(2) to SFPI is limited to these circumstances (i.e., voluntary use of SFPI to comply with § 50.155(b)(1)) because the Commission, in SRM-COMSECY-14-0037, affirmed that the reevaluated hazard information be considered within only the mitigation strategies.

#### J. Drill Frequency

The NRC received comments regarding the proposed 8-year frequency for performance of drills under § 50.155(e). One commenter expressed the view that there is a relatively high frequency of extreme events, and given the potentially high consequences associated with such events, the final rule must require an exercise interval no longer than once every three years. The commenter noted that an 8-year frequency was too infrequent, resulting in a steady decline in capabilities between tests. Finally, the commenter expressed the view that these drills need to be comprehensive and as realistic as possible.

Another commenter suggested drills be conducted annually or every two years. The remaining commenters supported the proposed 8-year frequency.

The NRC did not revise the MBDBE drill frequency in response to these comments. The NRC judged that the 8-year frequency, and use of a drill rather than an exercise requirement as the minimum requirement, provides for the appropriate level of regulatory assurance for the MBDBE rule 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 licensees are maintaining the MBDBE requirements, 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 NRC concludes that the MBDBE drill requirements should be viewed in the larger context of the training requirements in the MBDBE rule that include the use of the systems approach to training as defined in § 55.4, which provides a feedback mechanism to

increase the frequency of training and other performance-enhancing experiences such as drills and exercises, if necessary.

#### K. Consideration of Explicit Requirements for a Three-Phase Response

The NRC received a comment that the MBDBE rule should maintain the three-phase response structure for mitigation that was described in the Mitigation Strategies Order rather than use the proposed rule's performance-based requirements. The commenter stated that the substitution of "higher level, performance-based requirements" reduces confidence that the MBDBE measures will be successful if needed. It is the commenter's view that the nuclear industry and the NRC have consistently disagreed on what constitutes appropriate compensatory measures and associated administrative controls and provided an example to support the comment. The commenter expressed the view that the three-phase structure provides 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.

The NRC did not revise the MBDBE rule as a result of this comment. The issuance of the Mitigation Strategies Order included a separate attachment 3 for the imposition of requirements on Vogtle Electric Generating Plant (VEGP) Units 3 and 4 to reflect their use of the AP1000 design. In the Mitigation Strategies Order, 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 that is addressed in attachment 2 of the Mitigation Strategies Order. The RG 1.226 provides implementation guidance for the three-phase approach as one acceptable method of complying with the MBDBE rule. Future designers may be able to develop and implement strategies and guidelines that do not rely on a

three-phase approach, and may propose alternative approaches as updates to the existing guidance or in their applications.

This framework is consistent with the Commission's direction in SRM-SECY-11-0124 to follow performance-based approaches for beyond-design-basis 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 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 the Mitigation Strategies Order, is identifying the types of challenges noted by the commenter and ensuring that they are resolved.

#### L. Clarifications to Decommissioning Provisions

The NRC received comments concerning the proposed MBDBE provisions in § 50.155(a)(3) regarding the applicability of the MBDBE rule to licensees with reactors in a decommissioning phase. The commenters agreed with the underlying approach to the MBDBE decommissioning provision and suggested revisions to clarify those provisions and eliminate unnecessary language.

The NRC agrees with some of the suggestions, and the final rule reflects those changes. Section 50.155(a)(2) in the final rule explicitly identifies which portions of the MBDBE rule apply to a licensee as it proceeds through the decommissioning process.

#### M. Clarifications to Equipment Requirements and Removal of Proposed Maintenance Requirement

The NRC requested feedback concerning the proposed maintenance provision in § 50.155(c)(3). The Mitigation Strategies Order did not contain a specific maintenance

requirement, but instead contained a performance-based requirement “to develop, implement and maintain strategies.” This same language was included in proposed § 50.155(b)(1), so that a failure to perform adequate maintenance would likely lead to a failure to meet this requirement.

The feedback indicated that commenters did not see a need for a separate maintenance provision in § 50.155(c)(3) for the § 50.155(b)(1) equipment. Commenters noted that the proposed maintenance requirement of § 50.155(b), along with the guidance in NEI 12-06, as endorsed by JLD-ISG-2012-01 for the Mitigation Strategies Order and as proposed to be endorsed in DG-1301, adequately addresses equipment maintenance. The NRC agrees with this feedback. The intent is to carry forward the maintenance requirements of the Mitigation Strategies Order, and accordingly the proposed separate maintenance requirement is removed from the final rule.

Regarding maintenance, the NRC also received feedback suggesting that the MBDBE rule be revised to state that § 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 solely comply with the MBDBE rule. The NRC agrees that the Maintenance rule does not apply to the FLEX equipment when that equipment is used to comply with § 50.155. However, the criteria in § 50.65(b) do not scope FLEX equipment into the Maintenance rule if the FLEX equipment is used solely for § 50.155.<sup>2</sup> Accordingly, the suggested revision is not necessary. Furthermore,

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<sup>2</sup> In the event that a licensee relies upon the mitigating strategies equipment for other purposes such as mitigation of a design-basis event, the application of scoping criteria for reliance on the equipment for those purposes would govern. As a result, equipment that has dual purposes could fall within the scope of the Maintenance rule for one purpose, while being out of scope for the purpose of use in the mitigating strategies. For example, a turbine-driven auxiliary feedwater (TDAFW) pump in a pressurized-water reactor would fall within the scope of the Maintenance rule’s monitoring requirements of § 50.65(a) under the criteria of § 50.65(b) for those functions that meet the criteria, but not for the performance of beyond-design basis functions for the strategies and guidelines

such an addition could result in complications if a licensee chooses to use FLEX equipment in a future regulatory application (separate from § 50.155) for which the Maintenance rule is applied in order for NRC to grant credit for the FLEX equipment for that regulatory application.

In response to one comment, the NRC changed § 50.155(c)(1) in the final rule to more clearly communicate the equipment capacity and capability requirements. One of the changes extends the capacity and capability requirements to § 50.155(b)(2) because the § 50.155(b)(2) requirements cannot be satisfied unless the equipment credited in § 50.155(b)(2) has sufficient capacity and capability. The remaining changes to paragraph (c) in § 50.155 are discussed in the “Reasonable Protection,” “Spent Fuel Pool Instrumentation,” and “Relocating Staffing and Communications” sections of this portion of the notice.

#### N. Discussion of Four General Areas That Were Generically Dispositioned

The NRC received a number of comments that fell into 4 general topic areas. The comments were considered and generically dispositioned. These comments did not result in changes to the MBD BE rule. A discussion of these topics is provided below.

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required by § 50.155. As a result, the monitoring under § 50.65(a) would be with the goal of providing reasonable assurance that the TDAFW pump is capable of fulfilling its intended safety function (i.e., specific function) within the reference bounds of the design bases as defined in § 50.2 for the functions that result in its inclusion in the scope of § 50.65. The capability of the TDAFW pump to remain functional in the context of a loss of all ac power concurrent with a loss of normal access to the ultimate heat sink, which could expose the pump to environmental and operational constraints outside the reference bounds of the design bases for the events resulting in inclusion in the scope of § 50.65(a) due to a longer period with an absence of normally available cooling, would not be addressed by the § 50.65(a) monitoring program, but instead by the maintenance and testing programs established under § 50.155 through the guidance of RG 1.226 and NEI 12-06.

Similarly, some licensees rely on a portable, ac-power independent pump for the strategies and guidelines developed under § 50.155(b)(1), (2), or (3). These strategies and guidelines may be referred to in the licensee’s EOPs, but are not necessary in order to conform to the NRC-approved emergency planning guidelines that form the basis for the EOPs. Therefore, because the portable, ac-power independent pump is not used in the EOPs, it would not be within the scope of paragraph (a)(1) of the Maintenance Rule under § 50.65(b)(2)(i) unless otherwise required by paragraph (b) of the Maintenance Rule. Further details on scoping of equipment under the Maintenance Rule are provided in NUMARC 93-01, “Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.”

1. Comments that Suggest a Completely Different Approach to Mitigation of Beyond-Design-Basis Events

Several commenters provided feedback that the MBDBE rule should contain requirements that address various specific external events. The suggestions included geomagnetic storms (which are addressed separately in section III of this notice because they are the subject of a petition for rulemaking currently under consideration by the NRC), 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 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 beyond-design-basis events than the NRC took under the Mitigation Strategies Order following the Fukushima event. While the comments tend to explicitly identify 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 in scope of the MBDBE rule, establish mitigation strategies requirements that include the proposed additional events, and then specifically establish requirements for the damage states and conditions that are postulated to stem from the proposed additional set of events.

Rather than following the approach to effectuate the commenters' suggestions discussed above, the NRC is continuing with the regulatory approach taken with the issuance of the Mitigation Strategies Order. The order 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. These strategies give licensees a capability for the mitigation of beyond-design-basis external events. This regulatory approach provides

additional mitigation capability as well. Due to the fundamentally unbounded nature of the events to which these requirements are directed, the NRC determined that to address this beyond-design-basis external event uncertainty, licensees need to assume 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. For a more detailed explanation of this response, refer to the NRC response to General Comment 9 in the Comment Response Document (see section XIX of this notice, “Availability of Documents”).

## 2. Comments that Suggest the NRC Revisit Issues Associated with SFP Safety

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 Commission has previously considered and dispositioned these issues, and the NRC concluded that it was not within the scope of the MBDBE rule to revisit these SFP safety issues. Moreover, the MBDBE rule is addressing and enhancing SFP safety through the imposition of regulations that: 1) require licensees to have strategies that maintain or restore SFP cooling capabilities for beyond-design-basis external events, and 2) provide information, through the use of SFPI, that enables operators to appropriately prioritize the use of resources following a beyond-design-basis external event. Explanations of the NRC’s considerations of the commenters’ issues are provided as a convenience to stakeholders in the NRC response to General Comment 8 in the Comment Response Document. (See section XIX of this notice, “Availability of Documents”).

## 3. Comment Regarding Decommissioning

The NRC received comments from stakeholders that were directed towards the basis for previous NRC exemption decisions regarding power reactor licensees in decommissioning. While the MBDBE rule does include provisions that facilitate the reduction of its requirements at the appropriate points within the decommissioning process, the rulemaking’s regulatory scope



does not include revisiting the bases for previous decisions on decommissioning exemptions. Instead, the MBDBE rule is simply reflecting those decisions and enabling systematic removal of the mitigation strategies requirements as a facility proceeds through the process of decommissioning. The NRC enables these requirements to be removed through regulation, rather than requiring removal by the more resource-intensive exemption process, based on the same set of acceptance criteria that were used in granting the exemptions to licensees in decommissioning. Concerns about the NRC's decommissioning regulations should be raised in the ongoing regulatory effort to more broadly address decommissioning issues for all applicable requirements. See "Regulatory Improvements for Decommissioning Power Reactors; Advance notice of proposed rulemaking," (80 FR 72358; November 19, 2015). If, as a result of that regulatory effort, the NRC changes its position with regard to the bases for decommissioning and, specifically, if those changes impact the decommissioning provisions that are part of the MBDBE rule, then the NRC will make future conforming changes to the MBDBE rule to align it with the revised decommissioning requirements.

#### 4. Comments on Geomagnetic Disturbances

The NRC received comments on the subject of geomagnetic disturbances. While these could be viewed as comments on a specific beyond-design-basis external event and be addressed by the discussion in section IV.N.1 of this notice, due to the NRC's ongoing consideration of that issue, the NRC decided that the issue deserves more discussion. Although 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), the rulemaking's 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, as discussed in section III of this notice.

## **V. Discussion**

### **A. Rulemaking Objectives**

The MBDBE rule: 1) makes the requirements in the Mitigation Strategies and SFPI Orders generically applicable, giving consideration to lessons learned from implementation of the orders and public comment on the MBDBE proposed rule; 2) establishes new requirements for an integrated response capability; and 3) addresses issues raised by PRMs that were submitted to the NRC.

*1. Makes the requirements in the Mitigation Strategies and SFPI Orders generically applicable, giving consideration to lessons learned from implementation of the orders and public comment on the MBDBE proposed rule.*

This rule places the requirements in the Mitigation Strategies Order and SFPI Order into the NRC's regulations so that they apply to all current and future power reactor applicants, and provides regulatory clarity and stability to power reactor licensees. In making the requirements of the Mitigation Strategies Order generically-applicable, this rule includes consideration of the reevaluated hazard information developed in response to the March 12, 2012, NRC letter issued under § 50.54(f) and ensures that licensees address the reevaluated hazard information within their mitigation strategies. Because these orders were issued to then-current licensees, the requirements of these orders would not apply to future licensees. In the absence of this rule,

these requirements would need to be imposed on new reactor applicants or licensees through additional orders or license conditions (as was done for the combined licenses (COL) for Virgil C. Summer Nuclear Station, Units 2 and 3; Enrico Fermi Nuclear Plant, Unit 3; and South Texas Project Units 3 and 4). As part of this rulemaking, the NRC considered stakeholder feedback and lessons-learned from the implementation of the orders, including any challenges or unintended consequences associated with implementation. The NRC reflected this stakeholder input in the final rule as discussed in the previous section of this notice as well as in regulatory guidance for this rule.

*2. Establishes new requirements for an integrated response capability.*

This rule establishes requirements for an integrated response capability for beyond-design-basis events that integrates existing strategies and guidelines (implemented through guideline sets) with the existing emergency operating procedures (EOPs) and enhances onsite emergency response capabilities. This framework includes guideline sets for requirements that were formerly located in § 50.54(hh)(2) and are now located in § 50.155(b)(3), and the Mitigation Strategies Order. This framework also includes mitigation strategies, or alternative approaches, used to address reevaluated hazards, as applicable. This rule requires sufficient staffing, command and control, training, drills, communications capability, and documentation of changes to support the integrated response capability.

*3. Address a number of PRMs submitted to the NRC.*

This rulemaking addresses, and completes the regulatory actions planned for, the five PRMs filed by the NRDC that raise issues that pertain to the technical aspects of this rulemaking. The petitions rely solely on the NTTF Report and request that the NRC undertake rulemaking in a number of areas that are addressed by this rule. This rule also addresses, in

part, the PRM submitted by Mr. Thomas Popik. However the issues raised in that petition (PRM-50-96) remain under consideration by the NRC.

## B. Rulemaking Scope

The MBDBE rule addresses a significant number of regulatory issues that stem from NRC review of the NTTF recommendations that provided the regulatory impetus for this rule, including:

1. NTTF recommendations 4 and 7, and portions of NTTF recommendation 11.1 regarding onsite emergency resources to support multi-unit events with station blackout, including the need to deliver equipment to the site despite degraded offsite infrastructure. The implementation of the licensees response to these provisions of the MBDBE rule is largely complete (as of December 2016), because they were implemented under the Mitigation Strategies Order.

2. NTTF recommendation 8, and the command and control issues in NTTF recommendation 10.2.

3. Numerous requirements regarding onsite emergency response actions implemented by the Mitigation Strategies Order, including supporting guidance to implement the emergency response aspects of this rule. The specific regulatory actions related to emergency response in this rule and the associated NTTF recommendations are:

- a. Staffing and communications requirements that address NTTF recommendation 9.3 and were also discussed in NTTF recommendations 9.1 and 9.2. These regulatory issues were initially addressed through the implementation of the Mitigation Strategies Order. The MBDBE rule addresses supporting facilities and equipment, as discussed in the same NTTF recommendations.

b. Training and exercise requirements that address NTTF recommendation 9.3 and were also discussed in NTTF recommendations 9.1 and 9.2. These regulatory issues were implemented under the Mitigation Strategies Order.

Accordingly, the MBDBE rule addresses NTTF recommendations 4, 7, 8, 9.1, 9.2, 9.3 (except for maintenance of ERDS capability throughout a beyond-design-basis external event), 10.2, and 11.1.

The MBDBE rule also addresses NTTF recommendation 9.4 to modernize ERDS. This action differs from the other regulatory actions because ERDS is not an essential component of a licensee's capability to mitigate a beyond-design-basis external event. However, ERDS is an important form of communication between the licensee and the NRC. Modernization of ERDS was completed voluntarily by industry prior to issuance of this rule; therefore, NRC includes in this rule, amendments to remove the technology-specific references in 10 CFR part 50, appendix E, section VI, "Emergency Response Data System."

#### *Severe Accident Management Guideline and Multiple Source Term Dose Assessment Voluntary Initiatives*

The Commission considered a proposed SAMG backfit analysis, provided as part of SECY-15-0065, that relied on qualitative factors and related SAMGs to defense-in-depth. The Commission concluded that the imposition of SAMG requirements was not warranted and, consequently, SAMGs were removed as requirements in the MBDBE rule. Instead, SAMGs continue to be implemented and maintained through a voluntary industry initiative (refer to SRM-SECY-15-0065). For more information on that proposal, refer to the MBDBE proposed rule published on November 13, 2015 (80 FR 70609).

Multiple source term dose assessment requirements were part of the proposed MBDBE rule and addressed NTTF recommendations 9.3 and 9.1. These proposed requirements

are removed from the final MBDBE rule and instead have been implemented voluntarily by licensees as discussed in section IV.E of this notice.

#### *Scope of Procedure and Guideline Integration*

The MBDBE rule limits the scope of the integrated response capability to the strategies, guidelines, and alternative approaches under § 50.155(b). This rule includes:

1. Section 50.155(b)(1), resulting from the Mitigation Strategies Order, and addressing beyond-design-basis external events (from natural phenomena). These requirements are those that the NRC, while developing part of the regulatory basis for this final rule, termed as “Station Blackout Mitigation Strategies.” The nuclear industry refers to these as “FLEX Support Guidelines” (FSGs).

2. Section 50.155(b)(2). The MBDBE rule contains requirements for reevaluated seismic and flooding strategies and guidelines or alternative approaches in § 50.155(b)(2). These strategies and guidelines or alternative approaches apply to licensees that have reevaluated hazards that exceed in magnitude their design basis external seismic and flooding event hazards. The phrase “exceed in magnitude” is discussed in section IV.C and section VI of this notice. These strategies and guidelines can be identical to, similar to, or significantly different from those developed under § 50.155(b)(1). Licensees may modify the strategies and guidelines required by § 50.155(b)(1) if the licensee shows that the revised strategies and guidelines can address the effects of the reevaluated hazards. The § 50.155(b)(2) strategies and guidelines can differ significantly from the § 50.155(b)(1) strategies and guidelines when the licensee chooses an alternative approach to address the reevaluated hazard scenarios and associated damage states. This alternative may use any available equipment (including the mitigation strategies equipment), as well as any installed SSCs (including SSCs and equipment that were not part of mitigation strategies), as a means to address the reevaluated hazard

effects. The § 50.155(b)(2) strategies and guidelines or alternative approaches differ from the strategies and guidelines in § 50.155(b)(1) and (3) in an important manner when a licensee chooses to pursue an alternative approach. In such cases, the MBDBE rule provides licensees the flexibility to develop strategies or alternative approaches that address specific flooding and seismic scenarios and the associated effects on the nuclear facility (whereas the guideline sets in § 50.155(b)(1) and (3) are intended to address undefined, beyond-design-basis events).

3. Section 50.155(b)(3) (formerly in § 50.54(hh)(2)). The term used by the NRC for the strategies and guidelines under this requirement is Extensive Damage Mitigation Guidelines (EDMGs). This term is defined in NEI 06-12, Revision 2, “B.5.b Phase 2 & 3 Submittal Guideline,” which is endorsed in NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” Section 19.4, “Strategies and Guidance to Address Loss-of-Large Areas of the Plant Due to Explosions and Fires,” as the regulatory guidance for the requirements in former § 50.54(hh)(2) (now § 50.155(b)(3)). NEI 06-12, Revision 2, defines EDMGs as a subset of the strategies and guidelines for addressing the loss of large areas of the plant due to explosions or fire. While the generic term, “EDMGs,” in the final rule includes all of the strategies and guidelines used under § 50.155(b)(3), this administrative change is not intended to expand or modify the requirements that are associated with EDMGs or the loss of large areas of the plant due to explosions or fire.

The MBDBE rule’s integrated response capability structure avoids unnecessarily revisiting the existing symptom-based EOPs that were developed following the Three Mile Island, Unit 2 (TMI-2) accident. The NRC has determined that current regulations addressing EOPs provide sufficient control of the EOPs. These requirements include the quality assurance requirements of criterion V, “Instructions, Procedures, and Drawings,” and criterion VI, “Document Control,” in appendix B to 10 CFR part 50, and the administrative controls section of the technical specifications for each plant as well as the guidance provided in regulatory guides

and technical reports (e.g., NUREG-0660, “NRC Action Plan Developed as a Result of the TMI-2 Accident,” issued May 1980; NUREG-0737, “Clarification of TMI Action Plan Requirements,” issued November 1980; and NUREG-0711, “Human Factors Engineering Program Review Model,” issued November 2012). In order to avoid the unnecessary regulatory burden that would result by moving the requirements for EOPs into § 50.155 or requiring that the mitigation strategies, guidelines, and alternative approaches of § 50.155(b) be integrated *into* the existing EOPs, § 50.155(b)(4) requires that the strategies, guidelines, and alternative approaches of § 50.155(b) be integrated *with* the EOPs.

#### *Guideline Sets Excluded From this Final Rule*

During the development of this rule, other guideline sets were considered for inclusion within the integrated response capability. The guideline sets considered included fire response procedures, alarm response procedures, and abnormal operating procedures (AOPs). These guideline sets were not included in the final rule for the reasons stated in section IV.B of the MBDBE proposed rule.

### C. Final Rule Regulatory Bases

#### *Applicability*

This rule applies, in whole or in part, to applicants for and holders of an operating license for a nuclear power reactor under 10 CFR part 50 or combined license under 10 CFR part 52.

This rule does not apply to applicants for, or holders of, an operating license for a non-power reactor under 10 CFR part 50. Non-power reactor licensees are not subject to this rule because non-power reactors pose lower radiological risks to the public from accidents than power reactors because: 1) the core radionuclide inventories in non-power reactors are lower



than in power reactors as a result of their lower power levels and often shorter operating cycle lengths; and 2) non-power reactors have lower decay heat associated with a lower risk of core melt and fission product release in a loss-of-coolant accident than power reactors.

A holder of a general or specific 10 CFR part 72 independent spent fuel storage installation (ISFSI) license for dry cask storage is not subject to this rule for the ISFSI, because the decay heat load of the irradiated fuel is sufficiently low prior to movement to dry cask storage that it can be air-cooled. This also meets the criteria for “sunsetting,” or phased removal, of requirements (discussed later in this section of this document).

The GE Morris facility in Illinois, which is the only SFP licensed under 10 CFR part 72 as an ISFSI, does not need to comply with this rule and is excluded by the rule applicability described in § 50.155(a). The NRC considered including the GE Morris facility within the scope of this rule but found that the age and corresponding low decay heat load of the fuel in the facility made it unnecessary. The GE Morris facility also meets this rule’s sunsetting criteria. While this rule leaves in force the EDMG requirements of § 50.155(b)(3), those requirements are not applicable to GE Morris due to its status as a non-10 CFR part 50 licensee. In the course of the development and implementation of the guidance and strategies required by § 50.155(b)(3), the NRC evaluated whether additional mitigation strategies were warranted at GE Morris and concluded that no mitigating strategies were warranted beyond existing measures, due to the extended decay time since the last criticality of the fuel stored there, the resulting low decay heat levels, and the assessment that a gravity drain of the GE Morris SFP is not possible due to the low permeability of the surrounding rock and the high level of upper strata groundwater.

### *Decommissioning reactors*

The MBDBE rule contains a regulatory structure for phasing out the mitigation strategies requirements for a licensee as its reactor decommissioning process proceeds. This structure consists of three phases:

1. Once fuel is removed permanently from the reactor, the mitigation strategies associated with the reactor source term and primary containment are no longer needed. Consequently, the requirements of § 50.155 continue to apply, but only for the spent fuel pool.
2. When the decay heat of the spent fuel is reduced to a level that provides ample time to enable ad hoc action to be taken in response to an event that can introduce kinetic energy into the SFP, then all the requirements of § 50.155 can be removed with the exception of only § 50.155(b)(3).
3. Once all fuel is removed from the spent fuel pool, all requirements of the MBDBE rule no longer apply.

The following provides a more detailed discussion of this structure and the regulatory decisions made for decommissioning licensees that provide the basis for this structure.

Once the NRC has docketed a licensee's § 50.82(a)(1) or § 52.110(a) certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel, that licensee need only comply with the requirements of § 50.155(b) through (e), and (g) associated with maintaining or restoring SFP cooling. As discussed previously, these proposed requirements are based on the Mitigation Strategies Order. The licensees for the Kewaunee Power Station, Crystal River Unit 3 Nuclear Generating Plant, San Onofre Nuclear Generating Station, Units 2 and 3, and Vermont Yankee Nuclear Power Station, submitted § 50.82(a)(1) certifications after issuance of the Mitigation Strategies Order; the NRC has rescinded the Mitigation Strategies Order for this group of NPP licensees (Shutdown NPP Group). These rescissions were based on the NRC's conclusion that the lack of fuel in the licensee's reactor core and the absence of challenges to the containment rendered unnecessary the development

of guidance and strategies to maintain or restore core cooling and containment capabilities. Consistent with these rescissions, the MBDBE rule relieves licensees in decommissioning from the requirement to comply with the § 50.155(b) requirements to have mitigation strategies and guidelines to maintain or restore core cooling and containment capabilities. Moreover, these licensees do not need to comply with any of the other requirements in this final rule that support compliance with the § 50.155(b) requirements to have mitigation strategies and guidelines for maintaining or restoring core cooling and containment capabilities.

This MBDBE rule treats the EDMG requirements in a manner similar to the requirements for FSGs. For a licensee that has § 50.82(a)(1) or § 52.110(a) certifications docketed at the NRC, the lack of fuel in its reactor core and the absence of challenges to the containment would render unnecessary EDMGs for core cooling and containment capabilities. This licensee would not need to comply with the requirements in the MBDBE rule associated with core cooling or containment capabilities; rather, the licensee would be required to comply with the requirement to have EDMGs based on the presence of fuel in the SFP.

Once the NRC has docketed a licensee's § 50.82(a)(1) or § 52.110(a) certifications, that licensee does not need to comply with the MBDBE requirement in 10 CFR 50.155(f) that the licensee provide reliable means to remotely monitor wide-range SFP levels to support effective prioritization of event mitigation and recovery actions. The requirement in 10 CFR 50.155(f) makes generically-applicable the requirements in the SFPI Order. This order requires a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a beyond-design-basis external event with the potential to challenge both the reactor and SFP.

The NRC also rescinded the SFPI Order for the Shutdown NPP Group. These rescissions were based, in part, on the NRC's conclusions that once a licensee certifies the

permanent removal of the fuel from its reactor vessel, the safety of the fuel in the SFP becomes the primary safety function for site personnel. In the event of a challenge to the safety of fuel stored in the SFP, decision-makers would not have to prioritize actions and the focus of the licensee staff would be the SFP condition. Therefore, once fuel is permanently removed from the reactor vessel, the basis for the SFPI Order no longer applies. Consistent with the NRC order rescissions, the NRC no longer requires licensees in decommissioning to have a reliable means to remotely monitor wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a beyond-design-basis external event with the potential to challenge both the reactor and SFP.

The Mitigation Strategies Order also required power reactor licensees to have certain SFP cooling capabilities. In the rescission letters to the licensees for the Shutdown NPP Group, the NRC determined that, due to the passage of time, the fuel's low decay heat, and the long time to boil off the water inventory in the SFP obviated the need for the Shutdown NPP Group licensees to have guidance and strategies necessary for compliance with the Mitigation Strategies Order. The rescission of the Mitigation Strategies Order for those licensees eliminated the requirement for them to comply with the order's requirements concerning beyond-design-basis event strategies and guidelines for SFP cooling capabilities. Consistent with the basis for the order rescissions, licensees in decommissioning are relieved from the requirements concerning beyond-design-basis event strategies and guidelines for SFP cooling capabilities and any related requirements. These licensees have to perform and retain an analysis demonstrating that sufficient time has passed since the fuel within the SFP was last irradiated such that the fuel's low decay heat and boil-off period provide sufficient time for the licensee to obtain offsite resources to sustain the SFP cooling function indefinitely. Licensees in decommissioning may use the equipment in place for EDMGs should that equipment be available, recognizing that the protection for that equipment is against the hazards posed by

events that result in losses of large areas of the plant due to fires or explosions rather than beyond-design-basis external events resulting from natural phenomena. If the EDMG equipment is not available, the offsite resources would be used by the licensee only for onsite emergency response (i.e., SFP cooling). This requirement does not impact any commitments licensees have made regarding exemptions from offsite emergency planning requirements, which consider a beyond-design-basis event that could result in a zirconium cladding fire due to a loss of SFP inventory and do not consider offsite resources in mitigation strategies.

The NRC is maintaining 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 an aircraft impact or a beyond-design-basis security event that could introduce kinetic energy into the SFP independent from the decay heat of the fuel. These types of events and their potential consequences were considered as a part of the final rule 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. 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 is correcting this error from the 2009 final rule in this final rule as explained in the “EDMGs” portion of this section.

The NRC is excluding from § 50.155 the licensee for Millstone Power Station Unit 1, Dominion Nuclear Connecticut, Inc. Dominion Nuclear Connecticut, Inc. is also the licensee for Millstone Power Station Units 2 and 3, but this exclusion applies to Dominion Nuclear Connecticut, Inc. in its capacity as licensee for only Unit 1, which is not operating but has irradiated fuel in its SFP and satisfies the proposed criteria for not having to comply with this

final rule except for the EDMG requirements. In the course of the development and implementation of the guidance and strategies required by new § 50.155(b)(3), the NRC evaluated whether additional mitigation strategies were warranted at Millstone Power Station Unit 1 and concluded that no mitigating strategies were warranted beyond existing measures. This conclusion is based principally on the extended decay time since the last criticality occurred on November 4, 1995, and the fact that this results in low decay heat levels that allow sufficient time for the use of existing strategies. The exclusion for Millstone Power Station Unit 1 in this rule is based upon that conclusion, with the understanding that additional mitigating capabilities will be present due to the implementation of the § 50.155(b)(3) strategies at the collocated Millstone Power Station Units 2 and 3.

#### *Integrated Response Capability*

Each applicant or licensee subject to the MBDBE rule is required to develop, implement, and maintain an integrated response capability that includes FSGs, reevaluated hazards strategies and guidelines or alternative approaches as applicable, EDMGs, sufficient staffing, communications capabilities, and a supporting organizational structure with defined roles, responsibilities, and authorities for directing and performing these strategies, guidelines, and procedures. The MBDBE rule integrates this new capability *with* existing EOPs, as discussed in further detail later in this section of the notice. The basis for this framework is explained in the following discussion.

The MBDBE requirements for FSGs make generically-applicable requirements previously imposed on licensees by the Mitigation Strategies Order, on Virgil C. Summer Nuclear Station Units 2 and 3 by the V.C. Summer Unit 2 license, License No. NPF-93, Condition 2.D(13) and V.C. Summer Unit 3 license, License No. NPF-94, Condition 2.D(13); on Enrico Fermi Nuclear Plant Unit 3, License No. NPF-95, by license condition 2.D(12)(g); and on

South Texas Project Units 3 and 4 by the South Texas Project, Unit 3, License No. NPF-097, license condition 2.D(14)(g) and South Texas Project, Unit 4, License No. NPF-098, license condition 2.D(14)(g).

The nuclear industry developed EDMGs following the terrorist events of September 11, 2001, in response to security advisories, orders, and license conditions issued by the NRC that required licensees to develop and implement guidance and strategies intended to maintain or restore core cooling and containment and SFP cooling capabilities under the circumstances associated with the loss of large areas of the plant due to fire or explosion. The EDMGs further extend the range of initiating events and plant damage states for which strategies and guidelines are available for use by operators to include the loss of large areas of the plant and a subsequent impairment of the operability and functionality of SSCs that are within that area. The NEI 06-12, "B.5.b Phase 2&3 Submittal Guideline," Revision 2, December 2006 (the NRC-endorsed guidance for the requirements associated with EDMGs) provides appropriate coordination of the EDMGs with the voluntarily-maintained SAMGs through its guidance that the EDMGs "must be interfaced with existing SAMGs so that potential competing considerations associated with implementing these and other strategies are appropriately addressed."

Based upon these considerations, the NTTF recommended that the NRC require licensees to further integrate EOPs, SAMGs and EDMGs, including a clarification of transition points, command and control, decision making, and rigorous training that includes conditions that are as close to real accident conditions as feasible.

Based on the lessons learned from the Fukushima event, the range of initiating events and plant damage states for which strategies and guidelines are available for use by operators was further extended through the development of mitigation strategies for beyond-design-basis external events in response to the Mitigation Strategies Order. The development and implementation of this set of strategies and guidelines was accomplished giving consideration to

other NTTF recommendations to the extent practical. In order to provide better integration with the EOPs, the resulting strategies and guidelines (FSGs) leave the designation of command and control and decision-making functions within the EOPs or SAMGs, as maintained under the voluntary industry initiative, as appropriate. Consistent with the recommendation in the NTTF Report, this rule requires that EDMGs and FSGs, including strategies and guidelines or alternative approaches, as applicable, for reevaluated hazards, be integrated with EOPs, thereby maintaining EOPs as the central element of a licensee's initial response capability.

In establishing a requirement for a response capability that encompasses the use of EOPs, EDMGs, and FSGs, the NRC considered the fact that these strategies, guidelines and procedures were developed at separate times over a period of several decades and that the associated efforts have been focused on responding to different types of initiating events and plant damage states. As a result, these strategies, guidelines and procedures may not properly reflect consideration of the interfaces (e.g., procedure transitions), dependencies (e.g., reliance on common systems or resources) and interactions (e.g., alignment of response strategies) among strategies, guidelines and procedures that may be used in combination, either consecutively or concurrently, to mitigate a design-basis or beyond-design-basis event.

Additionally, the NRC considered that these strategies, guidelines and procedures are not used by a single licensee organizational unit but will often require coordination and transfer of responsibilities among licensee organizational units. For example, in the event of the loss of the main control room, the EDMGs may be implemented, and therefore initiated and directed by knowledgeable and available site personnel until coordination and augmentation efforts enable transition to a more stable command and control structure. The mitigation strategies for beyond-design-basis external events, though initiated by the main control room complement of licensed operators, may require coordination with and augmentation by offsite organizations. Further, and as noted previously, there are potential accident scenarios in which a licensee



might employ strategies from more than one of these strategies, guidelines and procedures during its response to an accident. One plausible sequence is for an initial response to be under the EOPs, supplemented by actions under the FSGs, and ultimately transition to actions under the SAMGs, which are implemented under a voluntary initiative. Such an accident progression engages and requires the coordination of multiple licensee organizational units.

In light of the preceding considerations, this MBDBE rule requires that the mitigating strategies, guidelines and procedures, staffing, and supporting organizational structure be developed, implemented, and maintained such that they function as an “integrated” response capability. The intent of this integrated response capability requirement is to ensure that applicants and licensees establish and maintain a functional capability to produce a coordinated and logical response under a wide range of accident conditions. The intent is not to require physical integration (e.g., organizations need not be merged and strategies, guidelines and procedures need not be combined), but rather to require a functional integration of the elements of the response capability.

To achieve this functional integration, the NRC expects that applicants and licensees have addressed the interfaces, dependencies, and interactions among the elements of their response capability. 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. Functional integration of response organizations ensures that organizations working together to use these strategies, guidelines, and procedures (e.g., to coordinate actions or provide support) have clearly defined lines of communication among the organizations, as well as clearly defined authorities and responsibilities relative to each other, such that there are no gaps or conflicts.

Recognizing that beyond-design-basis external events are fundamentally unbounded, and that these events can result in a multitude of damage states and associated accident conditions, a significant regulatory challenge is developing bounded requirements that meaningfully address the regulatory issue. From a practical standpoint, development of mitigation strategies requires that there be a reasonable definition (or boundary conditions established) for an onsite damage state that the strategies would then address and thereby provide an additional capability to mitigate beyond-design-basis external event conditions that might occur. The assumed damage state should ideally capture a reasonable range of potential damage states that might occur as a result of beyond-design-basis external events, and it should present an immediate challenge to the key safety functions for the facilities, so that the resultant strategies provide greater capabilities and can improve safety. An assumed damage state that accomplishes this objective is the loss of all ac power.

The MBDBE rule and the Mitigation Strategies Order both require the mitigation of a loss of all ac power condition. Both the MBDBE rule and the Mitigation Strategies Order address this requirement in two parts: 1) through the use of an assumed damage stage that is then used to develop the strategies and guidelines for the mitigation of beyond-design-basis external events, and 2) supporting contingencies within the strategies that address conditions that are more severe than those assumed to develop the strategies and guidelines. The assumed damage state for this rule is the same as that assumed to implement the requirements of attachment 2 to the Mitigation Strategies Order for currently operating power reactors: a loss of all ac power condition concurrent with loss of normal access to the ultimate heat sink (LUHS). This assumed damage state is effective at immediately challenging the key safety functions of core cooling, containment, and SFP cooling following a beyond-design-basis external event. Requiring strategies to maintain or restore these key functions under such circumstances results in an

additional mitigation capability consistent with the Commission's objective when it issued the Mitigation Strategies Order.

As discussed in section IV.D of this notice, the public comments provided on the MBDBE proposed rule showed some confusion regarding the requirement for loss of all ac power. The proposed rule contained the language, "extended loss of all ac power." The requirements in § 50.155(b)(1) provide for a capability to maintain or restore key functional capabilities indefinitely, or until sufficient site functional capabilities can be maintained without the need for mitigation strategies. As such, the word "extended" was unnecessary, and the NRC concluded that it may have contributed to the confusion given that implementation of this requirement involves assumption of an extended loss of ac power. Therefore the NRC deleted the word "extended." But, as also discussed in this section, implementation of this requirement involves the use of contingencies that address damage states more severe than an assumed ELAP, and together, the assumed ELAP and the contingencies are the means for meeting a loss of all ac power requirement.

This MBDBE rule is not prescriptive in terms of the specific set of initial and boundary conditions assumed for the loss of all ac power and LUHS condition. The NRC understands that the damage state for currently operating reactors, defined in more detail in RG 1.226, reflects currently operating power reactor designs and the reliance of those designs on ac power, while the assumed damage state for a future design may be different depending upon the design features. Specifically, the damage state of a loss of all ac power condition concurrent with LUHS in the Mitigation Strategies Order was implemented first through the assumption of an ELAP to the onsite emergency ac buses, while allowing ac power from the inverters to be assumed available. This assumption is used to establish event sequence and the associated times for when mitigation actions would be assumed to be required. Secondly, to address the MBDBE rule and the Mitigation Strategies Order requirement for a 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 (e.g., sending operators to immediately take manual control over a non ac-powered core cooling pump). As such, this provision makes generically-applicable the current implementation under the Mitigation Strategies Order with no intent to either relax or impose new requirements, and is performance-based to allow some flexibility for future designs. As an example, some reactor designs (e.g., Westinghouse AP1000 and General Electric Economic Simplified Boiling Water Reactor (ESBWR)) use passive safety systems to meet NRC requirements for maintaining key safety functions. The inherent design of those passive safety systems makes certain assumptions, such as loss of access to the ultimate heat sink, not credible. Accordingly, the assumed condition for the FSG requirements for passive reactors is the loss of normal access to the normal heat sink, discussed further in this section. Nevertheless, in this rule the NRC is requiring that the strategies and guidelines be capable of implementation during a loss of all ac power.

Regarding the assumed LUHS for combined licenses or applications referencing the AP1000 or the ESBWR designs, the assumption was modified to be a loss of normal access to the normal heat sink (see attachment 3 to the Mitigation Strategies Order; the V.C. Summer Unit 2 license, License No. NPF-93, Condition 2.D(13); the V.C. Summer Unit 3 license, License No. NPF-94, Condition 2.D(13); and Enrico Fermi Nuclear Plant Unit 3 License, License No. NPF-95, Condition 2.D(12)(g)). This modified language reflects the passive design features of the AP1000 and the ESBWR that provide core cooling, containment, and spent fuel cooling capabilities for 72 hours without reliance on ac power. These features do not rely on access to any external water sources for the first 72 hours because the containment vessel and the passive containment cooling system serve as the safety-related ultimate heat sink for the

AP1000 design and the isolation condenser system serves as the safety-related ultimate heat sink for the ESBWR design.

As discussed previously, the range of beyond-design-basis external events is unbounded. The MBDBE rule is not intended, and should not be understood, to mean that the mitigation strategies can adequately address all postulated beyond-design-basis external events. It is always possible to postulate a more severe event that causes greater damage and for which the mitigation strategies may not be able to maintain or restore the functional capabilities (e.g., meteorite impact). Instead, the MBDBE requirements provide additional mitigation capability in light of uncertainties associated with external events, consistent with the NRC's regulatory objective for issuance of the Mitigation Strategies Order.

This MBDBE rule requires that the FSGs be capable of being implemented site-wide. This recognizes that severe external events are likely to impact the entire reactor site, and for multi-unit sites, damage all the power reactor units on the site. This requirement means that there needs to be sufficient equipment and supporting staff to enable the maintenance or restoration of core cooling, containment, and SFP cooling functions for all the power reactor units on the site. This is a distinguishing characteristic of this set of mitigating strategies from those in § 50.155(b)(3), for which the damage state is a more limited, albeit large area of a single plant, reflecting the hazards for which that set of strategies was developed.

The NRC gave consideration to whether there should be changes made to § 50.63, "Loss of all alternating current power," to link those requirements with this rule. This consideration stemmed from recommendation 4.1 of the NTTF Report to "initiate rulemaking to revise 10 CFR 50.63" and the understanding that this rule could result in an increased station blackout coping capability, in addition to the regulatory objectives of the MBDBE rule, which provide additional beyond-design-basis external event mitigation. Because of the substantive differences between the requirements of § 50.63 for licensees to be able to withstand and

recover from a station blackout and the MBDBE requirements, the NRC determined that such a linkage is not necessary and could lead to regulatory confusion.

The principal regulatory objective of § 50.63 was to establish station blackout coping durations for a specific scenario: the loss of offsite power coincident with a failure of all trains of emergency onsite ac power (typically, the failure of multiple emergency diesel generators). In meeting this regulatory objective, the NRC understood that there would be safety benefits accrued through the provision of an alternate ac source diverse from the emergency diesel generators and therefore defined “alternate ac source” in § 50.2. The NRC defined the event a licensee must withstand and recover from as a “station blackout” rather than a “loss of all ac power.” A station blackout allows for continued availability of ac power to buses fed by station batteries through inverters or by alternate ac sources. The MBDBE rule requires an additional capability to mitigate beyond-design-basis external events. Because the condition assumed for the mitigation strategies to establish the additional mitigation capability includes an ELAP, which is more conservative than a station blackout as defined in § 50.2 (because it is an extended loss of ac power, not a loss for a certain amount of time, and it also assumes the loss of § 50.63 alternate ac sources), there can be a direct relationship between the two different sets of requirements with regard to the actual implementation at the facility. Specifically, implementation of the mitigation strategies links into the station blackout procedures (e.g., the applicable strategies would be implemented to maintain or restore the key safety functions when the EOPs reach a “response not obtained” juncture).<sup>3</sup>

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<sup>3</sup> One of the formats for symptom-based EOPs that are used in the operating power reactors has the operators take an action and verify that the system responds to the action in a manner that confirms that the action was effective. For example, a step in an EOP could be to open a valve in order to allow cooling water flow, and the verification would be obtained by confirming there are indications that flow has commenced, such as a decrease in temperature of the system being cooled. If those indications are not obtained, the procedure would provide instructions on the next step to accomplish in a separate column labeled “response not obtained.”

Step-by-step procedures are not necessary for many aspects of the mitigation strategies and guidelines. Rather, the strategies and guidelines are intended to be flexible, and enable plant personnel to adapt them to the conditions that result from the beyond-design-basis external event. The provisions typically would result in strategies and guidelines that use both installed and portable equipment, instead of only relying on installed ac power sources (with the exception of protected battery power) to maintain or restore core cooling, containment, and SFP cooling capabilities. By using equipment that is separate from the normal installed ac-powered equipment, the strategies and guidelines have a diverse attribute. By having available multiple sets of portable equipment that can be deployed and used in multiple ways depending on the circumstances of the event, operators are able to implement strategies and guidelines that are flexible and adaptable.

The mitigation strategies requirements are both performance-based and functionally-based. The performance-based requirements recognize that the new requirements provide most benefit to future reactors whose designs could differ significantly from current power reactor designs and as such, use of more prescriptive requirements could be problematic and create unnecessary regulatory impact and need for exemptions. Use of functionally-based requirements results from the need to have requirements that can address a wide range of damage states that might exist following beyond-design-basis external events. Maintaining or restoring three key functions (core cooling, containment and SFP cooling) supports maintenance of the fission product barriers (i.e., fuel clad, reactor coolant pressure boundary, and containment) and results in an effective means to mitigate these events, while remaining flexible such that the strategies and guidelines can be adapted to the damage state that occurs. Functionally-based requirements also result in strategies that align well with the symptom-based procedures used by power reactors to respond to accidents. Accordingly, the Mitigation Strategies Order contained requirements for a three-phased approach for current operating

reactors. The MBDBE rule does not specify a number of phases; instead, it establishes higher-level, performance-based requirements consistent with this discussion. Section IV.K of this notice contains further discussion of this aspect of the MBDBE rule.

The NRC considered incorporating into this rule a requirement that licensees be capable of implementing the strategies and guidelines “whenever there is irradiated fuel in the reactor vessel or spent fuel pool.” This provision would have been a means of making generically-applicable the requirement from the Mitigation Strategies Order that licensees be capable of implementing the strategies and guidelines “in all modes.” The NRC considered the terminology “whenever there is irradiated fuel in the reactor vessel or spent fuel pool” to be a better means to address the order requirement because the phrase did not use technical specification type language (i.e., modes), which is in effect when a licensee completely offloads the fuel from the reactor vessel into the SFP during an outage. The NRC did not use the phrases, “whenever there is irradiated fuel in the reactor vessel or spent fuel pool,” or, “in all modes,” in the MBDBE rule and instead structured the applicability provisions to achieve this same objective by requiring licensees to have mitigation strategies for beyond-design-basis external events for the various configurations that can exist for the reactor and SFPs throughout the operational, refueling and decommissioning phases.

The mitigation strategies and guidelines implemented under the Mitigation Strategies Order assume a demanding condition that maximizes decay heat that would need to be removed from the reactor core and SFP source terms on site. This implementation results in a more restrictive timeline (i.e., mitigation actions required earlier following the event to take action to maintain or restore cooling to these source terms) and a greater resulting additional capability. These assumed at-power conditions are 100 days at 100 percent power prior to the occurrence of the beyond-design-basis event for the reactor core, consistent with the assumption used for § 50.63. This assumption establishes a conservative decay heat for the



reactor source term. The assumed SFP conditions include the design basis heat load for the SFP, which is typically a full core offload following a refueling outage which is used for the sizing of FLEX equipment. 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 is calculated based on the worst case conditions for SFP heat load assuming the plant is at power. The NRC considers the development of timelines for the mitigating strategies using these assumptions for the reactor core and SFP to be appropriate.

The NRC recognizes the difficulty of developing engineered strategies for the extraordinarily large number of possible plant and equipment configurations that might exist under shutdown conditions (i.e., at shutdown when equipment may be removed from service, when there is ongoing maintenance and repairs or refueling operations, or modifications are being implemented). Licensees must be cognizant of such configurations, equipment availability, and decay heat states that could present greater challenges under these conditions, and design mitigation strategies that can be implemented under such circumstances.

The NRC considered incorporating requirements into the MBDBE rule that would require strategies to be developed that specifically assume that delays in the receipt of offsite resources occur as a result of damage to the transportation infrastructure. While severe events could damage local infrastructure, and could create challenges with regard to the delivery of offsite resources, the NRC concluded that having this level of specificity in the MBDBE rule is not necessary. Instead, this rule contains provisions that are more performance-based, requiring continued maintenance or restoration of the functional capabilities until acquisition of offsite assistance and resources. Potential delays and other challenges presented by extreme events that affect acquisition and use of offsite resources are addressed by licensee programs that implement the provisions.

The Mitigation Strategies Order included a requirement that licensees develop guidance and strategies to obtain “sufficient offsite resources to sustain [the functions of core cooling, containment, and SFP cooling] indefinitely.” The NRC considered using this language in this rule, but concluded that this would be better phrased as “indefinitely, or until sufficient site functional capabilities can be maintained without the need for the mitigation strategies.” The NRC concluded that this phrase more clearly communicates the existence of a transition from the use of the mitigating strategies to recovery operations.

The NRC recognizes that the use of the mitigating strategies potentially requires departure from a license condition or a technical specification (contained in a license issued under 10 CFR part 50 or 52) and could be considered a proceduralization of the allowance provided under § 50.54(x). Given that the initiation of the use of these strategies may be included in EOPs or other procedures, which might be considered procedures described in the final safety analysis report (as updated), there is an interaction with the provisions of § 50.59(c)(1) regarding the need to obtain a license amendment in order to make the necessary change to those procedures. The NRC considered including provisions in this rule specifically to allow departures from license conditions or technical specifications in order to clarify this situation, but found these provisions unnecessary. For holders of operating licenses under 10 CFR part 50 and combined licenses under 10 CFR part 52 that were subject to the Mitigation Strategies Order, the provisions of that order provided more specific criteria for making the necessary changes than § 50.59, making that section inapplicable as set forth in § 50.59(c)(4). Those criteria included the provision of submitting an overall integrated plan to the NRC for review. Similar criteria were included in license conditions for the subsequently issued combined licenses.

In support of the regulatory objective to require licensees to have an integrated response capability, and recognizing the similarity of the existing mitigation strategies and guidelines formerly in § 50.54(hh)(2) with the new FSGs, the NRC relocated the EDMGs into the MBDBE rule as § 50.155(b)(3). In addition to moving the text, the NRC made a few editorial changes. The wording used to describe these requirements has evolved from “guidance and strategies,” in Interim Compensatory Measures Order EA-02-026, dated February 25, 2002, to “strategies,” in the corresponding license conditions, to “guidance and strategies,” in § 50.54(hh)(2), to its current form, “strategies and guidelines.” The word “guidelines” was chosen rather than “guidance” to more accurately reflect the nature of the instructions that a licensee could develop and to avoid confusion with the term “regulatory guidance.” The word “strategies” is used in this rule to reflect its meaning, “plans of action.” The resulting plans of action may include plant procedures, methods, or other guideline documents, as deemed appropriate by the licensee during the development of these strategies. These plans of action also include the arrangements made with offsite responders for support during an actual event. No substantive change to the requirements is intended by this change in the wording.

The final rule clarifies the § 50.155(b)(3) requirements by adding the phrase “impacted by the event” in order to differentiate these requirements from those located in § 50.155(b)(1). The requirements in § 50.155(b)(3), which address the loss of large areas of the plant, are limited to the plant impacted by the event, and as such, are not intended to address a site-wide event. This clarification was necessary as a result of the relocation of these requirements to the MBDBE rule and their juxtaposition with the mitigation strategies for beyond-design-basis external events in § 50.155(b)(1), which are for a site-wide event. These events can impact key equipment that is shared between power reactor units (i.e., SFPs), and that is why the NRC did not use language that would have limited the application of these requirements to an individual

power reactor unit. This clarification is to preserve the scope of this requirement, and specifically avoid an unintended imposition of a new requirement.

Applicability of the requirements of § 50.155(b)(3) was formerly governed by § 50.54(hh)(3), which made these requirements inapplicable following the submittal of the certifications required under § 50.82(a) or § 52.110(a)(1). As discussed in the Power Reactor Security Requirements final rule (74 FR 13926; March 7, 2009), the NRC concludes that it is 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 is requiring EDMGs for a licensee with permanently shutdown defueled reactors, but with irradiated fuel still in its SFP, because the licensee must be able to implement effective mitigation measures for large fires and explosions that could impact the SFP while it contains irradiated fuel. The MBDBE rule corrects the wording of former § 50.54(hh)(3) to implement the sunseting of the associated requirement intended by the Commission in 2009. This change does not constitute backfitting for currently operating reactors because the change concerns decommissioning reactors. The change does 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. The MBDBE rule replaces the license conditions on the effective date of the MBDBE rule, thereby maintaining the EDMGs requirement for these licensees.

In the proposed MBDBE rule, the NRC discussed secondary containment aspects of the mitigating strategies in the decommissioning provisions of paragraph 50.155(a) for licensees that rely on secondary containment as a fission product barrier for their spent fuel pools. The intent of the proposed requirement was to document the requirement without change from the requirements that had been imposed under the Mitigation Strategies Order and paragraph 50.54(hh)(2). In the course of interactions with the ACRS and during the CER meeting, the

NRC received feedback that this phrasing of the requirement was confusing and conveyed that the requirements were being modified. Therefore, the NRC has revised the final MBDBE rule to eliminate the discussion of secondary containment in the decommissioning provisions of paragraph 50.155(a).

### *Integration with EOPs*

In developing a requirement for the integration of strategies, guidelines, and alternative approaches of § 50.155(b) with the EOPs, the NRC considered their differences in content and the standards for usage applied to them. The EOPs are a specific and prescribed set of instructions implemented in accordance with exacting standards for usage and adherence (e.g., step-by-step sequential performance, concurrent execution of multiple sections) that operators and plant staff are required to follow when performing a specific task or addressing plant conditions. When licensees implement procedures, each step is to be performed as prescribed, with rare exceptions. The strategies and guidelines that are required by the MBDBE rule differ from EOPs primarily in terms of the level of detail to which they are written and expectations regarding usage. The MBDBE strategies and guidelines may be a less prescriptive set of instructions than the EOPs and may not be subject to the same constraints imposed by standards of usage for procedure implementation (e.g., may not be followed in a step-by-step manner). This is because the MBDBE strategies and guidelines must take into account: 1) the large number of possible event initiators, plant configurations, and sequences; and 2) the high degree of uncertainties in event progression and consequences. The strategies and guidelines can take the form of high level plans that identify and describe potential, previously evaluated, success paths for addressing specific conditions such as loss of core cooling. As a result, strategies and guidelines provide operators and plant staff the information and latitude to respond as necessary to unpredictable and dynamic situations, allowing them to adapt to the

actual conditions and damage states without the burden of detailed procedures and the challenge of determining which procedure may be applicable and effective under the uncertain conditions of a beyond-design-basis event.

Given these differences in content and standards for usage, the intent of this rule is not to require conformance of the strategies and guidelines to the level of detail and standards of usage for EOPs, or consolidation of the strategies, guidelines and procedures into a single set of instructions, but rather, as previously described, to require functional integration of strategies and guidelines with the EOPs. The objective is for the strategies, guidelines, and procedures to retain or employ the characteristics that support their effective use under the range of conditions to which they are each intended to apply while ensuring that the strategies and guidelines, in conjunction with the EOPs, constitute a useable and cohesive set of instructions for mitigating the consequences of a wide range of initiating events and plant damage states. To achieve this functional integration, the NRC expects that applicants and licensees will address the interfaces, dependencies, and interactions among the strategies and guidelines that are required under this rule and the EOPs, such that they can be implemented in concert with each other, as necessary, to effectively use available plant resources and direct a logical and coordinated response to a wide range of accident conditions.

In keeping with the basis for a functional integration of the strategies and guidelines with EOPs, the MBDBE rule requires that the § 50.155(b) strategies, guidelines, and alternative approaches be integrated “with the Emergency Operating Procedures (EOPs).” This language is intended to communicate the NRC’s expectation that the EOPs retain their role as the primary means of directing emergency operations and that the strategies and guidelines that are required under this rule are integrated with EOPs to support their implementation.

The NRC considered establishing specific criteria for the integration of the strategies and guidelines with EOPs that supports a capability to mitigate beyond-design-basis events but

opted to specify only a high level requirement to allow applicants and licensees flexibility in the means by which they achieve the functional integration described previously. Approaches for achieving functional integration could include the following:

1. Strategies, guidelines, and procedures have clearly defined transitions (e.g., entry and exit conditions with distinct pointers) from one strategy, guideline, or procedure to another.

2. Individuals are cued by the document or trained to know when transitions between the strategies, guidelines, and procedures result in corresponding changes in the associated standards for usage (e.g., when transitioning from EOPs to the voluntarily maintained SAMGs, the operator is able to recognize the transition from a step-by-step procedure to a flexible guideline set where it is permissible to deviate from the order or method of accomplishing the steps).

3. Licensees establish expectations (e.g., through standards for usage) pertaining to the parallel use of strategies, guidelines, and procedures. Plant personnel using different strategies, guidelines, and procedures concurrently understand which is the controlling procedure and therefore which actions take precedence.

4. Licensees identify and resolve conflicts between the strategies, guidelines and procedures.

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

6. Licensees control the development and maintenance of their content and format in accordance with human factors standards and guidelines (e.g., writer's guides) that recognize and address the interfaces between them in order to achieve compatibility of the strategies, guidelines, and procedures.

The MBDBE rule requires that licensees provide the staffing necessary for having an integrated response capability to support implementation of the strategies, guidelines, and alternative approaches required by § 50.155(b). 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 required of a licensee by the MBDBE rule is that staffing necessary to directly support the assessment and implementation of the range of mitigation strategies developed, implemented and maintained by the license that are intended to maintain or restore the functions of core cooling, containment, and SFP cooling.

The recommended minimum positions and staffing levels for emergency plans were initially provided in 1980 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." In 2011, the NRC issued the "Enhancements to Emergency Preparedness Regulations" final rule (EP final rule) (76 FR 72560; November 23, 2011) to amend, in part, 10 CFR part 50, appendix E, to address 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. The MBDBE rule addresses the staffing requirements for the expanded response capabilities for on-shift response and the ERO.

The MBDBE rule requires adequate staffing to implement the strategies, guidelines, and alternative approaches required by § 50.155(b) with the EOPs without requiring further analysis to supplement analyses that were completed as a result of the Mitigation Strategies Order or the EP final rule. Staffing levels should be established to ensure that if strategies are executed,



completing them would not be delayed due to the lack of qualified personnel. The MBDBE rule contains drill and training requirements that provide assurance that the licensee staff are properly trained and can demonstrate implementation of the mitigation strategies and guidelines. These additional requirements also provide assurance that the staffing levels are sufficient and maintained because insufficient staffing levels would result in ineffective implementation of the strategies.

### *Command and Control*

The MBDBE rule requires licensees to have a supporting organizational structure with defined roles, responsibilities, and authorities for directing and performing the strategies, guidelines, and alternative approaches required by § 50.155(b). The objective is to ensure that licensees address the organizational implications of: 1) implementing the FSGs; and 2) integrating the FSGs, reevaluated hazard strategies and guidelines or alternative approaches, and EDMGs with the EOPs such that organizational units responsible for on-site accident mitigation (e.g., main control room, emergency operations facility, and technical support center staff) can support a coordinated implementation of these procedures and guidelines under the challenging conditions presented by beyond-design-basis events.

Additional requirements exist in 10 CFR part 50, appendix E, section IV.A, for the inclusion within the licensee's emergency plan of a description of the organization for coping with radiological emergencies, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization and the means for notification of such individuals in the event of an emergency. These requirements provide the command and control structure for use in the execution of the emergency plan. The current 10 CFR part 50, appendix E, sections IV.A.2. and IV.A.5., further require that the emergency plan include: 1) a detailed description of the authorities, responsibilities, and duties of the individual(s) who will

take charge during an emergency; 2) plant staff emergency assignments; 3) authorities, responsibilities, and duties of an onsite emergency coordinator who shall be in charge of the exchange of information with offsite authorities responsible for coordinating and implementing offsite emergency measures; and 4) the identification, by position and function to be performed, of other employees of the licensee with special qualifications for coping with emergency conditions that may arise.

The need for defined command and control structures and responsibilities for use in beyond-design-basis conditions was recognized in the course of the development of the guidance and strategies for the former § 50.54(hh)(2), now § 50.155(b)(3). As stated in the industry's guidance document for that set of requirements, NEI 06-12, "B.5.b Phase 2 & 3 Submittal Guideline," Revision 2, "Experience with large scale incidents has shown that command and control execution can be a key factor to mitigation success." The guidance and strategies developed for that effort include an EDMG for initial response to provide a bridge between normal operational command and control and the command and control that is provided by the ERO in the event that the normal command and control structure is disabled. The NRC considers that the actions taken in the development of the EDMGs for initial response for the guidance and strategies for § 50.155(b)(3) continue to be adequate for compliance with the MBDBE rule for EDMGs.

The regulatory guidance for the MBDBE rule, specifically RG 1.226, which endorses industry guidance in NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," specifies that the existing command and control structure will be used for transition to the voluntarily maintained SAMGs.

All previous requirements did not specify a command and control structure for a multi-unit event that includes the potential need for acquisition of offsite assistance to support onsite event mitigation. Additionally, these requirements were not understood to require such a

response because they preceded the Fukushima event and the regulatory actions that stemmed from that event. As a practical matter, the current command and control structures, including any changes that resulted from the implementation of the Mitigation Strategies Order requirements, are sufficient to ensure that the functional objectives of the MBDBE rule are achieved. The NRC requested stakeholder feedback on this issue in the proposed rule (refer to section VI of the proposed rule *Federal Register* notice). Based on that feedback, which suggested that the MBDBE rule should contain its own command and control requirements, the NRC has concluded that it is appropriate to require command and control for the integrated response capability in the final rule in order to address the additional area of command and control for multi-unit events, including the need for the acquisition of offsite assistance.

### *Equipment*

The MBDBE rule contains requirements for licensee equipment that is relied upon for use in mitigation strategies and guidelines. This final rule makes generically applicable requirement (2) in attachments 2 and 3 of the Mitigation Strategies Order, which reads as follows: “These strategies must... have adequate capacity to address challenges to core cooling, containment, and SFP cooling capabilities at all units on a site subject to this Order.”

The industry guidance of NEI 12-06, as endorsed by NRC 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,” included specifications for each licensee’s provision of a spare capability in order to assure the reliability and availability of the equipment required to provide the capacity and capability requirements of the Mitigation Strategies Order (Section X of this notice contains a discussion of the guidance supporting the MBDBE rule, including its relation to the guidance developed to support implementation of the Mitigation Strategies and SFPI orders). This “spare capability” was also

referred to within the guidance as an “N+1” capability, where “N” is the number of power reactor units on a site. The NRC considered including requirements similar to the spare capability specification of NEI 12-06 in this rule but determined that such an inclusion would be too prescriptive and could result in the need to grant exemptions for alternate approaches that provide an effective and efficient means to provide the required capability. One example of this is in the area of flexible hoses, for which a strict application of the spare capability guidance could necessitate a licensee’s provision of spare hose or cable lengths sufficient to replace the longest run of hoses being used by the licensee, when significant operating experience with similar hoses for fire protection does not show a failure rate that would support the need for such a spare capability.

The development of the mitigating strategies in response to the Mitigation Strategies Order relied upon a variety of initial and boundary conditions that were provided in the regulatory guidance of JLD-ISG-2012-01 and NEI 12-06. These initial and boundary conditions followed the philosophy of the basis for imposition of the requirements of the Mitigation Strategies Order, which was to require additional defense-in-depth measures to provide continued reasonable assurance of adequate protection of public health and safety. As a result, the industry response to the Mitigation Strategies Order includes diverse and flexible means of accomplishing safety functions rather than providing an additional further hardened train of safety equipment. These requirements and conditions included the acknowledgement that, due to the fact that initiation of an event requiring use of the strategies would include multiple failures of SSCs, it is inappropriate to postulate further failures that are not consequential to the initiating event. As a result, the NRC has determined that the conditions to which the instrumentation (as a class of equipment), that would be relied on for the mitigating strategies, would be exposed do not include conditions stemming from fuel damage, but instead are limited to the initial and boundary conditions set forth in the guidance and include the conditions assumed to result from

a deterministic beyond-design-basis external event used in developing the guidelines and strategies under the MBDBE rule. The NRC has determined that it should not be necessary for the instrumentation to be designed specifically for use in the mitigating strategies and guidelines, but instead it would be necessary that the design and associated functional performance be sufficient to meet the demands of those strategies (i.e., a licensee may rely upon existing instrumentation that is capable of operating in the conditions anticipated for the required strategies and guidelines rather than replacing it with new instrumentation specifically designed for those conditions). For example, the guidance of RG 1.226 and NEI 12-06 includes a discussion in NEI 12-06, section 3.2.1.12 regarding the basis that should be provided for plant equipment that is relied in the mitigation strategies.

The MBDBE requirements cover events that are not included in design-basis events as that term is used in the § 50.2 definition of “safety-related structures, systems, and components.” Because of this, reliance on equipment for use in the mitigating strategies does not result in the applicability of 10 CFR part 50, appendix A, General Design Criterion (GDC)-2, “Design bases for protection against natural phenomena,” or the principal design criterion (PDC) applicable to a plant’s operating license if the license was issued prior to the effective date of GDC-2. The MBDBE rule requires reasonable protection for the equipment relied on for the mitigation strategies from a hazard that is equivalent in magnitude to that originally determined for the facility under GDC-2 or the applicable PDC, unless the reevaluated hazards determined in response to the March 12, 2012, NRC letter issued under § 50.54(f), as assessed by the NRC, show that increased protection is necessary. The March 12, 2012, NRC letter requested information on licensees’ seismic and flooding hazards. The licensees and the NRC began work to complete the consideration of the effects of these reevaluated hazards during the development of the MBDBE rule. However, completion of these efforts necessitates the use of a flexible scheduling provision in the the MBDBE rule as discussed elsewhere in this notice.

As discussed in COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and The Reevaluation of Flooding Hazards," and its associated SRM, the requirements of the Mitigation Strategies Order were imposed in parallel with the agency's March 12, 2012, requests for information on the reevaluation of external hazards. As a result, the Mitigation Strategies Order included a requirement in both attachment 2 and 3 for licensees to provide reasonable protection for equipment associated with the required mitigating strategies from external events without specific reference to the necessary level of protection. The appropriate level of protection from external hazards, particularly flooding, was the subject of discussion in the course of NRC-held public meetings leading up to the issuance of JLD-ISG-2012-01 and its endorsement of the industry guidance for the Mitigation Strategies Order, NEI 12-06. Section 6.2.3.1 of NEI 12-06 specifies that the level of protection for flooding should be "the flood elevation from the most recent site flood analysis. The evaluation to determine the elevation for storage should be informed by flood analysis applicable to the site from early site permits, combined license applications, and/or contiguous licensed sites." The choice of this hazard level was driven by the recognition that, while the flooding hazard reevaluations by holders of operating licenses and construction permits may not be complete in advance of the development and implementation of the mitigating strategies, information available from flood analyses for nearby sites could be taken into account in choosing the appropriate hazard level in order to avoid the need for rework or modification of the strategies. Many licensees took the former approach, using their best estimates of potential hazard levels and providing additional margin to the current licensing basis. (See, e.g., the description of the flooding strategies for Fort Calhoun Station on page B-43 et seq., of Omaha Public Power District's Overall Integrated Plan (Redacted) in response to the Mitigation Strategies Order, provided in section XIX of this notice.)

In COMSECY-14-0037, the NRC staff requested that the Commission affirm 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; 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 SFPs; and 3) the NRC staff should revise the flooding assessments and integrate the decision-making into the development and implementation of mitigating strategies in accordance with the Mitigation Strategies Order and this rulemaking. These principles reflect the NEI 12-06 reference to the “most recent flood analysis” previously discussed and the documentation by licensees in their overall integrated plans for the mitigating strategies that, at the time of their submittals, “flood and seismic reevaluations pursuant to the § 50.54(f) letter of March 12, 2012, are not completed and therefore not assumed in this submittal. As the reevaluations are completed, appropriate issues would be entered into the corrective action system and addressed on a schedule commensurate with other licensing bases changes.” In SRM-COMSECY-14-0037, the Commission approved the first two items recommended by the NRC staff, regarding the need for operating nuclear power plant licensees to address the reevaluated flood hazards within the mitigating strategies and the potential for using targeted or scenario-specific mitigating strategies. The Commission did not approve the third recommendation; however, that recommendation would have been outside the scope of this rulemaking effort. The MBDBE rule reflects this Commission direction by the inclusion of the requirements in § 50.155(b)(2).

Because the events for which the mitigating strategies are to be used are outside the scope of the design basis events considered in establishing the basis for the design of the facility, equipment that is relied upon for those mitigating strategies does not fall within the

scope of § 50.65, “Requirements for monitoring the effectiveness of maintenance at nuclear power plants,” based on licensee reliance on the equipment for the mitigating strategies. Nevertheless, the equipment used to implement the mitigation strategies must receive adequate maintenance in order to assure that it is capable of fulfilling its intended function, and thereby ensure that the requirement to develop, implement, and maintain the mitigation strategies continues to be met.

This rulemaking does not revise the regulatory treatment of equipment relied upon for the EDMGs now relocated to § 50.155(b)(3). The regulatory treatment of that equipment remains as it is described in NEI 06-12, “B.5.b Phase 2&3 Submittal Guideline,” the endorsed guidance document for those strategies and guidelines.

The NRC recognizes that existing nuclear power reactors with operating licenses issued under 10 CFR part 50 and those new nuclear power reactors with combined licenses issued under 10 CFR part 52 or operating licenses issued under 10 CFR part 50 may establish different approaches in developing strategies to mitigate beyond-design-basis events. For example, new nuclear power plants may use installed plant equipment for both the initial and long-term response to an ELAP with less reliance on offsite resources than existing nuclear power reactors. Under § 50.155(c), the NRC will consider the specific plant approach when evaluating the SSCs relied on as part of the mitigating strategies for beyond-design-basis events.

### *Training*

The mitigation of the effects of beyond-design-basis events using the strategies and guidelines is principally accomplished through manual actions rather than automated plant responses. Additionally, the instructions provided for event mitigation may be largely provided as high level strategies and guidelines rather than step-by-step procedures. The use of



strategies and guidelines supports the ability to adapt the mitigation measures to the specific plant damage and operational conditions presented by the event. However, effective use of this flexibility depends upon the knowledge and abilities of personnel to select appropriate strategies or guidelines from a range of options and implement mitigation measures using equipment or methods that may differ from those employed for normal operation or design-basis event response. As a result, the NRC considers personnel training and qualification necessary to ensure that individuals are capable of effectively performing their roles and responsibilities in accordance with the strategies and guidelines that are required by this rule.

The NRC acknowledges that licensee training programs, such as those required for licensed operators under 10 CFR part 55, "Operators' Licenses," the programs for plant personnel specified under § 50.120, "Training and Qualification of Nuclear Power Plant Personnel," and the training for emergency response personnel required by 10 CFR part 50, appendix E, section IV.F, "Training," likely provide for the knowledge and abilities required for performing activities in accordance with the strategies and guidelines that are required by this rule. Nevertheless, as noted previously, the strategies and guidelines may use new methods or equipment that require knowledge and abilities not currently addressed under existing training programs and, as a result, there may be gaps in these training programs that must be addressed to support effective use of the strategies and guidelines. Accordingly, the MBDBE rule further requires that licensees provide for the training of personnel using the "systems approach to training" (SAT) as defined in § 55.4, except for elements already covered under other NRC regulations. The SAT process, which is acceptable for meeting training requirements under 10 CFR part 55 and § 50.120, also is appropriate for licensee identification and resolution of any current gaps or future modifications to personnel training that may be necessary to provide for the training of personnel performing activities in accordance with the mitigating strategies and guidelines that are required by this final rule. The NRC recognizes that

there are other training programs that are currently acceptable for meeting other regulatory required training (e.g., 10 CFR part 50, appendix E, section IV.F) that do not use the SAT process. In light of the existence of these training programs, which have been found acceptable for more frequently occurring design-basis events, the NRC has determined that these training programs can meet the needs for common elements with beyond-design-basis event mitigation. Therefore, the NRC is not requiring licensees to revise these training programs to use the SAT process to meet the MBDBE rule requirements. Licensees are required to use the SAT process for newly identified training requirements supporting the effective use of the strategies and guidelines that are required by this rule.

By using the SAT process, licensees identify and train on any additional tasks that are necessary to implement the strategies and guidelines for the mitigation of beyond-design-basis events as defined in this final rule. The additional tasks identified are incorporated into the training program to ensure appropriate training is administered for each qualified individual designated to implement the strategies and guidelines required by this rule.

#### *Drills or Exercises*

As described in the discussion of training requirements, the NRC is requiring licensees to conduct drills or exercises to provide assurance that the licensee staff are properly trained and can demonstrate implementation of the mitigation strategies and guidelines. The drill or exercise requirement satisfies the SAT element for evaluation and revision of the training based on the performance of trained personnel in the job setting found in 10 CFR 55.4.

In addition, the drill requirement for strategies and guidelines under paragraph 50.155(b)(3) results from moving 10 CFR 50.54(hh)(2) to the new 10 CFR 50.155(b)(3) and the movement of the accompanying training requirement from 10 CFR part 50, appendix E, section F.2.j.

Licensees are required to demonstrate a capability to use at least one of the strategies and guidelines developed to comply with paragraph 50.155(b)(1) or (b)(2) and paragraph 50.155(b)(3). Licensees that comply with paragraph 50.155(b)(2) by developing event-specific approaches that rely on normal operating procedures or AOPs such as severe weather preparation procedures, would not treat these approaches as strategies and guidelines for the purposes of the drill requirements. Conversely, licensees that comply with paragraph 50.155(b)(2) by developing targeted or scenario-specific mitigating strategies, possibly including unconventional measures, shall treat these event-specific approaches as strategies and guidelines under the drill requirements.

#### *Spent Fuel Pool Monitoring*

The MBDBE rule requires licensees to have a means to remotely monitor wide-range SFP level as a separate requirement within the MBDBE rule, which makes the requirements of the SFPI Order generically-applicable. While many licensees make use of this instrumentation to support implementation of the mitigation strategies, the instrumentation requirement was imposed under the SFPI Order to address the potential for the licensee personnel to be distracted from other issues by the status of the SFP, and thereby enable the operators to re-prioritize resources if necessary, following a beyond-design-basis external event. This requirement has a separate purpose from the mitigation strategies requirements: to provide a reliable indication of the water level in associated spent fuel storage pools to allow prioritization of response actions between the core and the SFP. Therefore, this requirement was moved to paragraph (f) in the final rule to ensure a continued separation of the requirements. The NRC considered including the detailed requirements from the SFPI Order within the MBDBE rule, but determined that the more performance-based approach taken with this rule allows an applicant for a new reactor license or design certification to provide innovative solutions to address the

need to effectively prioritize event mitigation and recovery actions between the source term contained in the reactor vessel and that contained within the SFP.

In the course of implementation of the SFPI Order requirements, one lesson learned was that the need for prioritization of event mitigation and recovery actions is inapplicable to SFPs for which the decay heat load is sufficiently low that SFP cooling is not challenged in the same time frame as event progression for the reactor core. This was documented in the regulatory guidance of JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," and NEI 12-02, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify License with Regard to Reliable Spent Fuel Pool Instrumentation'," Revision 1, which eliminates from the definition of an SFP, a pool that does not contain fuel used for the generation of power within the preceding five years. This is clarified in the MBDBE rule in § 50.155(f) by including a termination of the requirement, once five years have elapsed since the fuel within the pool was last used for power generation in a reactor vessel.

### *Documentation of Changes*

Because the MBDBE rule requirements address beyond-design-basis events, currently-existing change control processes, including most notably § 50.59, may not address all aspects of a contemplated change to the strategies and guidelines under this rule. Therefore, the MBDBE rule includes a change control provision intended to supplement the existing change control processes and focus on the beyond-design-basis aspects of proposed changes. The MBDBE rule does not contain criteria typically included in other change control processes that are used as a threshold for determining when a licensee needs to seek NRC review and approval prior to implementing the proposed change. Instead, the MBDBE rule requires that licensees perform evaluations of proposed changes sufficient to reach a conclusion that the MBDBE rule requirements continue to be met, and to document and maintain this evaluation to

support NRC oversight of these activities. The final rule is revised to more clearly reflect this approach by referring to these requirements in § 50.155(g) as “Documentation of Changes.”

The NRC requested stakeholder feedback concerning the change control provisions for the MBDBE rule. The feedback provided is discussed in section IV of this notice. The NRC concludes that the final rule will follow the same approach contained in the proposed rule as discussed in section VI of this notice. Notwithstanding this conclusion, the NRC is revising the discussion in this notice for this provision to clarify its meaning and intent.

The NRC determined that the changes whose acceptability would be most difficult to judge 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. Changes to the implementation of the MBDBE requirements that remain consistent with regulatory guidance are acceptable, because such changes ensure continued compliance with the MBDBE requirements. The NRC recognizes that licensees may wish to make changes to the implementation of these requirements that do not follow current regulatory guidance for this rulemaking, and that are not an approved alternative that the licensee can demonstrate applies to their facility. To clarify the MBDBE rule change control requirements, the NRC added additional information to Section VI, Section-by-Section Analysis, of this notice that discusses potential changes, which are outside endorsed guidance or approved alternatives, that would clearly not constitute “demonstrated compliance.”

During public discussions before issuance of the proposed rule, a stakeholder suggested that the NRC should consider a provision to allow a licensee to request NRC review of a proposed change, and that if the NRC did not act upon the request for a suggested time period (e.g., 180 days), then the request would be considered “acceptable,” similar to the process for changes to the quality assurance program description under § 50.54(a)(4)(iv). The NRC did not include this form of tacit approval process in the MBDBE rule and instead included provisions in

the MBDBE rule to place on licensees the responsibility for ensuring that proposed changes result in continued compliance with the rule, subject to NRC oversight, or are otherwise submitted to the NRC under the § 50.12 exemption process.

A licensee may intend to change its facility, procedures, or guideline sets to revise some aspect of beyond-design-basis mitigation governed by the MBDBE rule in a manner that can impact multiple aspects of the facility, including “design basis” aspects of the facility subject to other regulations and change control processes. As previously discussed, the NRC anticipates that licensees will ensure that changes to the implementation of the MBDBE requirements are consistent with endorsed guidance, or otherwise demonstrate continued compliance with the MBDBE rule. This same change also could impact safety-related SSCs, either directly (e.g., a proposed change that impacts a physical connection of mitigation strategies equipment to a safety-related component or system) or indirectly (e.g., a proposed change that involves the physical location of mitigation equipment in the vicinity of safety-related equipment that presents a potential for adverse physical/spatial interactions with safety-related components). As a result, § 50.59 and other change control processes, as appropriate, would need to be applied to evaluate the proposed change for acceptability under any other applicable change control process.

Additionally, proposed changes can impact numerous aspects of the facility beyond the safety-related impacts, including implementation of fire protection requirements, security requirements, emergency preparedness requirements, or safety/security interface requirements. A licensee must therefore ensure that all applicable change control provisions are used to judge the acceptability of facility changes including, for example, change control requirements for fire protection, security, and emergency preparedness. Additionally, recognizing the nature of mitigation strategies and the reliance on human actions, a licensee also needs to ensure that the proposed changes satisfy the safety/security interface requirements of § 73.58. While the

obligation of a licensee to comply with all applicable requirements might be viewed as making the MBDBE change control provision in § 50.155(g)(2) unnecessary, the NRC recognizes the potential complexity of proposed facility changes and the complexity of existing regulatory requirements that govern change control. Therefore, the NRC concluded that adding the § 50.155(g)(2) change control provision, for the purposes of regulatory clarity, was warranted.

### *Implementation*

Section 50.155(h)(1) provides a 2-year implementation period to provide sufficient time to implement portions of the MBDBE rule that were not completed as part of the Mitigation Strategies and SFPI Orders, address the reevaluated hazards information required by § 50.155(b)(2), and allow licensees to review their previous compliance with the Mitigation Strategies and SFPI Orders and make any necessary changes to programs, plans, procedures, and guidelines to reflect and reference the newly issued § 50.155 requirements. This implementation period is 3 years for licensees that received NRC Order EA-13-109, “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions,” which was issued on June 6, 2013. These licensees are allowed an additional year of implementation in order to alleviate CER by allowing the same amount of time following achievement of full compliance with that order, which was issued a year after the Mitigation Strategies and SFPI Orders.

As discussed in section IV of this notice, the NRC received feedback indicating that power reactor licensees cannot complete implementation of the requirements of the MBDBE rule within two years of the effective date of the rule. The feedback focused on the implementation of the requirements for licensees to address the effects of reevaluated hazards contained in § 50.155(b)(2). The NRC agrees with the need for providing schedule flexibility, and concludes that providing the flexibility is acceptable given licensees’ prior implementation of

the remaining requirements in the MBDBE rule due to the scheduling requirements of the Mitigation Strategies and SFPI Orders, which significantly enhances licensees' capabilities to mitigate beyond-design-basis events. The NRC took into consideration the potential benefit of allowing licensees to understand the potential impact of addressing the reevaluated hazard information prior to implementing plant changes in order to avoid unnecessary costs incurred due to a need to rework the implementation of modifications, and that as part of the schedule submittal, licensees will discuss the basis for the extended schedule including why the licensee concludes that safety is maintained for the implementation time period. The flexible scheduling provision of § 50.155(h)(3) provides the NRC with the opportunity to notify the licensee of the unacceptability of a proposed schedule that is not appropriately justified in the event that it poses undue risk to public health and safety. Section 50.155(h)(3) also reduces the regulatory burden on the licensee and the NRC by allowing for tacit approval of the schedule after a reasonable period of time available for consideration.

In contrast with the portions of the final MBDBE rule that make the Mitigation Strategies and SFPI Orders generically applicable, § 50.155(b)(3) continues the requirements that were previously in § 50.54(hh)(2). Currently operating power reactor licensees have all achieved compliance with these requirements. Therefore, § 50.155(h)(1) requires that licensees subject to the requirements of § 50.155(b)(3) continue to comply with those requirements during the implementation period for the remainder of the final MBDBE rule.

#### *Onsite and offsite communications capability*

The MBDBE rule requires communication capabilities for events that result in loss of all ac power onsite, or potential destruction of offsite communications infrastructure. Because of the destruction to communications capability that occurred at Fukushima, the MBDBE rule contains requirements for licensees to provide a capability to communicate with onsite staff to



support mitigation of the event, and to support offsite communications to gain any additional support or to perform emergency preparedness functions. The communication requirements support effective implementation of the mitigation strategies and guidelines of § 50.155(b)(1) and were included as part of the implementation of the Mitigation Strategies Order. These requirements are relocated in the final MBDBE rule, as previously discussed in section IV of this notice, to more clearly reflect the importance of communication to effective implementation of the mitigation strategies and guidelines, and to better align with the previous implementation of these requirements under the Mitigation Strategies Order.

In its letter issued on March 12, 2012, pursuant to 10 CFR 50.54(f), the NRC requested information associated with the NTTF recommendation 9.3 for emergency preparedness communications. Specifically, the letter requested licensees submit an assessment of their current communications systems and equipment used during a beyond-design-basis natural event resulting in an ELAP to all units on site and impeding access to the site. The § 50.54(f) letter cites 10 CFR 50.47(b)(6) and 10 CFR part 50, appendix E, section IV.E.9 as the applicable regulations that describe the licensee's emergency plan communications systems requirements. The communications systems used by licensees to meet these regulations are the communications systems that were to be considered in the requested assessment. The intent of the communications assessment was to determine what, if any, enhancements would be needed for onsite communications systems (e.g., radios for response teams and between facilities) and offsite communications systems (e.g., cellular telephones and satellite telephones) used in support of required mitigative response actions during a site-wide ELAP to ensure continued availability.

Therefore, any communication capability enhancement made by a licensee in response to the assessment did not need to meet the design capabilities for the communications system required by 10 CFR part 50, appendix E or testing frequencies described for primary and

backup onsite and offsite communications systems. Any enhanced communications system, equipment, or power supply implemented as a result of the § 50.54(f) assessment was not necessary to meet the requirement to notify offsite emergency response organizations within 15 minutes of an emergency declaration or to meet the monthly communications testing requirement for contiguous State/local governments within the plume exposure pathway emergency planning zone.

#### *Order Rescission and Removal of License Conditions*

The NRC is including in the final rule specific terms that rescind orders and remove license conditions that are substantively redundant with provisions in the final rule. As discussed in this section, a primary objective of this rulemaking is to make the requirements of the Mitigation Strategies and SFPI Orders generically applicable to power reactor licensees and applicants, taking into account lessons learned in the orders' implementation and stakeholder feedback received through the regulatory process. As such, the requirements of § 50.155 fully replace the requirements of those orders. Although the orders provide for their relaxation or rescission on a licensee-specific basis, use of that process would be an inefficient and unnecessary administrative burden on licensees and the NRC—with no impact on public health and safety—because the final rule simultaneously replaces the orders in their entirety for all applicable licensees. Therefore, the NRC finds that good cause is shown to rescind the Mitigation Strategies and SFPI Orders for all licensees that received those orders once the MBDBE rule goes into effect and licensees are in compliance with it. The rescission date for these orders was set to be the latest date for compliance by licensees in receipt of the orders to prevent a regulatory gap; licensees proposing an alternative compliance schedule would need to address achievement of compliance with the requirements of the MBDBE rule corresponding

to these orders prior to the rescission date in the rule in order to show good cause for the alternate compliance schedule.

Order EA-06-137, "Order Modifying Licenses," issued June 20, 2006, concerns mitigating strategies for large fires or explosions at nuclear power plants. This order was issued to certain licensees who, like all operating power reactor licensees on February 25, 2002, received the initial post-9/11 order, Order EA-02-026, "Interim Safeguards and Security Compensatory Measures," which required licensees to take specific interim compensatory measures, including mitigating strategies for large fires or explosions at nuclear power plants, in light of the then-high-level threat environment. Order EA-06-137 required that licensees receiving the order incorporate into their security plans certain key mitigating strategies for large fires or explosions. The requirement that these strategies be incorporated in security plans was subsequently relaxed by letter dated August 28, 2006, which permitted licensees to consent to having their licenses amended to incorporate a license condition on the subject. Several licensees had these license conditions imposed by administrative license amendment (e.g., "Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Conforming License Amendments To Incorporate the Mitigation Strategies Required by Section B.5.b. of Commission Order EA-02-026 and the Radiological Protection Mitigation Strategies Required by Commission Order EA-06-137," dated August 16, 2007). In its Power Reactor Security Requirements final rule (74 FR 13926; March 27, 2009), the NRC established in § 50.54(hh)(2) a regulation that provides a performance-based requirement that encompasses the mitigating strategies required under Order EA-06-137 and its associated license condition. The MBDBE rule moves § 50.54(hh)(2) to the new § 50.155(b)(3). As a result, neither Order EA-06-0137 nor the license condition is necessary once the MBDBE rule goes into effect. Accordingly, the NRC finds that good cause is shown to rescind Order EA-06-137 for each licensee that received the order. Because the new § 50.155(b)(3) provides the same requirements as the license condition

associated with Order EA-06-0137, the license condition is deemed removed from each applicable power reactor license once the MBDBE rule goes into effect.

Order EA-02-026, issued February 25, 2002, included a section, numbered B.5.b, in its attachment 2, requiring mitigating strategies for large fires or explosions at nuclear power plants. Extensive interactions among the NRC, industry, and licensees refined the strategies required by the order. In 2007, the NRC issued to all then-operating power reactor licensees an administrative license amendment (e.g., "Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 - Conforming License Amendments To Incorporate the Mitigation Strategies Required by Section B.5.b. of Commission Order EA-02-026," dated July 11, 2007), containing a license condition entitled, "Mitigation Strategy License Condition," which required licensees to use 14 mitigating strategies. In the Power Reactor Security Requirements final rule, the NRC established in §§ 50.54(hh), 50.34(i), and 52.80(d) regulations that made the requirements of Order EA-02-026 generically applicable to power reactor licensees and applicants. In the Power Reactor Security Requirements final rule, the Commission explained that operating power reactor licensees already had procedures in place that complied with the new § 50.54(hh)(2). Licensees used the same implementation guidance to comply with the Mitigation Strategy License Condition as they used to comply with § 50.54(hh)(2), consequently compliance with § 50.54(hh)(2) is sufficient to comply with the Mitigation Strategy License Condition. Subsequently, the NRC rescinded Order EA-02-026, Section B.5.b by letter dated November 28, 2011, based on the fact that the regulations encompassed the order requirements. Because licensees comply with both the regulations and Mitigation Strategy License Condition via the same guidance, such that the former § 50.54(hh)(2) requirements encompass the license condition requirements, the NRC concludes that § 50.155(b)(3) fully replaces the requirements that exist in the Mitigation Strategy License Condition. Accordingly, under new § 50.155(i), the Mitigation Strategy License

Conditions imposed in 2007 are deemed removed from the licenses for those licensees that received that license condition.

The NRC is also removing certain license conditions contained within the combined licenses (COLs) held by Detroit Edison Company (for Enrico Fermi Nuclear Plant, Unit 3) (Fermi), South Carolina Electric & Gas Company (for Virgil C. Summer Nuclear Station, Units 3 and 4) (Summer), and Nuclear Innovation North America LLC, et al (for South Texas Project, Units 3 and 4) (STP). These licensees did not receive the Mitigation Strategies and SFPI Orders because the NRC had not issued COLs to these licensees at the time the NRC issued the Orders. When the NRC issued those COLs, it included license conditions that are equivalent to the orders' requirements. Because the license conditions contain the same requirements as the orders, and the provisions of § 50.155 replace the requirements imposed by the orders, the license conditions contain requirements equivalent to § 50.155 and will not be necessary once the MBD BE rule goes into effect. Therefore, the mitigation strategies for beyond-design-basis external events license conditions will be deemed removed from the Fermi, Summer, and STP COLs on **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**.

In addition to license conditions corresponding to the Mitigation Strategies Orders, the COLs for Fermi, STP, (Levy and Lee) included license conditions for the performance of staffing and communications assessments that correspond to the requests for information on those subjects in the NRC letter issued under § 50.54(f) on March 12, 2012. As discussed in the backfit assessment for § 50.155(b)(5) and (c)(4), the NRC used the information gathered in response to this letter in assessing the need to impose those additional requirements on the licensees on a generic rather than site-specific basis. Consequently, there is no longer a need to collect this information for these licensees because there will be no additional regulatory action taken to modify, suspend or revoke their licenses and the licensees are obligated to instead comply with the new requirements. Therefore, the license conditions calling for staffing

and communications assessments for these licensees will be deemed removed on **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**.

Because the final rule removes certain license conditions without actually amending the associated licenses, the NRC will issue by letter, an administrative license amendment to each applicable licensee that will remove the relevant license condition(s) from that licensee's license and include revised license pages.

For each of these orders being rescinded and license conditions being removed, the NRC is replacing it with equivalent requirements in the MBDBE rule. Although the NRC did not include these measures in the MBDBE proposed rule, the NRC has good cause for not providing notice and an opportunity to comment on them. Under the Administrative Procedure Act (5 U.S.C. 553(b)), an agency may waive the normal notice and comment requirements if it finds, for good cause, that they are impracticable, unnecessary, or contrary to the public interest. As authorized by 5 U.S.C. 553(b)(3)(B), the NRC finds good cause to waive notice and opportunity for comment on the measures because the measures will not change the applicable licensees' substantive requirements or have an impact on public health and safety or the common defense and security. The NRC is simply replacing the method that it uses to impose the same requirements on the same set of licensees. Removing the license conditions and rescinding the orders is also a logical outgrowth of the proposed rule, in which the Commission explained that the agency would make generically-applicable certain requirements in licensee-specific orders and license conditions for mitigation of beyond-design-basis events and orders for reliable SFP instrumentation. The Commission's decision to rescind the orders and remove the license conditions now that they are unnecessary was reasonably foreseeable. Similarly, Order EA-06-137 and its associated license condition have not been necessary since the 2009 Power Reactor Security Requirements final rule created § 50.54(hh).

### *Technology-neutral Emergency Response Data System*

The requirements of 10 CFR part 50, appendix E, section VI, for the ERDS are amended to reflect the use of up-to-date technologies and remain technology-neutral so that the equipment supplied by the NRC continues to be replaced as needed, without the need for future rulemaking as equipment becomes obsolete. In 2005, the NRC initiated a comprehensive, multi-year effort to modernize all aspects of the ERDS, including the hardware and software that constitute the ERDS infrastructure at NRC headquarters, as well as the technology used to transmit data from licensed power reactor facilities. As described in NRC Regulatory Issue Summary 2009-13, “Emergency Response Data System Upgrade From Modem to Virtual Private Network Appliance,” the NRC engaged licensees in a program that replaced the existing modems used to transmit ERDS data with Virtual Private Network (VPN) devices. The licensees now have less burdensome testing requirements, faster data transmission rates, and increased system security.

## **VI. Section-by-Section Analysis**

### ***§ 50.8 Information Collection Requirements: OMB Approval.***

This section, which lists all information collections in 10 CFR part 50 that have been approved by the Office of Management and Budget (OMB), is revised by adding a reference to § 50.155, the MBDBE rule. As discussed in the “Paperwork Reduction Act Statement” section of this document, the OMB has approved the information collection and reporting requirements

in the MBDBE rule. No specific requirement or prohibition is imposed on applicants or licensees in this section.

**§ 50.34 Contents of Applications; Technical Information.**

Section 50.34 identifies the technical information that must be provided in applications for construction permits and operating licenses. Paragraphs (a) and (b) of this section identify the information to be submitted as part of the preliminary or final safety analysis report, respectively. Revised paragraph (i) of this section identifies information to be submitted as part of an operating license application, but not necessarily included in the final safety analysis report.

The NRC is making an administrative change to § 50.34(a)(13) and (b)(12) to remove the word “stationary” from the requirement for power reactor applicants who apply for a construction permit or operating license, respectively. Section 50.34(a)(13) and 50.34(b)(12) were added to the regulations in 2009 to reflect the requirements of § 50.150(b) regarding the inclusion of information within the preliminary or final safety analysis reports for applicants subject to § 50.150. Section 50.34(a)(13) and (b)(12) were inadvertently limited to “stationary power reactors,” matching the wording of § 50.34(a)(1), (a)(12), (b)(10), and (b)(11), which pertain to seismic risk hazards for stationary power reactors. The NRC is changing the meaning of this requirement by removing the word “stationary” from these requirements. This change is to ensure consistency in describing the types of applications to which the requirements apply.

Section 50.34(i) requires each application for an operating license to include the applicant’s plans for implementing the requirements of § 50.155 including a schedule for achieving full compliance with these requirements. This paragraph also requires the application to include a description of: 1) the integrated response capability required by § 50.155(b) and 2) the equipment upon which the strategies and guidelines required by § 50.155(b) rely, including



the planned locations of the equipment and how the equipment and SSCs would meet the design requirements of § 50.155(c).

#### **§ 50.54 Conditions of Licenses.**

This rulemaking designates § 50.54(hh)(3) as § 50.54(hh)(2) to reflect the movement of the requirements formerly in § 50.54(hh)(2) to § 50.155(b)(3). Section 50.54(hh)(2) is revised to reflect that § 50.54(hh)(1)'s applicability is to the licensee rather than the facility and to correct the section numbers for the required certifications. Additionally, § 50.54(hh)(2) clarifies that the inapplicability is dependent upon the NRC docketing of the certifications rather than licensee submittal because § 50.82(a)(2) and § 52.110(b) set docketing as the point at which operation of the reactor is no longer authorized and fuel cannot be placed in the reactor vessel.

#### **§ 50.155 Mitigation of Beyond-Design-Basis Events.**

This final rule adds new § 50.155 Mitigation of beyond-design-basis events to 10 CFR part 50. The details of each paragraph within § 50.155 is explained in greater detail in the following paragraphs in this section.

##### *Paragraph 50.155(a), "Applicability"*

Paragraph 50.155(a) describes which entities are subject to the MBDBE rule. Paragraph 50.155(a)(1) provides that each holder of an operating license for a nuclear power reactor under 10 CFR part 50 and each holder of a COL under 10 CFR part 52 for which the Commission has made the finding under § 52.103(g) that the acceptance criteria have been met, is required to comply with the requirements of this rule until the time when the NRC has docketed the certifications described in § 50.82(a)(1) or § 52.110(a). These certifications inform the NRC that the licensee has permanently ceased to operate the reactor and permanently

removed all fuel from the reactor vessel. Upon the docketing of the certifications, by operation of law under §§ 50.82(a)(2) or 52.110(b), the licensee's 10 CFR part 50 or 52 license, respectively, no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel. At the time of NRC docketing of these certifications, control of the applicability of the requirements of § 50.155 for licensees transitions to paragraph 50.155(a)(2).

Paragraph 50.155(a)(2) addresses power reactor licensees that permanently stop operating and defuel their reactors and begin decommissioning the reactors. Paragraph 50.155(a)(2)(i) provides that when an entity subject to the requirements of § 50.155 submits to the NRC the certifications described in §§ 50.82(a)(1) or 52.110(a), and the NRC docket those certifications, then that licensee is required to comply only with the requirements of paragraphs 50.155(b) through (e), and (g) associated with maintaining or restoring SFP cooling capabilities for the reactor described in the § 50.82(a)(1) or § 52.110(a) certifications. In other words, the licensee may discontinue compliance with the requirements in § 50.155 associated with maintaining or restoring core cooling or the primary reactor containment functional capability for the reactor described in the § 50.82(a)(1) or § 52.110(a) certifications. Compliance with the requirements of paragraphs 50.155(b) through (e), and (g) associated with maintaining or restoring SFP cooling capabilities continues as long as spent fuel remains in the SFPs associated with the reactor described in the § 50.82(a)(1) or § 52.110(a) certifications, or until the criterion of § 50.155(a)(2)(ii) can be satisfied. Once those conditions are satisfied, control of the applicability of the requirements of § 50.155 for licensees transitions to paragraphs 50.155(a)(2)(iv) or 50.155(a)(2)(ii), respectively.

Paragraph 50.155(a)(2)(ii) discontinues all the requirements of § 50.155 except those provided in paragraph 50.155(b)(3) once the decay heat of the fuel in the SFP can be removed solely by heating and boiling of water within the SFP and the boil-off period provides sufficient time for the licensee to obtain off-site resources to sustain the SFP cooling function indefinitely.

To comply with the requirement of paragraph 50.155(a)(2)(ii), licensees must perform and retain an analysis demonstrating that sufficient time has passed since the fuel within the SFP was last irradiated such that the fuel's low decay heat and boil-off period provide sufficient time in an emergency for the licensee to obtain off-site resources to sustain the SFP cooling function indefinitely.

Paragraph 50.155(a)(2)(iii) exempts the licensee for Millstone Power Station Unit 1, Dominion Nuclear Connecticut, Inc. from the requirements of § 50.155.

Paragraph 50.155(a)(2)(iv) allows 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) to cease compliance with all requirements in § 50.155, once a power reactor licensee has permanently stopped operating, defueled its reactor, and removed all irradiated fuel from the SFP(s) associated with the reactor described in the § 50.82(a)(1) or § 52.110(a) certifications.

*Paragraph 50.155(b), "Integrated response capability"*

Paragraph 50.155(b) requires that each applicant or licensee develop, implement, and maintain an integrated response capability that includes: 1) mitigation strategies for beyond-design-basis external events, 2) reevaluated seismic and flooding hazards mitigation strategies and guidelines, or event-specific approaches, if applicable, 3) extensive damage mitigation guidelines, 4) integration of these strategies and guidelines with emergency operating procedures, 5) sufficient staffing to support implementation of the guidelines in conjunction with the EOPs, and 6) a supporting organizational structure with defined roles, responsibilities, and authorities for directing and performing these strategies, guidelines, and procedures. The intent of this requirement is that the operating license and COL holders described in paragraph 50.155(a) be able to mitigate the consequences of a wide range of initiating beyond-design-basis events and plant damage states that can challenge public health and safety.

The specification of strategies, guidelines and procedures for the response capability not only defines the required scope of the capability but also sets forth the expectation that the response capability must include planned methods for responding that are documented in some form of written instruction. To serve their function, these strategies, guidelines and procedures must be used by trained licensee personnel capable of properly directing and implementing the strategies and guidelines. Accordingly, paragraph 50.155(b)(5), in conjunction with paragraph 50.155(d), requires that the response capability include an adequate number of licensee personnel with the knowledge and skills to implement the strategies, guidelines and procedures and that the mitigation activities of these individuals be coordinated in accordance with a defined command and control structure required by paragraph 50.155(b)(6).

Paragraph 50.155(b) specifies that the integrated response capability be “developed, implemented, and maintained.” This language reflects NRC consideration that whereas certain elements of the integrated response capability have been developed and are currently in place (e.g., the EDMGs), other elements (e.g., guidelines to mitigate beyond-design-basis external events) may require additional efforts to complete and integrate. The term “implement” is used in paragraph 50.155(b) to mean that the integrated response capability is established and available to respond, if needed (e.g., the licensee has approved the strategies, guidelines, and procedures for use). The term “maintain” as used in paragraph 50.155(b) reflects the NRC’s intent that licensees ensure that the integrated response capability, once established, be preserved, including the need to maintain equipment relied on for the mitigation strategies such that the equipment is capable of fulfilling its intended function, and consistent with the change control provisions of paragraph 50.155(g).

Paragraph 50.155(b)(1) requires applicants and licensees to develop, implement and maintain strategies and guidelines to mitigate beyond-design-basis external events from natural phenomenon. These strategies and guidelines are developed assuming a loss of all ac power

concurrent with either a loss of normal access to the ultimate heat sink or, for passive reactor designs, a loss of normal access to the normal heat sink. These provisions require that the strategies and guidelines be capable of being implemented site-wide and include:

- i. Maintaining or restoring core cooling, containment, and spent fuel pool cooling capabilities; and
- ii. Enabling the use and receipt of offsite assistance and resources to support the continued maintenance of the functional capabilities for core cooling, containment, and spent fuel pool cooling indefinitely, or until sufficient site functional capabilities can be maintained without the need for the mitigation strategies.

New reactors may establish different approaches from those of operating reactors in developing strategies to mitigate beyond-design-basis events. For example, new reactors may use installed plant equipment for both the initial and long-term response to an ELAP with less reliance on portable equipment and offsite resources than currently operating nuclear power plants. The NRC would consider the specific plant approach when evaluating the SSCs relied on as part of the mitigating strategies for beyond-design-basis events. Additional information on these strategies is provided in RG 1.226, which endorses an updated version of the industry guidance, for use by applicants and licensees, that incorporates lessons learned and feedback stemming from the implementation of the Mitigation Strategies Order, consistent with Commission direction.

Paragraph 50.155(b)(1) limits the requirements for mitigation strategies to addressing “external events from natural phenomena.” This language is meant to differentiate these requirements from those that previously existed in § 50.54(hh)(2) that are now located in § 50.155(b)(3), and which address beyond-design-basis external events leading to loss of large areas of the plant due to explosions and fire.

The requirement to enable “the acquisition and use of offsite assistance and resources to support the functions required by paragraph 50.155(b)(1)(i) of this section indefinitely, or until sufficient site functional capabilities can be maintained without the need for the mitigation strategies” means that licensees need to plan for obtaining sufficient resources (e.g., fuel for generators and pumps, cooling and makeup water) to continue removing decay heat from the irradiated fuel in the reactor vessel and SFP as well as to remove heat from containment as necessary until an alternate means of removing heat is established. The alternate means of removing heat could be achieved through repairs to existing SSCs, commissioning of new SSCs, or reduction of decay heat levels through the passage of time sufficient to allow heat removal through losses to the ambient environment. More detailed planning for offsite assistance and resources is necessary for the initial period following the event; less detailed planning is necessary as the event progresses and the licensee can mobilize additional support for recovery.

Paragraph 50.155(b)(2) requires licensees who received the March 12, 2012, NRC letter issued under § 50.54(f) to consider the effects of the reevaluated flooding and seismic hazards information developed in response to that request, if the magnitude of those hazards exceeds the external design basis of the licensee’s facility. In paragraph 50.155(b)(2), the phrase, “developed in response,” is intended to allow licensees the flexibility to rely on NRC-reviewed licensee adjustments to the hazard calculations originally submitted in response to the § 50.54(f) request. As discussed further below in this section, the reevaluated hazards are conservative and bounding, and licensees are provided the flexibility in this final rule to remove conservatism for their facility to enable more cost-effective means for addressing the information. The words, “if the magnitude of those hazards,” are intended to convey that it is the magnitude that is being compared to determine which effects to use in developing strategies, guidelines, or approaches. The current external design basis of the facility, for the purposes of

§ 50.155, is the information on external hazards that was developed during licensing under GDC-2 or the PDC using guidance and methods that were state-of-the-art at the time of licensing. Differences may exist between the external design basis for a facility and the reevaluated flooding and seismic hazard information due to changes in the guidance and methods used for the determination of conservative values to determine the design basis for initial siting of a facility.

The words, “reevaluated hazard information,” are intended to convey that the reevaluated hazard information is not the design basis for currently operating licensees. The NRC recognizes that the methods and guidance are intended to establish specific values or ranges of values for controlling parameters as reference bounds for the design, and are therefore conservative and include margin for the limited accuracy, quantity and period of time in which historical data on the natural phenomena reported for the site and surrounding area has been accumulated. Accordingly, these calculations are not indicative of real external events, for a specific nuclear facility, based on its known historic external events. However, addressing the reevaluated hazard information within the mitigation strategies results in a greater capability for addressing external event uncertainty consistent with the Commission’s intent for these requirements, and implements the Commission’s direction in SRM-COMSECY-14-0037.

Recognizing the nature of the reevaluated hazard information, the NRC, through paragraph 50.155(b)(2), provides licensees with flexibility in the requirements for addressing the information. Licensees are required to address the effects of the reevaluated hazard information using one or both of the 1) the mitigation strategies and guidelines of paragraph 50.155(b)(1) as implemented or modified, and 2) event-specific approaches. As further illustration of the flexibility provided, RG 1.226 provides acceptable approaches for addressing this information that includes 5 different paths that may be used for both flooding

and seismic reevaluated hazard information, including both deterministic and risk-informed approaches. A licensee using the first approach can show that the mitigation strategies as implemented originally under the Mitigation Strategies Order or as modified to address the greater magnitude of the reevaluated hazards are sufficient to address the effects. This approach is similar to the basic approach in paragraph 50.155(b)(1). The words, “event-specific approaches,” mean that a licensee may address the reevaluated hazard information by considering the damage state that would occur due to the hazard scenario. The licensee may then use all available equipment and SSCs to address that damage state, not necessarily assuming the occurrence of the damage state of paragraph 50.155(b)(1) of a loss of all ac power and a loss of normal access to the ultimate heat sink if it would not be a consequence of the hazard. For example, for some flooding scenarios, a licensee may be able to estimate the damage state that the flooding scenario could create at the facility, which enables the licensee to then identify the equipment available to address the effects of the flooding scenario, and achieve and maintain a safe shutdown state. It is also possible for the licensee to take effective pre-emptive measures to place the facility in a safe state for some flood scenarios with sufficient warning time. The words, “event-specific approaches,” are intended to provide this flexibility and do not include the performance elements of paragraph 50.155(b)(1).

Paragraph 50.155(b)(3) contains the requirements for EDMGs that previously existed in § 50.54(hh)(2) and are described in the Power Reactor Security Requirement final rule (74 FR 13925, 13955-58). The movement of these requirements consolidates the requirements for beyond-design-basis strategies and guidance into a single section to promote efficiency in their consideration and allow for better integration. Although the wording of § 50.155(b)(3) differs from that of previous § 50.54(hh)(2), no substantive change in the requirements is intended.



The introductory text of paragraph 50.155(b)(3) that is contained in paragraph 50.155(b) is worded so that it requires that licensees “develop, implement, and maintain” the strategies and guidance required in paragraph 50.155(b)(3) rather than using the wording of previous § 50.54(hh)(2) to require that licensees “develop and implement” the described guidance and strategies. The addition of the word “maintain” is to correct an inconsistency with the wording of § 50.54(hh)(1), which was issued along with § 50.54(hh)(2) in the Power Reactor Security Requirements final rule. The requirement as it was originally issued in the Interim Compensatory Measures Order, EA-02-026, dated February 25, 2002, was worded to require licensees to “develop” specific guidance, while the corresponding license conditions imposed by the conforming license amendment was worded to require each affected licensee to “develop and maintain” strategies. The NRC concludes that the phrase “develop, implement, and maintain” provides better clarity of what is necessary for compliance with the requirements without substantively changing the requirements.

Paragraph 50.155(b)(4) requires licensees to integrate the capabilities required by paragraph 50.155(b) with EOPs. The Commission’s intent regarding integration of strategies, guidelines, and procedures was introduced in the section-by-section analysis of the paragraph 50.155(b) requirement for an integrated response capability and is described further under “Integration with EOPs” of Section V.C, Final Rule Regulatory Bases, of this notice.

Paragraph 50.155(b)(5) requires licensees to provide the staffing necessary for an integrated response capability to support use of the capabilities in paragraph § 50.155(b). The number and composition of the response staff should be sufficient to implement the capabilities required by paragraph 50.155(b). This requirement is not intended to require current licensees, who have performed staffing analyses to support implementation of the Mitigation Strategies Order or to support implementation of EDMGs, to redo these staffing analyses. Instead, the staffing requirement is expected to be verified through the use of drills, existing training

analyses and other methods. The word “sufficient” is used in paragraph 50.155(b)(5) to reflect its meaning: “adequate.”

Paragraph 50.155(b)(6) requires licensees to have a supporting organizational structure with defined roles, responsibilities, and authorities for directing and performing the capabilities required by paragraph 50.155(b). This requirement is separate from the requirement in 10 CFR part 50, appendix E, section IV.A and is intended to support regulatory clarity by providing a clear demarcation between the command and control requirement implemented under 10 CFR part 50, appendix E and those required for § 50.155. Accordingly, while a licensee may voluntarily choose to use existing 10 CFR part 50 appendix E plans and implementing procedures to implement this requirement, that approach is not required by paragraph 50.155(b)(6).

#### *Paragraph 50.155(c) Equipment requirements*

Paragraph 50.155(c)(1) requires that equipment relied on for the mitigation strategies of paragraph 50.155(b)(1) must have sufficient capacity and capability to simultaneously maintain or restore core cooling, containment, and SFP capabilities for all the power reactor units and spent fuel pools within the licensee’s site boundary.

The phrase sufficient, “capacity and capability,” in paragraph 50.155(c)(1) means that the equipment, and the instrumentation relied on to support the decision making necessary to accomplish the associated mitigating strategies of paragraph 50.155(b)(1), has the design specifications necessary to assure that it functions and provides the requisite plant information when subjected to the conditions it is expected to be exposed to in the course of the execution of those mitigating strategies. These design specifications include appropriate consideration of environmental conditions that are predicted in the thermal-hydraulic and room heat up analyses used in the development of the mitigating strategies responsive to paragraph 50.155(b)(1).

Paragraphs 50.155(c)(2) and (c)(3) require reasonable protection of the equipment in paragraphs 50.155(b)(1) and (b)(2), respectively. Paragraph 50.155(c)(2) requires reasonable protection from the effects of natural phenomena that are equivalent in magnitude to the phenomena assumed for developing the external design basis of the facility.

Paragraph 50.155(c)(3) requires reasonable protection from the effects of the reevaluated hazards determined in response to the March 12, 2012, NRC letter issued under § 50.54(f), but only applies to flooding and seismic reevaluated hazards, and only when those calculated hazards exceed the external design basis of the facility. “Reasonable protection” is the means by which the NRC applies the appropriate level of treatment to equipment and SSCs that are required to function for § 50.155, 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. Safety-related SSCs that function initially in response to beyond-design-basis external events have two sets of functions: safety-related functions and beyond-design-basis 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” (69 FR 68008; November 22, 2004).

The regulatory requirements and resulting level of regulatory assurance for the beyond-design-basis functions (i.e., the beyond-design-basis 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 “reasonable protection” requirement is the means for applying a reduced level of treatment for the beyond-design-basis functions and establishes an appropriate level of assurance. The phrase, “reasonable protection,” was initially proposed in recommendation 4.2 of the NTF Report in the context of a recommendation for the

NRC to issue an order to licensees to provide “reasonable protection” of equipment required by § 50.54(hh)(2) from the effects of design-basis external events along with providing additional sets of equipment as an interim measure during a subsequent rulemaking on prolonged station blackout. The NTTF based this recommendation on the potential usefulness of the EDMGs in circumstances that do not involve the loss of a large area of the plant and explained that reasonable protection from external events as used in the NTTF Report meant that the equipment must “be stored in existing locations that are reasonably protected from significant floods and involve robust structures with enhanced protection from seismic and wind-related events.”

The NRC carried forward the use of the phrase “reasonable protection” in the Mitigation Strategies Order with regard to the protection required for equipment associated with the mitigation strategies. That order did not, however, define “reasonable protection.” The NRC guidance in JLD-ISG-2012-01, Revision 0, discussed “reasonable protection” as follows:

Storage locations chosen for the equipment must provide protection from external events as necessary to allow the equipment to perform its function without loss of capability. In addition, the licensee must provide a means to bring the equipment to the connection point under those conditions in time to initiate the strategy prior to expiration of the estimated capability to maintain core and spent fuel pool cooling and containment functions in the initial response phase.

In JLD-ISG-2012-01, Revision 0, the NRC endorsed NEI 12-06, Revision 0, as providing an acceptable method to provide reasonable protection, storage, and deployment of the equipment associated with the Mitigation Strategies Order. The NEI 12-06, Revision 0, also omitted a definition for the phrase “reasonable protection,” but did provide guidelines for use by licensees for protecting the equipment from the hazards that would be commonly applicable: 1) seismic hazards; 2) flooding hazards; 3) severe storms with high winds; 4) snow, ice and extreme cold; and 5) high temperatures. Later revisions to the guidance for the Mitigation Strategies Order included further discussions on reasonable protection. The NEI 12-06,

Revision 2, defined reasonable protection as “[s]toring on-site FLEX equipment in configurations such that no one external event can reasonably fail the site FLEX capability (N) when the required FLEX equipment is available.” The JLD-ISG-2012-01, Revision 1 endorsed the approach of NEI 12-06, Revision 2 as an acceptable method of providing reasonable protection to the equipment associated with the strategies and guidelines developed under the Mitigation Strategies Order, clarifying that the elements of the approach that should be addressed are:

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

The NRC’s RG 1.226 carries forward this guidance on reasonable protection, endorsing the current version of NEI 12-06 as providing an acceptable method of complying with paragraphs 50.155(c)(2) and (c)(3).

The guidance of RG 1.226 and NEI 12-06 includes the use of structures designed to or evaluated as equivalent to American Society for Civil Engineers (ASCE) Standard 7-10, “Minimum Design Loads for Buildings and Other Structures,” for the seismic and high winds hazards, rather than requiring the use of a structure that meets the plant’s design basis for the safe shutdown earthquake or high winds hazards including missiles. The NEI 12-06 guidelines also allow storage of the equipment above the flood elevation from the most recent site flood analysis, storage within a structure designed to protect the equipment from the flood, or storage below the flood level if sufficient time would be available and plant procedures would address the need to relocate the equipment above the flood level based on the timing of the limiting flood scenario(s). The NEI 12-06 guidelines further provide that multiple sets of equipment may be stored in diverse locations in order to provide assurance that sufficient equipment would remain

deployable to assure the success of the strategies following an initiating event. The NRC-endorsed guidelines in NEI 12-06 do not consider concurrent, unrelated beyond-design-basis external events to be within the scope of the initiating events for the mitigating strategies. There is an assumption of a beyond-design-basis external event that establishes the event conditions for reasonable protection, and then it is assumed that the event leads to an ELAP and LUHS. But, for example, there is not an assumption of multiple beyond-design-basis external events occurring at the same time. As a result, reasonable protection for the purposes of compliance with paragraphs 50.155(c)(2) and (c)(3) allows the provision of specific sets of equipment for specific hazards with the required protection for those sets of equipment being against the hazard for which the equipment is intended to be used.

The NRC use of the phrase “reasonable protection” in paragraphs 50.155(c)(2) and (c)(3) is intended to distinguish the protection of GDC-2 or the PDCs, as applicable, which require that SSCs important to safety be designed to withstand the effects of natural phenomena, from that of paragraphs 50.155(c)(2) and (c)(3), which allow damage to, or loss of, specific pieces of equipment so long as the capability to use sufficient sets of the remaining equipment to accomplish strategies and guidelines is retained. “Reasonable protection” also allows for protection of the equipment using structures that could deform as a result of natural phenomena so long as the equipment could be deployed from the structure to its place of use.

The remaining portion of paragraphs 50.155(c)(2) and (c)(3) sets the hazard level for which “reasonable protection” of the equipment must be provided. The hazard level is the level determined for the design basis for the facility for protection of safety-related SSCs from the effects of natural phenomena under paragraph 50.155(c)(2). Paragraph 50.155(c)(3) sets the necessary level for the protection for equipment used in paragraph 50.155(b)(2) and therefore only applies if the magnitude of the licensee’s reevaluated hazards, stemming from the March 12, 2012, NRC letter issued under § 50.54(f), exceeds the hazard level determined for the

design basis for the facility. When applicable, paragraph 50.155(c)(3) sets the level for reasonable protection at the reevaluated hazard levels determined in response to the March 12, 2012, NRC letter.

Paragraph 50.155(c)(4) requires that each licensee provide sufficient communications capability, both onsite and offsite, to support implementation of the mitigation strategies and guidelines of paragraphs 50.155(b)(1) and (b)(2). The communications capability requirement is linked directly to the mitigation strategies requirements in paragraphs 50.155(b)(1) and (b)(2) because of the essential nature of effective communications to successful implementation of the mitigation strategies and guidelines for beyond-design-basis external events. Accordingly, these requirements mean that the communication capability must account for the assumed damage state for paragraph 50.155(b)(1), which is a loss of all ac power concurrent with either a loss of normal access to the ultimate heat sink or, for passive reactor designs, a loss of normal access to the normal heat sink. Similarly, these requirements mean that the communication capability must account for the reevaluated hazard information under paragraph 50.155(b)(2).

In its letter dated March 12, 2012, issued under § 50.54(f), the NRC sought information from licensees on potential enhancements to support emergency responses to beyond-design-basis events effecting multiple units at a site. The NRC endorsed NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," the industry-developed guidance for the responses to this request, as providing an appropriate method to respond. The NRC assessed licensee responses regarding communications capabilities and concluded that the need for these capabilities should be included in the MBDBE rule as a performance-based requirement. Recognizing that a licensee may modify its approach to complying with the requirements of § 50.155 as allowed in paragraph 50.155(g), however, the NRC does not seek to bind licensees to providing the communications capabilities discussed in their responses to the March 12, 2012, letter, but

instead requires under this paragraph that licensees provide sufficient communications capabilities to accomplish the strategies and guidelines as they exist. Acceptable approaches for addressing this requirement are provided in RG 1.228.

*Paragraph 50.155(d) Training requirements*

Paragraph 50.155(d) requires that each licensee specified in paragraph 50.155(a) provide for the training and qualification of licensee personnel that perform activities in accordance with the capabilities required under paragraph 50.155(b). Paragraph 50.155(d) requires training and qualification on these activities to be developed using a systems approach to training as defined in § 55.4. Licensee training programs, such as those required for licensed operators under 10 CFR part 55, "Operators' Licenses," the programs for plant personnel specified under § 50.120, "Training and Qualification of Nuclear Power Plant Personnel," and the training for emergency response personnel required by 10 CFR part 50, appendix E, section IV.F, "Training," can provide for the knowledge and abilities required for performing activities in accordance with the strategies and guidelines required by this final rule. The strategies and guidelines required by the MBDBE rule can use new methods or equipment that require knowledge and abilities not currently addressed under existing training programs and, as a result, there can be gaps in these training programs that must be addressed to support effective use of the strategies and guidelines. Accordingly, the MBDBE rule requires that licensees provide for the training of personnel using a systems approach to training (SAT), except for elements already covered under other NRC regulations. The SAT process, which is acceptable for meeting training requirements under 10 CFR part 55 and § 50.120, is acceptable for licensee identification and resolution of any current gaps or future modifications to personnel training that may be necessary to provide for the training of personnel performing activities under the MBDBE rule. The NRC recognizes that there are other training programs that are currently



acceptable for meeting other training required by regulation (e.g., 10 CFR part 50, appendix E, section IV.F) that do not use the SAT process. In light of the existence of these training programs, which have been found acceptable for more frequently occurring design-basis events, the NRC has determined that these training programs can meet the needs for common elements with beyond-design-basis event mitigation. Therefore, the NRC is not requiring licensees to revise these training programs to use the SAT process to meet the MBDBE requirements. Licensees are required to use the SAT process for newly identified training requirements supporting the effective use of the strategies and guidelines required by the MBDBE rule.

*Paragraph 50.155(e) Drills or Exercises*

Paragraph 50.155(e) requires that each licensee and applicant specified in paragraph 50.155(a) conduct drills or exercises for personnel that perform activities in accordance with the strategies and guidelines identified in paragraphs 50.155(b)(1) and (3). Under paragraph 50.155(e)(4), this requirement is extended to include the strategies and guidelines of paragraph 50.155(b)(2), because paragraph 50.155(e)(4) applies to current operating licensees who received the March 12, 2012, NRC letter issued under § 50.54(f) and therefore may have mitigation strategies for reevaluated seismic and flooding hazards. The use of drills or exercises allows demonstration and evaluation of the licensee's capability to execute the integrated response capability required by paragraph 50.155(b) mitigation strategies and guidelines in light of the specific plant damage and operational conditions presented by an initiating event. The word "integrated" is used to describe the licensee's or applicant's approach to using all tools, spaces, qualified personnel and resources during a drill or exercise to the extent practical given a set of initiating conditions and within the bounds of the drill or exercise scenario. When two or more strategies or guidelines in paragraphs 50.155(b)(1) and (3) (or

paragraphs 50.155(b)(1) through (3) as applicable) are used, “integrated” means that transitions to and from one set of strategies or guidelines to another are coordinated.

This final rule uses the words “drill” and “exercise” to mean an evaluated drill or exercise that reasonably simulates the interactions between the appropriate emergency facilities, teams and support groups or individuals that would be expected to occur during the event. For the initial drill or exercise, the licensee is required to demonstrate its capability to transition to and use one or more of the strategies that would be required by paragraphs 50.155(b)(1) and (3) (or paragraphs 50.155(b)(1) through (3) as applicable) from the AOPs or EOPs, whichever governs for the initiating event and plant degraded conditions, using the equipment and communication systems used for the EOPs and guidelines.

Paragraph 50.155(e)(1) requires the initial drill or exercise to be conducted within 12 months prior to the issuance of the first operating license (OL) for the unit described in the application. This allows the license applicant to implement any improvements or corrective actions identified during the drill or exercise, and allows the Commission to consider the results of any drill or exercise actions in the decision on whether to authorize the OL. Because paragraph 50.155(e)(1) applies only to applicants for operating licenses, it does not apply to holders of operating licenses under 10 CFR part 50, who are subject to paragraph 50.155(e)(4), or holders of COLs under 10 CFR part 52, who are subject to paragraphs 50.155(e)(2) through (4). Following issuance of the operating license, the applicant, as a licensee, is subject to paragraph 50.155(e)(3).

Paragraph 50.155(e)(2) requires the licensee to conduct an initial drill or exercise that demonstrates the capability to transition from the AOPs or EOPs, using one or more of the strategies and guidelines in paragraphs 50.155(b)(1) and (3) of this section, and demonstrates the communications capability required by paragraph 50.155(c)(4), no more than 12 months before the date specified for completion of the last inspections, tests, and analyses in the

inspections, tests, analyses, and acceptance criteria (ITAAC) completion schedule as required by § 52.99(a) for the unit described in the combined license. This schedule allows the licensee to implement any improvements or corrective actions identified during the drill or exercise, and allows the Commission to consider the results of any drill or exercise actions.

The paragraph 50.155(e)(2) requirement for initial drills or exercises is limited to holders of COLs under 10 CFR part 52 before the Commission has made the finding under § 52.103(g). A COL holder for whom the Commission has already made the finding under § 52.103(g) as of the effective date of the MBDBE rule is not subject to paragraph 50.155(e)(2), but instead is subject to paragraph 50.155(e)(4) for the initial drill requirements.

Paragraph 50.155(e)(3) requires holders of operating power reactor licenses issued under 10 CFR part 50 subsequent to the effective date of this final rule, and holders of COLs issued under 10 CFR part 52 for whom the Commission has made the finding under § 52.103(g) subsequent to the effective date of this final rule, to conduct subsequent drills or exercises that collectively demonstrate a capability to use at least one of the strategies and guidelines in each of paragraphs 50.155(b)(1) and (3) (or paragraphs 50.155(b)(1) through (3) as applicable) in succeeding 8-year intervals. This requires that the drills or exercises performed to demonstrate this capability include transitions from other procedures and guidelines, as applicable, and demonstrate the communications capability required by paragraph 50.155(c)(4). This requirement differs from the paragraphs 50.155(e)(1) and (2) initial demonstration requirement, in that it requires licensees to demonstrate a continuing capability, and as such, it is structured to require licensees to demonstrate at least one of the strategies and guidelines from each of the guidelines during the 8-year interval.

Paragraph 50.155(e)(4) requires holders of operating licenses or COLs for which the Commission has made the finding under § 52.103(g), as of the effective date of the MBDBE rule, to conduct an initial drill or exercise that demonstrates the capability to transition to and

use one or more of the strategies and guidelines in paragraphs 50.155(b)(1) and (3) (or paragraphs 50.155(b)(1) through (3) as applicable) and demonstrate the communications capability required in paragraph 50.155(c)(4). Paragraph 50.155(e)(4) is the equivalent to paragraphs 50.155(e)(1) and (2) for initial drills or exercises, but applies to current licensees. Following this initial drill or exercise, the licensee is required to conduct subsequent drills or exercises that collectively demonstrate a capability to use at least one of the strategies and guidelines in paragraph 50.155(b)(1) or (b)(2), and at least one of the strategies and guidelines in paragraph (b)(3) in succeeding 8-year intervals. Paragraph 50.155(e)(4) is equivalent to paragraph 50.155(e)(3) for subsequent drills or exercises, but applies to current licensees under 10 CFR part 50 and those under 10 CFR part 52 for whom the Commission has made the finding under § 52.103(g) as of the effective date of the rule.

*Paragraph 50.155(f) Spent Fuel Pool Monitoring*

Paragraph 50.155(f) requires each licensee to provide a reliable means to remotely monitor wide-range water level for each SFP at its site until five years have elapsed since all of the fuel within that SFP was last used in a reactor vessel for power operation. This requirement enables effective prioritization of event mitigation and recovery actions following beyond-design-basis external events. This provision does not apply to General Electric Mark III upper containment pools. These pools are referred to in the UFSARs for the applicable plants, Clinton Power Station, Grand Gulf Nuclear Station, Perry Nuclear Power Plant, and River Bend Station, by different terms, such as “upper containment fuel storage pool,” “upper containment fuel pool,” and “containment upper pool.” The use of the term “upper containment pool” in paragraph 50.155(f) and in this discussion of the paragraph means the pools described in those UFSARs by those terms. The Mark III upper containment pools are only to store fuel during refueling outages at which time the upper pool and reactor coolant system are merged, mitigating the

potential for operator distraction should an extreme event happen at that time. After refueling is completed, and the reactor is critical, no fuel can be stored in the upper pool, and instead fuel must either be in the reactor and used to generate power, or it is spent fuel, and stored in the SFP.

#### *Paragraph 50.155(g) Documentation of Changes*

Paragraph 50.155(g) establishes requirements that govern changes in the implementation of the requirements of § 50.155. Prior to implementing a change, paragraph 50.155(g)(1) requires the licensee to demonstrate that the provisions of § 50.155 continue to be met and to maintain documentation of changes until the requirements of § 50.155 no longer apply. This documentation requirement applies to all changes that impact the implementation of § 50.155. The NRC recognizes that the licensee will maintain documentation of non-significant changes as part of their normal procurement and configuration management programs.

Regarding the meaning of demonstrated compliance, changes to the implementation of § 50.155 that are consistent with the regulatory guidance supporting the MBDBE rule are acceptable. Additionally, changes to the implementation of the MBDBE requirements that are approved alternative approaches, which are shown to apply to the licensee's facility consistent with the NRC's approval, are also acceptable. Changes that are outside of endorsed guidance or approved alternatives can be demonstrated to comply with § 50.155; however in this regard the NRC emphasizes that licensees must be mindful of the following:

1. The NRC initially issued requirements for the mitigation of beyond-design-basis external events in the Mitigation Strategies Order under the adequate protection provision of § 50.109(a)(4)(ii). The NRC seeks to ensure through § 50.155(g) that the resulting capabilities are maintained. A failure to maintain the functional capabilities first

imposed by the Mitigation Strategies Order and now part of the MBDBE rule would challenge the continued reasonable assurance of adequate protection of public health and safety and not equate to demonstrated compliance with § 50.155.

2. The mitigation strategies are intended to address uncertainties associated with beyond-design-basis external events, and the requirements as implemented provide a capability that can be used and adapted to any event that exceeds the external design basis of the facility. While it was necessary for practical reasons to make assumptions concerning a damage state and conditions that could then be used to provide this additional capability, it is equally important to preserve the attributes of the mitigation strategies that provide flexibility, and enable adaptation to unknown events. Significantly impacting these attributes would reduce the capability for a licensee to successfully apply the strategies to real events. Such a change would not constitute demonstrated compliance with § 50.155. For example, the mitigation strategies use multiple sets of equipment, use strategies and guidelines rather than step-by-step procedures, have contingencies for conditions more severe than the assumed damage state used to develop the capability, employ alternate connection points, and are supported with offsite resources to provide for an indefinite capability. All of these are important elements of the additional mitigation capability for beyond-design-basis external events required by § 50.155. Changes that result in a significant reduction of these attributes would result in the mitigation strategies being less flexible and adaptable, and therefore being less likely to be successfully deployable following a beyond-design-basis external event. Such changes would not constitute demonstrated compliance. For example, permanent removal of a set of equipment clearly removes flexibility and lessens the potential for successful mitigation of a beyond-design-basis external event.

Paragraph 50.155(g)(2) requires that changes in the implementation of the requirements of § 50.155 subject to other change control requirements be processed via their respective change control processes, unless the changes being evaluated impact only the implementation of § 50.155. Changes to the implementation of § 50.155 can impact multiple aspects of the facility. Paragraph 50.155(g)(2) is intended to clearly identify that other change control requirements such as those in §§ 50.59, 50.54(p), 50.54(q), 73.58, and fire protection change controls may apply depending on the extent of the change and the aspects of the facility that are impacted. The NRC understands that this requirement is not necessary because it is the licensee's obligation to comply with all applicable regulations. However, the NRC also understands the complexity of facility changes, and therefore maintains this requirement for regulatory clarity in the final rule consistent with public comment. For example, a change to an SSC having both a beyond-design-basis function for § 50.155 and a design-basis function, would have the aspects of the change involving its beyond-design-basis functions addressed under paragraph 50.155(g), and the aspects of the change involving the design-basis functions addressed under § 50.59 or any other applicable change control requirement. Another example may be a change to deploy in place equipment for § 50.155, that in turn impacts ingress and egress for an area of the facility important for security, and therefore needs to be evaluated under § 73.58.

#### *Paragraph 50.155(h) Implementation*

Paragraph 50.155(h) establishes the compliance schedule for the MBDBE rule. Paragraph 50.155(h)(1) establishes a compliance date of 3 years following the effective date of the MBDBE rule for each holder of a 10 CFR part 50 operating license who received NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," on the effective date of the final rule

and a compliance date of 2 years following the effective date of the MBDBE rule for each holder of a 10 CFR part 50 operating license that did not receive NRC Order EA-13-109 and each holder of a 10 CFR part 52 combined license for which the Commission has made the § 52.103(g) finding as of the effective date of the rule. Paragraph 50.155(h)(2) provides a flexible schedule provision for currently operating power licensees. For part 50 operating licensees that need additional time beyond the compliance schedule established in paragraph 50.155(h)(1), to address the requirements in paragraph 50.155(b)(2), the NRC will consider an alternative compliance date if the licensee submits to the Director, Office of Nuclear Reactor Regulation, under § 50.4, no later than 90 days following the effective date of the MBDBE rule, a schedule request to use paragraph 50.155(h)(2). The request to use paragraph 50.155(h)(2) must provide good cause for exceeding the 2-year or 3-year compliance date of paragraph 50.155(h)(1). Unless the NRC notifies a licensee that their request to use paragraph 50.155(h)(2) does not provide good cause, the request is considered approved by the Commission 120 days after submission.

Licensees requesting to use paragraph 50.155(h)(2) may show good cause by supporting their request with the reasons why compliance with the paragraph 50.155(b)(2) requirement could not be achieved and a basis for the revised compliance schedule. In addition to the extended compliance period, a licensee submittal under paragraph 50.155(h)(2) should address portions of the MBDBE rule for which the licensee is already in compliance. For example, all existing power reactor licensees were required, under § 50.54(hh)(2), prior to the effective date of the MBDBE rule, to have the strategies and guidelines now required under paragraph 50.155(b)(3). Continued compliance with this requirement provides the justification for removal of the Mitigation Strategies License Conditions. The NRC does not intend to allow a gap in compliance with this requirement through the use of the flexible scheduling of paragraph 50.155(h)(2). Similarly, the NRC does not intend to allow a gap in compliance with



the requirements of the Mitigation Strategies Order and those of paragraph 50.155(b)(1). As a result, a licensee proposing a revised compliance schedule under this provision would need to document in their submittal that they will achieve compliance with § 50.155(b)(1) prior to the rescission date for the Mitigation Strategies Order to demonstrate good cause for the revised compliance schedule.

*Paragraph 50.155(i) Rescission of orders and removal of license conditions*

Under paragraph 50.155(i)(1), the Mitigation Strategies and SFPI Orders will be rescinded on **[INSERT DATE 3 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**.

Under paragraph 50.155(i)(2), Order EA-06-137 will be rescinded on **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**.

Under paragraph 50.155(i)(3), on **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**, the Mitigation Strategy License Condition is deemed removed from the power reactor license of each licensee subject to § 50.155.

Under paragraph 50.155(i)(4), on **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**, the license condition associated with Order EA-06-137 is deemed removed from the power reactor license of each applicable licensee subject to this section.

Under paragraph 50.155(i)(5), the reliable SFP/buffer pool level instrumentation, mitigation strategies for beyond-design-basis external events, and emergency planning license conditions, except for license condition 2.D(12)(g)1, will be deemed removed from the Fermi license on **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**.

Under paragraph 50.155(i)(6), the mitigation strategies for beyond-design-basis external events license condition will be deemed removed from the Summer licenses on **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**.

Under paragraph 50.155(i)(7), the mitigation strategies for beyond-design-basis external events and emergency planning license conditions will be deemed removed with the exception of license conditions 2.D(14)(g)1 and 2.D(14)(g)6-8, from the STP licenses on **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**.

Under paragraph 50.155(i)(8), the mitigation strategies for beyond-design-basis external events, reliable SFP level instrumentation, and emergency planning license conditions will be deemed removed with the exception of license condition 2.D(12)(j)1 from the William States Lee III Units 1 and 2 licenses on **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**.

Under paragraph 50.155(i)(9), the mitigation strategies for beyond-design-basis external events, reliable SFP instrumentation, and emergency planning license conditions will be deemed removed with the exception of license condition 2.D(12)(j)1 from the Levy Nuclear Plant Units 1 and 2 licenses on **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**.

***10 CFR Part 50, Appendix E, Section IV, Training.***

This final rule moves the § 50.54(hh)(2) exercise requirement from 10 CFR part 50, appendix E, section IV.F.2.j, to § 50.155(e). This move changes the exercise requirement to a drill requirement, aligning the requirement with the mitigation strategies drill requirements described in § 50.155(e).

***10 CFR Part 50, Appendix E, Section VI, Emergency Response Data Systems.***

The NRC is amending its Emergency Response Data Systems regulations to allow the use of technology-neutral equipment. The requirements in appendix E, section VI, paragraph

3.c are amended to replace the phrase “onsite modem” with “equipment” and remove the word “unit.”

***§ 52.80 Contents of Applications; Additional Technical Information.***

Section 52.80 identifies the required additional technical information to be included in an application for a combined license. Paragraph 52.80(d) is amended to require a combined license applicant to include the applicant’s plans for implementing the requirements of § 50.155, including a schedule for achieving full compliance with these requirements. This paragraph requires the application to include a description of: 1) the integrated response capability required by § 50.155(b); and 2) the equipment upon which the strategies and guidelines that are required by § 50.155(b)(1) rely, including the planned locations of the equipment and how the equipment and SSCs meet the design requirements of § 50.155(c).

**VII. Regulatory Flexibility Certification**

Under the Regulatory Flexibility Act (5 U.S.C. 605(b)), the NRC certifies that this rule does not have a significant economic impact on a substantial number of small entities. This rule affects only the licensing and operation of nuclear power plants. The companies that own these plants do not fall within the scope of the definition of “small entities” set forth in the Regulatory Flexibility Act or established in § 2.810, “NRC size standards.”

**VIII. Availability of Regulatory Analysis**

The NRC has prepared a regulatory analysis on this regulation. The analysis examined the costs and benefits of the alternatives considered by the NRC. The regulatory analysis is available as indicated in the “Availability of Documents” section of this document

## **IX. Availability of Guidance**

The NRC is issuing regulatory guidance for the implementation of the MBDBE rule. The guidance is available in ADAMS under ADAMS Accession Nos. ML16301A128, ML16211A166, and ML16218A236. You may access information and comment submissions related to the guidance by searching on <http://www.regulations.gov> under Docket ID NRC-2014-0240. The guidance to implement the MBDBE rule consists of three regulatory guides (RGs), each of which is discussed below.

The RG 1.226, “Flexible Mitigation Strategies for Beyond-Design-Basis Events,” endorses, with clarifications, the methods and procedures issued by the Nuclear Energy Institute (NEI) in technical document NEI 12-06, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide.” This regulatory guidance provides licensees and applicants with an acceptable method of implementing the MBDBE rule primarily with regard to the provisions in § 50.155(b)(1), (b)(2), (c), and (g) regarding measures for the mitigation of beyond-design-basis external events. Previous versions of this guidance were endorsed to support compliance with the Mitigation Strategies Order. Licensees who used previous endorsed versions of NEI 12-06 are not required to revise their implementation under the Mitigation Strategies Order to address the MBDBE rule requirements. The later revisions of the endorsed guidance contain additional information for addressing reevaluated hazard information, frequently asked questions, and acceptable alternatives, and accordingly provide a larger set of guidance that licensees may use

to implement the MBDBE rule, or to consult when deciding on the acceptability of changes to the implementation of the MBDBE rule requirements.

The RG 1.227, “Wide-Range Spent Fuel Pool Level Instrumentation,” endorses with exceptions and clarifications, NEI 12-02, “Industry Guidance for Compliance with NRC Order EA-12-051, ‘To Modify License with Regard to Reliable Spent Fuel Pool Instrumentation’,” Revision 1. This guidance provides an acceptable method of implementing the MBDBE rule requirement in § 50.155(f). This RG does not differ in a significant manner from previously endorsed guidance for the SFPI Order, which was JLD-ISG-2012-03, “Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation.”

The RG 1.228, “Integrated Response Capabilities for Beyond-Design-Basis Events,” endorses with clarifications the methods and procedures issued by NEI in three technical documents:

1. NEI 12-01, “Guidelines for Assessing Beyond-Design-Basis Accident Response Staffing and Communications Capabilities,” Revision 0, dated May 2012.
2. NEI 13-06, “Enhancements to Emergency Response Capabilities for Beyond-Design-Basis Events and Severe Accidents,” Revision 1, dated February 2016.
3. NEI 14-01, “Emergency Response Procedures and Guidelines for Beyond-Design-Basis Events and Severe Accidents,” Revision 1, dated February 2016.

This guidance provides acceptable methods for implementing the MBDBE rule requirements primarily in § 50.155(b)(4), (b)(5), (d), and (e). Changes to the endorsed guidance ensure consistency with the final rule, but do not contain guidance that substantially differs from that used previously to support a broad implementation of the Mitigation Strategies and SFPI Orders.

## **X. Backfitting and Issue Finality**

### *Rule*

As required by §§ 50.109 and 52.98, the Commission has completed a backfitting and issue finality assessment for this rule. The Commission finds that the final rule does not contain any backfits. Even if the staffing and communications requirements are considered to be backfitting, they are necessary for licensees to comply with the MBDBE rule and, as such, are necessary for adequate protection of the public health and safety or common defense and security. Thus, the requirements would satisfy the criteria for an exception from the requirement to conduct a backfitting analysis under § 50.109(a)(4)(ii). Availability of the backfit and issue finality assessment is indicated in the “Availability of Documents” section of this document.

### *Regulatory Guidance*

The NRC is issuing three RGs that provide guidance for the implementation of this rule: The 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.” These RGs provide guidance on the methods acceptable to the NRC for complying with this final rule. The RGs apply to all current holders of, and applicants for operating licenses under 10 CFR part 50 and COLs under 10 CFR part 52.

Issuance of the RGs does not constitute backfitting under § 50.109 and does not otherwise violate issue finality under 10 CFR part 52. As discussed in the “Implementation” section of each RG, the NRC has no current intention to impose the RGs on current holders of an operating license or COL.

Applying the RGs to applications for operating licenses or COLs does not constitute backfitting as defined in § 50.109 and does not otherwise violate issue finality under 10 CFR

part 52, because such applicants are not within the scope of entities protected by § 50.109 or the applicable issue finality provisions in 10 CFR part 52. Neither § 50.109 nor the issue finality provisions under 10 CFR part 52 – with certain exceptions – were intended to apply to every NRC action that substantially changes the expectations of current and future applicants.

## **XI. Cumulative Effects of Regulation**

The NRC engaged extensively with external stakeholders throughout this rulemaking and related regulatory activities. Public involvement has included: 1) issuance of two ANPRs and two draft regulatory basis documents that requested stakeholder feedback; 2) issuance of conceptual and preliminary proposed rule language in support of public meetings; 3) numerous public meetings with the ACRS; 4) issuance of draft final rule language to support meeting with the ACRS, 5) a public meeting held during the final rule stage to gather additional feedback concerning cumulative effects of regulation, and 6) many more public meetings that supported both the development of the draft regulatory basis documents as well as development of the implementing guidance for the two orders that this rulemaking makes generically applicable (i.e., the Mitigation Strategies and SFPI Orders). Section II.E of this notice provides a more detailed discussion of public involvement.

The NRC requested and received feedback following its CER process. The feedback received is discussed in more detail in conjunction with the consideration of a flexible scheduling provision, in Section IV of this notice. Most significantly, this final rule includes a flexible scheduling provision, in § 50.155(h)(2), as well as an additional year for implementation for licensees that received Order EA-13-109, that is intended to address the CER feedback received.

Regarding the CER process requirements for issuance of guidance, the NRC is issuing three RGs in conjunction with the issuance of the final rule as discussed in Section IX of this notice. Additionally the NRC issued draft guidance with the proposed rule for comment, which enabled more informed external stakeholder feedback to be obtained.

## **XII. Plain Writing**

The Plain Writing Act of 2010 (Pub. L. 111-274) requires Federal agencies to write documents in a clear, concise, and well-organized manner. The NRC has written this document to be consistent with the Plain Writing Act as well as the Presidential Memorandum, “Plain Language in Government Writing,” published June 10, 1998 (63 FR 31883).

## **XIII. Environmental Assessment and Finding of No Significant Environmental Impact**

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission’s regulations in subpart A of 10 CFR part 51, that this rule is not a major Federal action significantly affecting the quality of the human environment, and therefore an environmental impact statement is not required. The basis of this determination reads as follows: The action will not result in any radiological effluent impact as it will not change any design basis structures, systems, or components that function to limit the release of radiological effluents during or after an accident. This final rule does not change the standards and requirements for radiological releases and effluents. None of the revisions or additions in this rule affect current occupational or public radiation exposure. The final rule will not cause any significant non-radiological impacts, as it will not affect any historic sites or any non-



radiological plant effluents. The NRC concludes that this rule will not cause any significant radiological or non-radiological impacts on the human environment.

The NRC requested the views of the States on the environmental assessment for this rule. No views were received.

The determination of this environmental assessment is that there will be no significant effect on the quality of the human environment from this action. The environmental assessment is available as indicated under the "Availability of Documents" section.

#### **XIV. Paperwork Reduction Act**

This rule contains new or amended information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq). The collections of information was approved by the Office of Management and Budget, approval number 3150-0011 and 3150-0151.

The burden to the public for the information collection(s) is estimated to average 955 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection.

The information collection is being conducted to:

1. Make changes to existing programs, plans, procedures, and guidelines implemented as a result of Order EA-12-049 and Order EA-12-051 to reflect the new requirements of this rule, which replaces the order requirements.
2. Support requests to implement the flexible scheduling provisions provided in 10 CFR 50.155(h)(2).

3. Support interactions between current operating licensees and the NRC concerning reevaluated hazard information to support implementation of 10 CFR 50.155(b)(2).

This information will be used by the NRC to support oversight activities associated with these requirements, to determine whether requests for use of the flexible scheduling provision have provide good cause for using that provisions, and for making regulatory determinations regarding the seismic and flooding reevaluated hazard information. Responses to this collection of information are mandatory for items 1 and 3 listed above, and voluntary for item 2 listed above.

You may submit comments on any aspect of the information collection(s), including suggestions for reducing the burden, by the following methods:

- **Federal rulemaking Web Site:** Go to <http://www.regulations.gov> and search for Docket ID <NRC-2014-0240>.
- **Mail comments to:** FOIA, Privacy, and Information Collections Branch, Office of Information Services, Mail Stop: T-5 F53, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001 or to Vlad Dorjets, Desk Officer, Office of Information and Regulatory Affairs (3150-AJ49), NEOB-10202, Office of Management and Budget, Washington, DC 20503; telephone: 202-395-7315, e-mail: [oir\\_submission@omb.eop.gov](mailto:oir_submission@omb.eop.gov).

### **Public Protection Notification**

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

## **XV. Congressional Review Act**

This final rule is a rule as defined in the Congressional Review Act (5 U.S.C. 801-808). The Office of Management and Budget has found it to be a major rule as defined in the Congressional Review Act.

## **XVI. Criminal Penalties**

For the purposes of Section 223 of the Atomic Energy Act of 1954, as amended (AEA), the NRC is issuing this rule that amends 10 CFR parts 50 and 52 under one or more of Sections 161b, 161i, or 161o of the AEA. Willful violations of the rule are subject to criminal enforcement. Criminal penalties as they apply to regulations in 10 CFR parts 50 and 52 are discussed in §§ 50.111 and 52.303.

## **XVII. Compatibility of Agreement State Regulations**

Under the “Policy Statement on Adequacy and Compatibility of Agreement State Programs,” approved by the Commission on June 20, 1997, and published in the *Federal Register* (62 FR 46517; September 3, 1997), this rule is classified as compatibility category “NRC.” Compatibility is not required for Category “NRC” regulations. The NRC program elements in this category are those that relate directly to areas of regulation reserved to the NRC by the AEA or the provisions of Title 10 of the *Code of Federal Regulations*, and although an Agreement State may not adopt program elements reserved to the NRC, it may wish to

inform its licensees of certain requirements via a mechanism that is consistent with a particular State's administrative procedure laws, but does not confer regulatory authority on the State.

### **XVIII. Voluntary Consensus Standards**

The National Technology Transfer and Advancement Act of 1995, Public Law 104-113, requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless the use of such a standard is inconsistent with applicable law or otherwise impractical. In this rule, the NRC is adding requirements for the mitigation of beyond-design-basis events. This action does not constitute the establishment of a standard that contains generally applicable requirements.

### **XIX. Availability of Documents**

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

<b>Document</b>	<b>ADAMS ACCESSION NO. / WEB LINK / FEDERAL REGISTER CITATION</b>
<b>Primary Rulemaking Documents</b>	
Regulatory Analysis	ML16301A009
Backfit and Issue Finality Analysis	ML16273A010
Environmental Assessment	ML16291A188
Information Collection Analysis	ML16291A246
<b>Regulatory Guides</b>	

RG 1.226, Flexible Mitigation Strategies for Beyond-Design-Basis Events	ML16301A128
RG 1.227, Wide-Range Spent Fuel Pool Level Instrumentation	ML16211A166
RG 1.228, Integrated Response Capabilities for Beyond-Design-Basis Events	ML16218A236
<b>Other References</b>	
Nonconcurrency NCP-2016-018	ML16312A020
ACRS Transcript—Full Committee, Discuss Preliminary Mitigation of Beyond-Design-Basis Events Rulemaking Language, December 4, 2014	ML14345A387
ACRS Transcript—Fukushima Subcommittee, Discuss Preliminary Mitigation of Beyond-Design-Basis Events Rulemaking Language, November 21, 2014	ML14337A671
ACRS Transcript—Full Committee, Discuss Consolidation of Station Blackout Mitigation Strategies and Onsite Emergency Response Capabilities Rulemakings, July 10, 2014	ML14223A631
ACRS Transcript—Full Committee, Discuss the Station Blackout Mitigation Strategies Regulatory Basis, June 5, 2013	ML13175A344
ACRS Transcript—Joint Fukushima and PRA Subcommittees, Discuss CPRR Technical Analysis, August 22, 2014	ML14265A059
ACRS Transcript—Plant Operations and Fire Protection Subcommittee, Discuss the Onsite Emergency Response Capabilities Regulatory Basis, February 6, 2013	ML13063A403
ACRS Transcript—Reactor Safeguards Reliability and PRA Subcommittee, Discuss CPRR Technical Analysis, November 19, 2014	ML14337A651
ACRS Transcript—Regulatory Policies and Practices Subcommittee, Discuss the Station Blackout Mitigation Strategies Regulatory Basis, December 5, 2013, and April 23, 2013	ML13148A404
American National Standards Institute/American Nuclear Society 3.2-2012, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants"	<a href="http://www.ans.org/store/">http://www.ans.org/store/</a>
CLI-12-09, South Carolina Electric & Gas Co. and South Carolina Public Service Authority (Also Referred to as Santee Cooper)	ML12090A531
COMGBJ-11-0002, "NRC Actions Following the Events in Japan," March, 21, 2011	ML110800456
COMSECY-13-0002, "Consolidation of Japan Lessons Learned Near-Term Task Force Recommendations 4 and 7 Regulatory Activities," January 25, 2013	ML13011A037
COMSECY-13-0010, "Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned," dated March 27, 2013	ML12339A262
COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and The Reevaluation of Flooding Hazards," November 21, 2014	ML14309A256

Conceptual Consolidated Preliminary Proposed Rule Language for NTTF Recommendations 4, 7, 8 and 9, February 21, 2014	ML14052A057
Containment Performance and Release Reduction Draft Regulatory Basis	ML15022A214
Crystal River Unit 3, "NRC Response to Duke Energy's Final Response to The March 2012 Request for Information Letter," January 22, 2014	ML13325A847
Crystal River Unit 3, "Rescission of Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events'," August 27, 2013	ML13212A366
Crystal River Unit 3, Final Response to March 12, 2012 Information Request Regarding Recommendations 2.1, 2.3 and 9.3, September 25, 2013	ML13274A341
Crystal River Unit 3, "Rescission Of Order EA-12-051, 'Order Modifying Licenses With Regard To Reliable Spent Fuel Pool Instrumentation'," August 27, 2013	ML13203A161
Executive Order 13744, "Coordinating Efforts To Preprepare the Nation for Space Weather Events"	81 FR 71573; October 13, 2016
<i>Federal Register</i> Notice—Mitigation of Beyond-Design-Basis Events, Proposed Rule, November 13, 2015	80 FR 70609
<i>Federal Register</i> Notice—Mitigation of Beyond-Design-Basis Events, Proposed Rule; correction, November 30, 2015	80 FR 74717
<i>Federal Register</i> Notice—Enhancements to Emergency Preparedness Regulations, Final Rule, November 23, 2011	76 FR 72560
<i>Federal Register</i> Notice—Onsite Emergency Response Capabilities, Regulatory Basis, October 25, 2013	78 FR 63901
<i>Federal Register</i> Notice—Onsite Emergency Response Capabilities, Advance Notice of Proposed Rulemaking, April 18, 2012	77FR 23161
<i>Federal Register</i> Notice—Onsite Emergency Response Capabilities, Draft Regulatory Basis, January 8, 2013	78 FR 1154
<i>Federal Register</i> Notice—Onsite Emergency Response Capabilities, Preliminary Proposed Rule Language, November 15, 2013	78 FR 68774
<i>Federal Register</i> Notice—Power Reactor Security Requirements, Final Rule, March 27, 2009	74 FR 13926
<i>Federal Register</i> Notice—PRM-50-100, Petition for Rulemaking Submitted by the Natural Resources Defense Council, Inc., July 23, 2013	78 FR 44034
<i>Federal Register</i> Notice—PRM-50-101, Petition for Rulemaking Submitted by the Natural Resources Defense Council, Inc., March 21, 2012	77 FR 16483
<i>Federal Register</i> Notice—PRM-50-102, Petition for Rulemaking; Submitted by the Natural Resources Defense Council, Inc., April 27, 2012	77 FR 25104

<i>Federal Register</i> Notice—PRM-50-96, Long-Term Cooling and Unattended Water Makeup of Spent Fuel Pools, Consideration in the Rulemaking Process, December 18, 2012	77 FR 74788
<i>Federal Register</i> Notice—PRM-50-97, PRM-50-98, PRM-50-99, PRM-50-100, PRM-50-101, PRM-50-102, Petitions for Rulemaking Submitted by the Natural Resources Defense Council, Inc., Notice of Receipt, September 20, 2011	76 FR 58165
<i>Federal Register</i> Notice—Statement of Principles and Policy for the Agreement State Program; Policy Statement on Adequacy and Compatibility of Agreement State Programs, Final Policy Statements, September 3, 1997	62 FR 46517
<i>Federal Register</i> Notice—Station Blackout Mitigation Strategies, Draft Regulatory Basis and Draft Rule Concepts, April 10, 2013	78 FR 21275
<i>Federal Register</i> Notice—Station Blackout Mitigation Strategies, Regulatory Basis, July 23, 2013	78 FR 44035
<i>Federal Register</i> Notice—Station Blackout, Advance Notice of Proposed Rulemaking, March 20, 2012	77 FR 16175
Interim Staff Guidance, NSIR/DPR-ISG-01, “Emergency Planning for Nuclear Power Plants,” November 2011	ML113010523
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,” Revision 0, August 29, 2012	ML12229A166
Inspection Manual Chapter (IMC) 0308, “Reactor Oversight Process Basis Document,” Attachment 2, “Technical Basis for Inspection Program,” October, 16, 2006	ML062890421
Kewaunee Power Station, 60-Day Response to March 12, 2012, Information Request Regarding Recommendation 2.1. Seismic Reevaluations, April 29, 2013	ML13123A004
Kewaunee Power Station, Rescission of Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events," June 10, 2014	ML14059A411
Kewaunee Power Station, Response to Request for Relief from Responding Further to the March 2012 Request for Information Letter for Recommendation 9.3, January 22, 2014	ML13322B255
Letter from ACRS to Chairman Jaczko, “Initial ACRS Review of: (1) The NRC Near-Term Task Force Report on Fukushima and (2) Staff’s Recommended Actions to be Taken Without Delay,” October 13, 2011	ML11284A136
Letter from ACRS to Mr. R. W. Borchardt, “Response To February 27, 2012 Letter Regarding Final Disposition Of Fukushima-Related ACRS Recommendations In Letters Dated October 13, 2011, And November 8, 2011,” March 13, 2012	ML12072A197
Letter from E.J. Leeds to Holders of Licenses for Operating Power Reactors as Listed in the Enclosure, “Rescission or Partial Rescission of Certain Power Reactor Security Orders Applicable to Nuclear Power Plants,” November 28, 2011	ML111220447

Letter from J. E. Dyer to Holders of Licenses for Operating Power Reactors Listed in the Enclosure, "Order Requiring Compliance with Key Radiological Protection Mitigation Strategies," August 28, 2006	ML062300304
Letter from D.V. Pickett to Mr. James A. Spina, "Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 - Conforming License Amendments To Incorporate the Mitigation Strategies Required by Section B.5.b. of Commission Order EA-02-026," July 11, 2007	ML071920056
Letter from E.A. Brown to Mr. William R. Campbell, Jr., "Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Conforming License Amendments To Incorporate the Mitigation Strategies Required by Section B.5.b. of Commission Order EA-02-026 and the Radiological Protection Mitigation Strategies Required by Commission Order EA-06-137," August 16, 2007	ML072270181
Letter from R.W. Borchardt to J. Sam Amijo, Chairman ACRS, "Final Disposition Of The Advisory Committee On Reactor Safeguards' Review Of (1) The U.S. Nuclear Regulatory Commission Near-Term Task Force Report On Fukushima, (2) Staff's Recommended Actions To Be Taken Without Delay (SECY-11-0124), And (3) Staff's Prioritization Of Recommended Actions To Be Taken In Response To Fukushima Lessons-Learned," February 27, 2012	ML12030A198
Letter from ACRS to Chairman Stephen G. Burns, "Draft SECY Paper Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)," April 22, 2015	ML15111A271
Letter from Mark Satorius to John Stetkar, "Draft SECY Paper Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)," May 15, 2015	ML15125A485
Letter from NEI to Mark Satorius, "Use of Qualitative Factors in Regulatory Decision Making," May 11, 2015	ML15217A314
NEI 06-12, "B.5.b Phase 2&3 Submittal Guideline," Revision 2, December 2006	ML070090060
NEI 10-05, "Assessment of On-Shift Emergency Response Organization Staffing and Capabilities," Revision 0, June 2011	ML111751698
NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0, May 2012	ML12125A412
NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 1a, October 2015	ML15279A426
NEI 13-06, "Enhancements to Emergency Response Capabilities for Beyond Design Basis Accidents and Events," Revision 0, September 2014	ML14269A230
NEI 14-01, "Emergency Response Procedures and Guidelines for Beyond Design Basis Events and Severe Accidents," Revision 0, September 2014	ML14269A236
NEI 91-04 (formerly NUMARC 91-04), Severe Accident Issue Closure Guidelines, Revision 1, December 1994	ML072850981
Non-concurrence NCP-2015-003	ML15091A646



NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, November 1980	ML040420012
NUREG-0660, Volume 1 and 2, "NRC Action Plan Developed as a Result of the TMI-2 Accident," May 1980	ML072470526 and ML072470524
NUREG-0711, "Human Factors Engineering Program Review Model," Revision 3, November 2012	ML12324A013
NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980	ML102560051
NUREG-0737, "Clarification of TMI Action Plan Requirements," Supplement 1, November 1980	ML102560009
NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report," November 2012	ML12332A057
Omaha Public Power District's Overall Integrated Plan (Redacted) in Response to March 12, 2012, Order EA-12-049, February 28, 2013	ML13116A208
Order EA-02-026, "Order for Interim Safeguards and Security Compensatory Measures," February 25, 2002	ML020510635
Order EA-12-049, "Issuance of Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," (Mitigating Strategies Order), March 12, 2012	ML12054A735
Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," (SFPI Order) March 12, 2012	ML12056A044
Order EA-12-063, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," (SFPI Order) March 30, 2012	ML120890218
Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," June 6, 2013	ML13130A067
Preliminary Proposed Rule Language for Mitigation of Beyond-Design-Basis Events Rulemaking made available to the public on November 13, 2014, and December 8, 2014, to support public discussion with the ACRS	ML14336A641
Preliminary Proposed Rule Language for Mitigation of Beyond-Design-Basis Events Rulemaking, August 15, 2014	ML14218A253
PRM 50-102, "NRDC's Petition For Rulemaking to Require More Realistic Training on Severe Accident Mitigation Guidelines," July 26, 2011	ML11216A242
PRM 50-97, "NRDC's Petition For Rulemaking to Require Emergency Preparedness Enhancements for Prolonged Station Blackouts," July 26, 2011	ML11216A237
PRM-50-100, "NRDC's Petition For Rulemaking to Require Licensees to Improve Spent Nuclear Fuel Pool Safety," July 26, 2014	ML11216A240
PRM-50-101, "NRDC's Petition For Rulemaking to Revise 10 CFR § 50.63," July 26, 2011	ML11216A241

PRM-50-96, "Petition for Rulemaking Submitted by Thomas Popik on Behalf of the Foundation for Resilient Societies to adopt regulations that would require facilities licensed by the NRC under 10 CFR Part 50 to assure long-term cooling and unattended water makeup of spent fuel pools," March 14, 2011	ML110750145
PRM-50-98, "NRDC's Petition For Rulemaking to Require Emergency Preparedness Enhancements for Multiunit Events," July 26, 2011	ML11216A238
Regulatory Issue Summary 2009-13, "Emergency Response Data System Upgrade from Modem to Virtual Private Network Appliance," September 28, 2009	ML092670124
Request for Information Pursuant to Title 10 of the <i>Code of Federal Regulations</i> 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, March 12, 2012	ML12053A340
San Onofre Nuclear Generating Station Units 2 and 3, "Rescission of Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events'," June 30, 2014	ML14113A572
San Onofre Nuclear Generating Station Units 2 and 3, "NRC Response To Southern California Edison's Final Response to the March 2012 Request for Information Letter," January 22, 2014	ML13329A826
San Onofre Nuclear Generating Station Units 2 and 3, Final Response to the March 12, 2012 Information Request Regarding Near-Term Task Force Recommendations 2.1, 2.3, and 9.3 and Corresponding Commitments San Onofre Nuclear Generating Station (SONGS) Units 2 and 3, September 30, 2013	ML13276A020
San Onofre Nuclear Generating Station Units 2 and 3, "Rescission of Order EA-12-051, 'Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'," June 30, 2014	ML14111A069
SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," July 12, 2011	ML11186A950
SECY-11-0124, "Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report," September 9, 2011	ML11245A127
SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," October 3, 2011	ML11272A111
SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned From Japan's March 11, 2011, Great Tōhoku Earthquake and Tsunami," February 17, 2012	ML12039A103
SECY-13-0132, "Plan for Updating the U.S. Nuclear Regulatory Commission's Cost Benefit Guidance," January 2, 2014	ML13274A495
SECY-14-0046, "Fifth 6-Month Status Update on Response to Lessons Learned From Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami," April 17, 2014	ML14064A523
SECY-15-0065, "Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)," April 30, 2015	ML15049A201
SECY 15-0050 "Cumulative Effects of Regulation Process Enhancements and Risk Prioritization Initiative," April 1, 2015	ML15034A360

SECY-89-012, "Staff Plans for Accident Management Regulatory and Research Programs," January 18, 1989	ML12251A414
SECY-97-132, "Status of the Integration Plan for Closure of Severe Accident Issues and the Status of Severe Accident Research," June 23, 1997	ML992930144
SECY-98-131, "Status of the Integration Plan for Closure of Severe Accident Issues and the Status of Severe Accident Research," June 8, 1998	ML992880008
SECY-15-0085, "Evaluation of the Containment Protection & Release Reduction for Mark I and Mark II Boiling Water Reactors Rulemaking Activities (10 CFR Part 50) (RIN-3150-AJ26)," enclosure entitled, "Containment Protection and Release Reduction (CPRR) Rulemaking: Draft Regulatory Basis")	ML15005A079
SRM-SECY-15-0065, "Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)"	ML15239A767
SRM-COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and The Reevaluation of Flooding Hazards"	ML15089A236
SRM-COMSECY-13-0002, "Consolidation of Japan Lessons Learned Near-Term Task Force Recommendations 4 and 7 Regulatory Activities"	ML13063A548
SRM-SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," August 19, 2011	ML112310021
SRM-SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned," December 15, 2011	ML113490055
SRM-SECY-13-0132, "U.S. Nuclear Regulatory Commission Staff Recommendation for the Disposition of Recommendation 1 of the Near-Term Task Force Report," May 19, 2014	ML14139A104
SRM-SECY-2011-0124, "Recommended Actions to be Taken Without Delay From the Near-Term Task Force Report," October 18, 2011	ML112911571
Temporary Instruction 2515/191, "Inspection of the Licensee's Responses to Mitigation Strategies Order EA-12-049, Spent Fuel Pool Instrumentation Order EA-12-051 and Emergency Preparedness Information Requested in NRC March 12, 2012," March 12, 2012	ML14273A444
Vermont Yankee Nuclear Power Station, "Rescission of Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events'," March 2, 2015	ML14321A685
Vermont Yankee Nuclear Power Station, "Rescission of Order EA-12-051, 'Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'," March 2, 2015	ML14321A696

The NRC may post documents related to this rulemaking, including public comments, on the Federal rulemaking Web site at <http://www.regulations.gov> under Docket ID NRC-2014-0240. The Federal rulemaking Web site allows you to receive alerts when changes or additions occur in a docket folder. To subscribe: 1) navigate to the docket folder (NRC-2014-0240); 2) click the “Sign up for E-mail Alerts” link; and 3) enter your e-mail address and select how frequently you would like to receive e-mails (daily, weekly, or monthly).

### **List of Subjects**

#### **10 CFR Part 50**

Administrative practice and procedure, Antitrust, Classified information, Criminal penalties, Education, Fire prevention, Fire protection, Incorporation by reference, Intergovernmental relations, Nuclear power plants and reactors, Penalties, Radiation protection, Reactor siting criteria, Reporting and recordkeeping requirements, Whistleblowing.

#### **10 CFR Part 52**

Administrative practice and procedure, Antitrust, Backfitting, Combined license, Early site permit, Emergency planning, Fees, Incorporation by reference, Inspection, Limited work authorization, Nuclear power plants and reactors, Penalties, Probabilistic risk assessment, Prototype, Reactor siting criteria, Redress of site, Reporting and recordkeeping requirements, Standard design, Standard design certification.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 552 and 553, the NRC is adopting the following amendments to 10 CFR parts 50 and 52:

## PART 50 - DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES

1. The authority citation for 10 CFR part 50 continues to read as follows:

**Authority:** Atomic Energy Act of 1954, secs. 11, 101, 102, 103, 104, 105, 108, 122, 147, 149, 161, 181, 182, 183, 184, 185, 186, 187, 189, 223, 234 (42 U.S.C. 2014, 2131, 2132, 2133, 2134, 2135, 2138, 2152, 2167, 2169, 2201, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2239, 2273, 2282); Energy Reorganization Act of 1974, secs. 201, 202, 206, 211 (42 U.S.C. 5841, 5842, 5846, 5851); Nuclear Waste Policy Act of 1982, sec. 306 (42 U.S.C. 10226); National Environmental Policy Act of 1969 (42 U.S.C. 4332); 44 U.S.C. 3504 note; Sec. 109, Pub. L. 96-295, 94 Stat. 783.

2. In § 50.8(b), add the number “50.155,” sequentially.

3. In § 50.34, remove the word “stationary” from paragraphs (a)(13) and (b)(12), and revise paragraph (i) to read as follows:

### **§ 50.34 Contents of applications; technical information.**

\* \* \* \* \*

(i) *Mitigation of beyond-design-basis events.* Each application for a power reactor operating license under this part must include the applicant’s plans for implementing the requirements of § 50.155, including a schedule for achieving full compliance with these requirements. The application must also include a description of:

- (1) The integrated response capability required by § 50.155(b); and

(2) The equipment upon which the strategies and guidelines required by § 50.155(b)(1) rely, including the planned locations of the equipment and how the equipment meets the requirements of § 50.155(c).

4. In § 50.54 remove paragraph (hh)(2), redesignate paragraph (hh)(3) as (hh)(2) and revise it to read as follows:

**§ 50.54 Conditions of licenses.**

\* \* \* \* \*

(hh) \* \* \*

(2) Paragraph 50.54(hh)(1) does not apply to a licensee that has submitted the certifications required under § 50.82(a)(1) or § 52.110(a) of this chapter once the NRC has docketed those certifications.

\* \* \* \* \*

5. Add new § 50.155 to read as follows:

**§ 50.155 Mitigation of Beyond-Design-Basis Events.**

(a) *Applicability.*

(1) Each holder of an operating license for a nuclear power reactor under this part and each holder of a combined license under part 52 of this chapter for which the Commission has made the finding under § 52.103(g), shall comply with the requirements of this section until the NRC's docketing of the license holder's certifications described in §§ 50.82(a)(1) or 52.110(a) of this chapter.

(2)(i) Once the NRC has docketed the certifications described in § 50.82(a)(1) or § 52.110(a) of this chapter, submitted by a licensee subject to the requirements of this section, that licensee need only comply with the requirements of § 50.155(b) through (e), and (g) of this section associated with spent fuel pool cooling capabilities

(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 the requirements of paragraph (b)(3) of this section associated with spent fuel pool cooling capabilities 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 described in § 50.82(a)(1) or § 52.110(a) of this chapter need not meet the requirements of this section once all irradiated fuel has been permanently removed from the spent fuel pool(s).

(b) *Integrated response capability.* Each applicant or licensee shall develop, implement, and maintain an integrated response capability that includes:

(1) *Mitigation Strategies for Beyond-Design-Basis External Events.* Strategies and guidelines to mitigate beyond-design-basis external events from natural phenomena that are developed assuming a loss of all ac power concurrent with either a loss of normal access to the ultimate heat sink or, for passive reactor designs, a loss of normal access to the normal heat

sink. These strategies and guidelines must be capable of being implemented site-wide and must include:

- (i) Maintaining or restoring core cooling, containment, and spent fuel pool cooling capabilities; and

- (ii) The acquisition and use of offsite assistance and resources to support the functions required by paragraph (b)(1)(i) of this section indefinitely, or until sufficient site functional capabilities can be maintained without the need for the mitigation strategies.

(2) *Reevaluated Seismic and Flooding Hazards Mitigation.* Each licensee that received the March 12, 2012 NRC letter issued under § 50.54(f) of this part shall consider the effects of the reevaluated hazards information developed in response to that request if the magnitude of those hazards exceeds the external design basis of the facility. Licensees shall address the effects of the reevaluated hazard information using one or both of the following approaches:

- (i) The mitigation strategies and guidelines required by paragraph (b)(1) of this section, as implemented or as modified;

- (ii) Event-specific approaches.

(3) *Extensive Damage Mitigation Guidelines (EDMGs).* Strategies and guidelines to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant impacted by the event, due to explosions or fire, to include strategies and guidelines in the following areas:

- (i) Firefighting;

- (ii) Operations to mitigate fuel damage; and

- (iii) Actions to minimize radiological release.

(4) Integration of capabilities required by paragraphs (b)(1) through (b)(3) of this section with the Emergency Operating Procedures (EOPs).



(5) Sufficient staffing to support implementation of the capabilities required in paragraphs (b)(1) through (b)(3) of this section in conjunction with the EOPs to respond to events.

(6) A supporting organizational structure with defined roles, responsibilities, and authorities for directing and performing the capabilities required in paragraphs (b)(1) through (b)(3) of this section.

(c) *Equipment.* (1) The equipment relied on for the mitigation strategies, guidelines and event-specific approaches required by paragraphs (b)(1) and (b)(2) of this section must have sufficient capacity and capability to perform the functions required by paragraphs (b)(1) and (b)(2).

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

(3) The equipment relied on for paragraph (b)(2) of this section must be reasonably protected from the effects of the reevaluated hazards determined in response to the March 12, 2012, NRC letter issued under § 50.54(f) of this part.

(4) Each licensee shall provide sufficient communications capability, both onsite and offsite, to support implementation of the mitigation strategies and guidelines of paragraphs (b)(1) and (b)(2) of this section.

(d) *Training requirements.* Each licensee shall provide for the training and qualification of personnel that perform activities in accordance with the capabilities required by paragraphs (b)(1) through (b)(3) of this section. 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.

(e) *Drills or Exercises.* (1) An applicant for an operating license issued under this part shall conduct an initial drill or exercise that demonstrates the capability to transition to and use one or more of the strategies and guidelines in paragraphs (b)(1) and (b)(3) of this section including demonstration of the communications capability required by paragraph (c)(4) of this section, no more than 12 months before issuance of an operating license for the unit described in the license application.

(2) A holder of a combined license issued under part 52 of this chapter before the Commission has made the finding under § 52.103(g), shall conduct an initial drill or exercise that demonstrates the capability to transition to and use one or more of the strategies and guidelines in paragraphs (b)(1) and (b)(3) of this section including demonstration of the communications capability required by paragraph (c)(4) of this section, no more than 12 months before the date specified for completion of the last inspections, tests, and analyses in the inspections, tests, analyses, and acceptance criteria completion schedule required by § 52.99(a) of this chapter for the unit described in the combined license.

(3) Once the Commission issues an operating license to an entity described in paragraph (e)(1) of this section or makes the finding under § 52.103(g) of this chapter for an entity described in paragraph (e)(2) of this section, the licensee shall conduct subsequent drills or exercises that collectively demonstrate a capability to use at least one of the strategies and guidelines in each of paragraphs (b)(1) and (b)(3) of this section in succeeding eight-year intervals. The drills or exercises performed to demonstrate this capability must include transitions from other procedures and guidelines as applicable, including demonstration of the communications capability required by paragraph (c)(4) of this section. Each licensee shall not exceed eight years between any consecutive drills or exercises.

(4) A holder of an operating license issued under this part or a combined license under part 52 of this chapter for which the Commission has made the finding specified in § 52.103(g)

as of **[EFFECTIVE DATE OF THE FINAL RULE]**, shall conduct an initial drill or exercise that demonstrates the capability to transition to and use one or more of the strategies and guidelines in paragraphs (b)(1) through (b)(3) of this section, or for a combined license holder paragraphs (b)(1) and (b)(3), including demonstration of the communications capability required by paragraph (c)(4) of this section, by **[DATE 4 YEARS AFTER EFFECTIVE DATE OF THE FINAL RULE]**. Following this initial drill or exercise, the licensee shall conduct subsequent drills, exercises, or both that collectively demonstrate a capability to use at least one of the strategies and guidelines under paragraph (b)(1) or (b)(2), and at least one of the strategies and guidelines under paragraph (b)(3), or for combined license holders paragraphs (b)(1) and (b)(3) of this section in succeeding eight-year intervals. The drills and exercises performed to demonstrate this capability must include transitions from other procedures and guidelines as applicable, including demonstration of the communications capability required by paragraph (c)(4) of this section. Each licensee shall not exceed eight years between any consecutive drills or exercises.

(f) *Spent Fuel Pool Monitoring.* In order to support effective prioritization of event mitigation and recovery actions, each licensee shall provide reliable means to remotely monitor wide-range water level for each spent fuel pool at its site until five years have elapsed since all of the fuel within that spent fuel pool was last used in a reactor vessel for power generation. This provision does not apply to General Electric Mark III upper containment pools.

(g) *Documentation of Changes.* (1) A licensee may make changes in the implementation of the requirements in this section without NRC approval, *provided* that before implementing each such change, the licensee demonstrates that the provisions of this section continue to be met and maintains documentation of changes until the requirements of this section no longer apply.

(2) Changes in the implementation of requirements in this section subject to other change control processes than paragraph (g) of this section must be processed via their respective change control processes, unless the changes being evaluated impact only the implementation of the requirements of this section.

(h) *Implementation.* Unless otherwise specified in this section:

(1) Each holder of an operating license for a nuclear power reactor under this part on **[INSERT EFFECTIVE DATE OF THE FINAL RULE]** and each holder of a combined license under part 52 of this chapter for which the Commission made the finding specified in § 52.103(g) as of **[INSERT EFFECTIVE DATE OF THE FINAL RULE]**, shall continue to comply with the provisions of paragraph (b)(3) of this section, and shall comply with all other provisions of this section no later than **[INSERT DATE 3 YEARS AFTER EFFECTIVE DATE OF THE FINAL RULE]** for licensees of that received NRC Order EA-13-109 or **[INSERT DATE 2 YEARS AFTER EFFECTIVE DATE OF THE FINAL RULE]** for all other applicable licensees.

(2) For licensees that cannot achieve compliance with paragraph (b)(2) of this section to address a reevaluated hazard by **[INSERT DATE 2 YEARS AFTER EFFECTIVE DATE OF THE FINAL RULE]**, the NRC will consider an alternative compliance date if the licensee submits to the Director, Office of Nuclear Reactor Regulation, under § 50.4 of this part, no later than **[INSERT DATE 90 DAYS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**, a request to revise the compliance date with good cause for not achieving compliance by **[INSERT DATE 2 YEARS AFTER EFFECTIVE DATE OF THE FINAL RULE]**. Unless the licensee is notified to the contrary, the submitted request to revise the compliance date will be regarded as approved by the Commission 120 days after submission to the Commission.

(i) *Rescission of orders and removal of license conditions.*

(1) On **[INSERT DATE 3 YEARS AFTER EFFECTIVE DATE OF THE FINAL RULE]**, Order EA-12-049, "Order Modifying Licenses With Regard to Requirements for Mitigation

Strategies for Beyond-Design-Basis External Events,” Order EA-12-051, “Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation,” and Order EA-12-063, “Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” are rescinded for each licensee or construction permit holder that was issued those Orders.

(2) On **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**, Order EA-06-137, “Order Modifying Licenses,” is rescinded for each licensee that was issued Order EA-06-137.

(3) On **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**, the Mitigation Strategies License Condition is deemed removed from the power reactor license of each licensee subject to this section.

(4) On **[INSERT THE EFFECTIVE DATE OF THE FINAL RULE]**, the license condition associated with Order EA-06-137 is deemed removed from the power reactor license of each applicable licensee subject to this section.

(5) On **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**, Enrico Fermi Nuclear Plant Unit 3, License No. NPF–95, license conditions 2.D(12)(h), “Reliable Spent Fuel Pool/Buffer Pool Level Instrumentation,” 2.D(12)(i), “Emergency Planning Actions,” and 2.D(12)(g), “Mitigation Strategies for Beyond-Design-Basis External Events,” except for 2.D(12)(g)1, are deemed removed from that license.

(6) On **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**, Virgil C. Summer Nuclear Station Unit 2, License No. NPF–93, license condition 2.D(13), “Mitigation Strategies for Beyond-Design-Basis External Events,” and Virgil C. Summer Nuclear Station Unit 3, License No. NPF–94, license condition 2.D(13), “Mitigation Strategies for Beyond-Design-Basis External Events,” are deemed removed from those licenses.

(7) On **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**, South Texas Project, Unit 3, License No. NPF–097, license conditions 2.D(14)(g), “Beyond Design Basis External Events,” and 2.D(14)(j), “Emergency Planning Actions,” and

South Texas Project, Unit 4, License No. NPF-098, license conditions 2.D(14)(g), “Beyond Design Basis External Events,” and 2.D(14)(j), “Emergency Planning Actions,” except for license conditions 2.D(14)(g)1, 2.D(14)(g)6-8, are deemed removed from those licenses.

(8) On **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**, William States Lee III Nuclear Station, Unit 1, License No. [NPF-101], license conditions 2.D(12)(d)11 regarding reliable spent fuel pool instrumentation, 2.D(12)(f), “Emergency Planning Actions,” and 2.D(12)(j), “Mitigation Strategies for Beyond-Design-Basis External Events,” except for 2.D(12)(j)1, and William States Lee III Nuclear Station, Unit 2, License No. [NPF-102], license conditions 2.D(12)(d)11 regarding reliable spent fuel pool instrumentation, 2.D(12)(f), “Emergency Planning Actions,” and 2.D(12)(j), “Mitigation Strategies for Beyond-Design-Basis External Events,” except for 2.D(12)(j)1, are deemed removed from those licenses.

(9) On **[INSERT DATE 2 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL RULE]**, Levy Nuclear Plant, Unit 1, License No. [NPF-99], license conditions 2.D(12)(d)11 regarding reliable spent fuel pool instrumentation, 2.D(12)(f), “Emergency Planning Actions,” and 2.D(12)(j), “Mitigation Strategies for Beyond-Design-Basis External Events,” except for 2.D(12)(j)1, and Levy Nuclear Plant, Unit 2, License No. [NPF-100], license conditions 2.D(12)(d)11 regarding reliable spent fuel pool instrumentation, 2.D(12)(f), “Emergency Planning Actions,” and 2.D(12)(j), “Mitigation Strategies for Beyond-Design-Basis External Events,” except for 2.D(12)(j)1, are deemed removed from those licenses.

6. In appendix E to part 50 revise paragraphs IV.F.2.j and VI.3.c to read as follows:

**Appendix E to Part 50—Emergency Planning and Preparedness for Production and Utilization Facilities**

\* \* \* \* \*

IV. \* \* \*

F. \* \* \*

2. \* \* \*

j. The exercises conducted under paragraph 2 of this section by nuclear power reactor licensees must provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to implement the principal functional areas of emergency response identified in paragraph 2.b of this section. Each exercise must provide the opportunity for the ERO to demonstrate key skills specific to emergency response duties in the control room, TSC, OSC, EOF, and joint information center. Additionally, in each eight calendar year exercise cycle, nuclear power reactor licensees shall vary the content of scenarios during exercises conducted under paragraph 2 of this section to provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to respond to the following scenario elements: hostile action directed at the plant site, no radiological release or an unplanned minimal radiological release that does not require public protective actions, an initial classification of or rapid escalation to a Site Area Emergency or General Emergency, and integration of offsite resources with onsite response. The licensee shall maintain a record of exercises conducted during each eight year exercise cycle that documents the content of scenarios used to comply with the requirements of this paragraph. Each licensee shall conduct a hostile action exercise for each of its sites no later than December 31, 2015. The first 8-year exercise cycle for a site will begin in the calendar year in which the first hostile action exercise is conducted. For a site licensed under 10 CFR part 52, the first 8-year exercise cycle begins in the calendar year of the initial exercise required by section IV.F.2.a of this appendix.

\* \* \* \* \*

VI. \* \* \*

3. \* \* \*

c. In the event of a failure of NRC-supplied equipment, a replacement will be furnished by the NRC for licensee installation.

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## Part 52 -- LICENSES, CERTIFICATIONS, AND APPROVALS FOR NUCLEAR POWER PLANTS

7. The authority citation for part 52 continues to read as follows:

**Authority:** Atomic Energy Act of 1954, secs. 103, 104, 147, 149, 161, 181, 182, 183, 185, 186, 189, 223, 234 (42 U.S.C. 2133, 2134, 2167, 2169, 2201, 2231, 2232, 2233, 2235, 2236, 2239, 2273, 2282); Energy Reorganization Act of 1974, secs. 201, 202, 206, 211 (42 U.S.C. 5841, 5842, 5846, 5851); 44 U.S.C. 3504 note.

8. In § 52.80, revise paragraph (d) to read as follows:

### § 52.80 Contents of applications; additional technical information.

\* \* \* \* \*

(d) The applicant's plans for implementing the requirements of § 50.155 of this chapter including a schedule for achieving full compliance with these requirements, and a description of:



- (1) The integrated response capability required by § 50.155(b) of this chapter; and
- (2) The equipment upon which the strategies and guidelines required by § 50.155(b)(1) of this chapter rely, including the planned locations of the equipment and how the equipment meets the requirements of § 50.155(c) of this chapter.

Dated at Rockville, Maryland, this     day of                     , 2017

For the Nuclear Regulatory Commission.

Annette L. Vietti-Cook,  
Secretary of the Commission.