
RULEMAKING ISSUE Notation Vote

April 30, 2015

SECY-15-0065

FOR: The Commissioners

FROM: Mark A. Satorius
Executive Director for Operations

SUBJECT: PROPOSED RULEMAKING: MITIGATION OF BEYOND-DESIGN-BASIS
EVENTS (RIN 3150-AJ49)

PURPOSE:

To obtain Commission approval to publish for public comment a proposed rule that would establish requirements for the mitigation of beyond-design-basis events for certain nuclear power reactor licensees and applicants.

SUMMARY:

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared a proposed rule (Enclosure 2) that would establish requirements for the mitigation of beyond-design-basis events. This proposed rulemaking would: 1) make generically-applicable requirements previously imposed by order for mitigation of beyond-design-basis external events and for monitoring spent fuel pool wide-range level; 2) include proposed provisions to have an integrated response capability; 3) include proposed requirements for increased emergency response capabilities for multi-unit events; 4) provide requirements for new reactor designs; and 5) address a number of petitions for rulemaking (PRMs) submitted in the aftermath of the March 2011 Fukushima Dai-ichi event. A member of the staff submitted a non-concurrence opposing the proposed new reactor design requirements as being unnecessary. The staff fully considered the non-concurrence during the development of the proposed rulemaking and concluded that the proposed rule should contain the new reactor design requirements.

CONTACTS: Timothy A. Reed, NRR/DPR
301-415-1462

Eric E. Bowman, NRR/JLD
301-415-2963

BACKGROUND:

As discussed in section II of the enclosed proposed rule *Federal Register* (FR) notice (also known as an FRN), the NRC has undertaken numerous regulatory actions in the aftermath of the Fukushima Dai-ichi event. These actions commenced with the efforts of the Near-Term Task Force (NTTF) and the development of the associated NTTF recommendations. The NRC's response to the NTTF report (Agencywide Document Access and Management System (ADAMS) Accession No. ML11186A950) continued these efforts, both identifying actions to be taken in the near term and prioritizing the NTTF recommendations. Near-term actions included the issuance of three orders, a request for information that addressed several regulatory issues under Section 50.54(f) of Title 10 of the *Code of Federal Regulations* (10 CFR), and two Advance Notices of Proposed Rulemakings (ANPRs). The regulatory efforts to address lessons-learned from Fukushima have evolved over time and based on several interactions with the Commission, the two major rulemaking efforts were consolidated into this proposed mitigation of beyond-design-basis events rulemaking.

The NRC staff has interacted extensively with external stakeholders throughout the development of this proposed rulemaking. This includes numerous public meetings (see Section II.E. of the FRN for more information) and the request for public comments through the issuance of two ANPRs and two draft regulatory basis documents and incorporation of the stakeholder feedback in finalizing the regulatory basis documents.¹ The most significant interactions include:

1. Issuance of the Station Blackout² ANPR (77 FR 16175; March 20, 2012)
2. Issuance of the Onsite Emergency Response Capabilities ANPR (77 FR 23161; April 18, 2012)
3. Issuance of the draft regulatory basis for Station Blackout Mitigation Strategies (78 FR 21275; April 10, 2013)
4. Issuance of the draft regulatory basis for Onsite Emergency Response Capabilities (78 FR 1154; January 8, 2013)

DISCUSSION:

The proposed rulemaking would apply to power reactor applicants and licensees and include provisions as follows:

¹ Note that the final regulatory basis documents were issued for Station Blackout Mitigation Strategies (78 FR 44035; July 23, 2013) and Onsite Emergency Response Capabilities (78 FR 63901; October 25, 2013).

² The Station Blackout regulatory effort is later referred to as Station Blackout Mitigation Strategies.

1. Proposed provisions that make generically-applicable requirements previously imposed by Order EA-12-049³ (ADAMS Accession No. ML12054A735) for the mitigation of beyond-design-basis external events.
2. Proposed requirements consistent with the “Policy Statement on the Regulation of Advanced Reactors” (73 FR 60612; October 14, 2008), for new reactor applicants to include design features that would enhance coping durations and reduce reliance on human actions for beyond-design-basis events.
3. Proposed provisions that make generically-applicable requirements previously imposed by Order EA-12-051 (ADAMS Accession No. ML12056A044) for remotely monitoring spent fuel pool wide-range level.
4. Proposed requirements for the reasonable protection of mitigation equipment for beyond-design-basis external events that reflect the reevaluated hazards determined through regulatory efforts stemming from the 10 CFR 50.54(f) request issued on March 12, 2012 (ADAMS Accession No. ML12053A340).
5. Proposed requirements for an integrated response capability consisting of strategies and guidelines for beyond-design-basis external events, the loss of large areas of the plant due to explosions and fires, and severe accidents. This would include the imposition of requirements for Severe Accident Management Guidelines (SAMGs), which are currently a voluntary industry initiative, and integration of SAMGs with existing emergency operating procedures.
6. Proposed requirements to enhance the onsite emergency response capabilities for multi-unit events. These capabilities are being implemented in conjunction with the mitigation strategies requirements of Order EA-12-049 and include a capability to evaluate the consequences from multiple sources including combinations of power reactor units and spent fuel pools on a single site.
7. Proposed requirements for training, drills or exercises, and change control for the new requirements that both reflect the post-Fukushima regulatory actions and provide assurance of a continued integrated accident response capability.
8. Proposed requirements that would facilitate decommissioning of licensees who would be subject to this rule. These requirements would be coordinated with the Commission-directed Decommissioning Rulemaking.

A more complete description of the scope of the proposed rulemaking, including its relation to the various post-Fukushima regulatory actions, is provided in section II of the enclosed proposed rule FRN.

New Proposed Requirements and Supporting Backfitting Justification

³ The staff intends to rescind Order EA-12-049 and Order EA-12-051 after the Mitigation of Beyond-Design-Basis Events final rule goes into effect. Further discussion of this matter will be provided at the final rule stage.

When the staff proposed in enclosure 6 to SECY-14-0046 “Fifth 6-Month Status Update on Response to Lessons Learned from Japan’s March 11, 2011, Great Tōhoku Earthquake and Subsequent Tsunami,” dated April 17, 2014, (ADAMS Accession No. ML14064A523) to consolidate ongoing rulemaking efforts and establish the current proposed rulemaking, it committed to identify whether different proposed requirements would be justified differently under the Commission’s backfitting and Part 52 issue finality requirements. The supporting backfitting and issue finality analysis is provided in the “Backfitting and Issue Finality” section in the enclosed proposed rule FRN. The proposed rule includes the entire scope of the requirements described in SECY-14-0046.

In this rulemaking the staff also proposes to require licensees to develop, implement and maintain SAMGs, consistent with the NTF recommendation 8. While the staff is proposing that SAMGs be required (as opposed to maintaining SAMGs as voluntary industry initiatives), the staff’s proposed regulatory treatment of SAMGs was developed considering insights from its backfitting analysis. This proposed treatment (discussed in the following section) is intended to ensure that the imposition of SAMG requirements is consistent with their risk significance, as well as Fukushima lessons learned, and would not result in excessive focus of licensee or NRC resources from activities having greater safety importance. Because the available quantitative risk information is not a complete measure of the SAMG safety benefits, the staff relied on quantitative and qualitative reasons to conclude that SAMG requirements would result in substantial additional protection for public health and safety, as stated in Appendix A to the supporting draft regulatory analysis. Specifically, quantitative risk information indicates that SAMGs have a small safety benefit. In addition, SAMGs directly support maintenance of containment integrity following severe accidents and indirectly support the protective action recommendations made by the emergency response organization in such circumstances and as such, the SAMGs have a very important link to two foundational parts of the NRC’s defense-in-depth framework: containment and emergency preparedness.

Scope of Severe Accident Management Guideline Requirements

Severe Accident Management Guidelines provide the strategies and guidelines to mitigate the consequences of a severe accident. When it is determined that adequate core cooling is no longer assured, the licensee exits the plant Emergency Operating Procedures or other governing processes and enters the SAMGs. The SAMGs are symptom-based, pre-planned accident mitigation strategies that were developed using modern thermal-hydraulic and accident progression and consequence modeling. The SAMGs were developed for use in specific reactor designs and then adapted by individual licensees to reflect plant-specific design features and capabilities. The SAMGs are currently in place at all operating power reactor sites as a voluntary industry initiative, and this proposed rulemaking would make them a regulatory requirement.

The industry has developed two guidance documents⁴ that are intended to provide licensees with acceptable methods for meeting the proposed new SAMG requirements, such as

⁴ The industry guidance is found in Nuclear Energy Institute (NEI) 13-06 (rev. 0), “Enhancements to Emergency

developing, implementing and maintaining the documents, training, command and control, and drills and exercises. The staff plans to issue draft regulatory guides (DGs) that would endorse, with clarifications, these guidance documents. The NRC staff has not conducted, and does not intend to conduct, a technical review of the owners groups' guidelines for SAMGs. The staff's proposal that the use of owners groups' guidelines for SAMGs would meet the proposed requirements is based on: 1) the assessment performed by the NRC staff in the 1990s when the industry initially implemented the SAMGs; 2) the NRC staff's recent interactions with industry on the latest revision of the SAMGs, including electronic portal access to the owners groups' SAMGs granted by industry; 3) the owners groups' proposal of a process for maintaining the guidelines for the SAMGs; and 4) interactions with stakeholders in public meetings. The updated guidelines for SAMGs reflect the revised Severe Accident Management Guidance Technical Report developed by the Electric Power Research Institute (EPRI) in 2012⁵ to incorporate lessons learned from the Fukushima Dai-ichi accident and include experience gained since the 1990s.

Consistent with the discussion above concerning the staff's proposed backfitting justification for SAMG requirements, the proposed SAMG requirements would not include new instrumentation requirements. The SAMGs were developed and implemented based on a philosophy that makes use of available instrumentation, includes backup or alternative means for determining plant conditions when the primary means become unavailable or unreliable, and includes a course of action to follow when the event degrades to the point where there is no reliable instrumentation available. The staff continues to conclude that this is a sound approach and further has determined that current equipment qualification and post-accident monitoring requirements, in concert with the guidance provided by the SAMGs for determining selection of the appropriate strategies, negates the need to require instrumentation upgrades.

Equipment Requirements and Consideration of Feedback and Lessons Learned from Implementation of Order EA-12-049

The proposed rule specifies technical requirements for equipment relied on for strategies to mitigate beyond-design-basis events, including specific provisions for equipment capacity and capability, reasonable protection, maintenance, and spent fuel pool level monitoring. New reactor designers may establish different approaches from those used for currently licensed operating reactors in developing strategies to mitigate beyond-design-basis events. For example, new reactor designers may use installed plant equipment for both the initial and long-term response to an extended loss of alternating current power (ELAP) with less reliance on portable equipment and offsite resources than currently operating nuclear power plants. The

Response Capabilities for Beyond Design Basis Events and Severe Accidents," (ADAMS Accession No. ML14269A230) and NEI 14-01 (rev. 0), "Emergency Response Procedures and Guidelines for Beyond Design Basis Events and Severe Accidents," (ADAMS Accession No. ML14269A236) both dated September 2014. On September 26, 2014, NEI transmitted two letters seeking endorsement of the two guidance documents (ML14269A229 and ML14269A237).

⁵ "Severe Accident Management Guidance Technical Basis Report, Volume 1: Candidate High-Level Actions and Their Effects." EPRI, Palo Alto, CA: 2012. 1025295. Available at <http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=1025295>.

NRC will consider the specific plant approach when evaluating the structures, systems, and components relied on as part of the mitigating strategies for beyond-design-basis events. Additional information on these strategies is provided in the draft guidance document developed by the staff to accompany this rule provision.⁶ The staff, in its previous interactions with the Commission regarding mitigation strategies for beyond-design-basis external events, noted the importance of considering in the proposed rulemaking the lessons learned and feedback stemming from the implementation of Order EA-12-049. This guidance also incorporates lessons learned and feedback stemming from the implementation of Order EA-12-049, consistent with Commission direction, and proposes to accept an updated version of industry guidance for use by applicants and licensees.

Design Features Requirements for New Reactor Applicants

The proposed rule would include a requirement for applicants for new nuclear power plant designs to include design features in the plant design sufficient to enhance coping durations and minimize reliance on human actions to maintain or restore key safety functions during an ELAP 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. Such capability would maximize reliance on installed design features to maintain or restore the key safety functions. As a result, new reactors would benefit from a flexible approach to such an event, with a longer period of time until the plant would need to rely on portable equipment or offsite resources to maintain or restore the key safety functions.

This approach provides an enhanced means of addressing the intent of Order EA-12-049, consistent with the Policy Statement on the Regulation of Advanced Reactors in which the Commission previously encouraged vendors to include certain design features into the plant design that provide enhanced margins of safety and use simplified means to accomplish safety functions, including longer times for operators to diagnose and manage challenges and simplified safety systems that reduce required operator actions. The Commission has in the past applied the regulatory approach of establishing alternative design requirements for new reactor applicants to enhance margins of safety for adequate protection and for beyond-design-basis events as with assessment requirements under 10 CFR 50.150, "Aircraft Impact Assessment."

This proposed requirement would only apply to applicants for new nuclear power reactor designs, not to licenses or certifications already issued (including renewals). As a result, the proposed requirement would neither constitute a backfit under 10 CFR 50.109, nor would it be inconsistent with any of the issue finality provisions in 10 CFR Part 52. The requirement is specifically directed at the designers of key safety functions (generally, design certification applicants), not to license applicants incorporating design material by reference into their applications. Thus, a combined license applicant not referencing a certified design would need to address these requirements. If approved by the Commission, the staff would engage with

⁶ Draft Regulatory Guide (DG-1301), "Flexible Mitigation Strategies for Beyond-Design-Basis External Events," which would endorse an updated version (revision 1) of NEI 12-06, "Diverse and Flexible Coping Strategies Implementation Guide," found in ADAMS at Accession No. ML13168A031.

applicants to pursue this approach through the design certification review process in parallel with the rulemaking process. Notwithstanding the inapplicability of this provision to existing design certifications, the proposed rule would require combined license applicants, including those referencing existing design certifications, to describe their integrated response capability, which would include mitigation strategies for beyond-design-basis external events.

Additional information on the costs and benefits of the proposed requirement for new reactors is presented in the draft supplemental regulatory analysis (Enclosure 4 to this paper).

A member of the staff submitted a non-concurrence (Enclosure 6) opposing the proposed new reactor design requirements. The basis for this non-concurrence was the staff member's view that the proposed requirements are arbitrary and ambiguous and may cause confusion for future design certification applicants. After fully considering the views expressed in the non-concurrence and thoroughly reviewing the rulemaking package, the staff concludes that the proposed requirement should remain in the rulemaking package for the Commission's consideration. The staff's basis for proposing this requirement is sufficiently documented in the rulemaking package.

Consideration of Reevaluated Hazards

As described in the enclosed proposed rule FRN and in COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and The Reevaluation of Flooding Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256), the staff and industry undertook development and implementation of strategies and guidelines for mitigation of beyond-design-basis external events under Order EA-12-049 in parallel with the reevaluation of the seismic and flooding hazards under the NRC's requests for information of March 12, 2012. The proposed rule would resolve and clarify the necessary actions a licensee must take to continue to show adequate protection of public health and safety, in light of the reevaluated hazards, as directed in SRM-COMSECY-14-0037 (ADAMS Accession No. ML15089A236).

Decommissioning Provisions

The staff is proposing decommissioning provisions within the applicability section for § 50.155 to reflect the cessation of requirements for strategies and guidelines when the underlying hazards no longer warrant the additional protection afforded by the strategies and guidelines. Under the proposed decommissioning provisions, once the NRC docket the certifications of permanent removal of fuel from the reactor vessel and cessation of operation, a licensee would not be required to maintain any of the strategies and guidelines related to core cooling and primary containment and would only be required to maintain strategies and guidelines related to spent fuel pool cooling and secondary containment capabilities, if applicable. Such a licensee would be required to maintain the full set of strategies and guidelines for spent fuel pools containing irradiated fuel, but could cease maintaining the strategies and guidelines for mitigation of beyond-design-basis events and severe accident management guidelines once decay heat has reduced sufficiently. At this stage, this would leave only the extensive damage mitigation guidelines in place. Dominion Nuclear Connecticut, Inc., would be specifically exempted from

the requirements of § 50.155 as the licensee of Millstone Power Station, Unit 1, due to the significant age of the irradiated fuel within the spent fuel pool for that unit and its extremely low decay heat.

Petitions for Rulemaking

On July 28, 2011, the NRC docketed five PRMs filed by the National Resources Defense Council Inc. (NRDC) (PRM 50-97, PRM-50-98, PRM-50-100, PRM-50-101, and PRM 50-102) that are pertinent to this rulemaking.⁷ The petitions rely solely on the NTTF report and request that the NRC undertake rulemaking in a number of areas that would be addressed by this proposed rulemaking. The regulatory scope of this proposed rulemaking, as discussed in section II of the proposed rule notice, contains proposed provisions that stem from NTTF recommendations 4.1, 7.5, 8.4, 9.1, and 9.2 on which these petitions rely. The “Petitions for Rulemaking” section of the enclosed proposed rule FRN provides a discussion of how each of these PRMs is considered in the proposed rule.

Supporting Draft Guidance

This proposed rulemaking is supported by three DGs, identified in the “Availability of Guidance” section of the enclosed proposed rule notice, that the staff proposes be issued for public comment in conjunction with this proposed rulemaking. Those DGs can be found at ADAMS Accession Nos. ML13168A031, ML14245A454, and ML14265A070.

Inspection

Many of the requirements associated with this rule will be inspected through Temporary Instruction 2515/191, “Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans” (TI-191, ADAMS Accession No. ML15068A393), as licensees come into compliance with Orders EA-12-049 and EA-12-051. Inspection of these requirements will transition to the baseline reactor oversight process following normal NRC processes as laid out in Inspection Manual Chapter 0307, Appendix B, “Reactor Oversight Realignment.” In addition to these inspection requirements, this rule would result in inspection requirements for SAMGs. The “Regulatory Oversight of Severe Accident Management Guidelines” section in the enclosed proposed rule contains a discussion of the current plans for inspection activities to support this rulemaking. Consistent with the staff’s proposed regulatory structure for SAMG requirements, the staff is proposing a SAMG inspection that would:

1. Verify that licensees have updated their site-specific SAMGs.

⁷ The petitions were docketed in the FR at 76 FR 58165. PRM-50-99 was submitted by the NRDC at the same time as the other 5 petitions and requests the NRC to conduct rulemaking for NTTF Recommendation 2.2 to require licensees to confirm seismic hazards and flooding hazards every 10 years and address new and significant information. Staff is not addressing this petition in this proposed rule.

2. Verify that licensees have included the SAMGs within the plant configuration management systems.
3. Verify that licensees have integrated the SAMGs consistent with the draft guidance contained in DG-1319.

Implementation and Cumulative Effects of Regulation

As previously discussed, the staff has engaged extensively with external stakeholders throughout this proposed rulemaking development process, including the issuance of two ANPRs and two draft regulatory basis documents requesting stakeholder feedback, as well as numerous public meetings, described in more detail in the “Background” section of the proposed rule FRN. The staff is following its Cumulative Effects of Regulation (CER) process for this rulemaking, including issuance of a supporting draft regulatory analysis for comment with the proposed rule. In this regard, the draft regulatory analysis estimates the costs and impacts of the two post-Fukushima orders (i.e., Orders EA-12-049 and EA-12-051), that would be made generically applicable through this rulemaking as historical costs, separates the costs associated with the new requirements (e.g., those that relate to SAMG requirements), and requests stakeholder feedback on those estimates. The staff has developed supporting draft guidance that is being issued with the proposed rule for public comments, as described in the “Availability of Guidance” section of the proposed rule FRN. Finally, the staff is requesting stakeholder feedback on a number of issues and is also requesting CER feedback, as described in the “Specific Requests for Comments” and “Cumulative Effects of Regulation” sections of the proposed rule FRN, respectively.

RECOMMENDATIONS:

The staff recommends that the Commission:

- (1) Approve the enclosed proposed rule notice (Enclosure 2) for publication in the *Federal Register*; and
- (2) Note the following:
 - a. The staff has prepared draft regulatory analyses for this rulemaking (Enclosures 2 and 3).
 - b. The staff will publish three draft regulatory guides for public comment concurrent with the publication of the proposed rule.
 - c. The staff will inform the appropriate congressional committees.
 - d. The Office of Public Affairs will issue a press release when the NRC publishes the proposed rule in the FR.

COORDINATION:

The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objection. The Office of the General Counsel has no legal objection to this paper. The Advisory Committee on Reactor Safeguards has reviewed the proposed rulemaking package and recommended that the staff publish the proposed rule (ADAMS Accession No. ML15049A216).

/RA/

Mark A. Satorius
Executive Director
for Operations

Enclosures:

1. Resource Estimates
2. *Federal Register* Notice
3. Draft Regulatory Analysis
4. Draft Supplemental Regulatory Analysis
5. Environmental Assessment
6. Non-concurrence NCP-2015-003

