



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

April 22, 2015

The Honorable Stephen G. Burns
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: DRAFT SECY PAPER, "PROPOSED RULEMAKING: MITIGATION OF BEYOND-DESIGN-BASIS EVENTS (RIN 3150-AJ49)"

Dear Chairman Burns:

During the 623rd meeting of the Advisory Committee on Reactor Safeguards, April 9-11, 2015, we met with representatives of the NRC staff to review a draft of the SECY paper on "Proposed Rulemaking: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)." We also had the benefit of discussions with representatives of the Nuclear Energy Institute (NEI).

Our Fukushima Subcommittee reviewed the draft SECY paper and related documentation on March 19, 2015. During a meeting on November 20-21, 2014, representatives of the NRC staff, NEI, Industry, and the Union of Concerned Scientists also briefed the subcommittee on details of implementing Orders EA-12-049 and EA-12-051, their associated guidance, and preliminary draft rule language for making these Orders generically applicable. Our review of this consolidated rulemaking activity was also supported by several preliminary meetings conducted by ACRS Subcommittees and the Full Committee during 2013 and early 2014. We also had the benefit of the documents referenced.

CONCLUSION AND RECOMMENDATIONS

1. We endorse publication of the draft proposed rule in the *Federal Register* for public comment subject to the following recommendations:
 - a. The public comment period should be extended beyond the proposed 75 days to allow ample opportunity for this important review,
 - b. Section 6 of Draft Regulatory Guide DG-1301 regarding the treatment of re-evaluated hazards should be completed, and
 - c. The draft proposed rule and Draft Regulatory Guide DG-1301 should not be issued until NEI 12-06, Revision 1, is published in final form and the staff confirms that its guidance is acceptable.

2. A more comprehensive symptom-based and function-based framework should be developed for the integration of response capabilities that extend beyond the Emergency Operating Procedures (EOPs). The framework should coordinate strategies and guidance that are currently distributed among the fire response procedures, flooding response procedures, FLEX Support Guidelines (FSGs), Extensive Damage Mitigation Guidelines (EDMGs), and Severe Accident Management Guidelines (SAMGs).

BACKGROUND

The staff has prepared a draft proposed rule designed to establish new or revised requirements for the mitigation of beyond-design-basis events, as part of the NRC response to lessons learned from Japan's March 11, 2011 Great Tohoku Earthquake and subsequent tsunami. The Commission determined that several activities related to NRC Orders, industry commitments, and response programs that resulted from the Near-Term Task Force (NTTF) recommendations required rulemaking. These were planned to be initiated as separate projects. Shortly thereafter, the staff identified that the Onsite Emergency Response Capabilities rulemaking could not be issued before the Station Blackout Mitigation Strategies rulemaking because it would need to reference the Station Blackout Mitigation Strategies requirements. In a July 9, 2014 Staff Requirements Memorandum (SRM), the Commission approved the staff's proposal to consolidate the Station Blackout Mitigation Strategies rulemaking with the Onsite Emergency Response Capabilities rulemaking, along with rulemaking for numerous Emergency Preparedness actions.

This draft proposed rulemaking would combine the Order requirements for mitigation of beyond-design-basis external events and for monitoring spent fuel pool wide range-level, including proposed provisions to have an integrated response capability. Additionally, the staff proposes consolidating the following rulemaking activities to develop an integrated response capability into this single rulemaking package:

- Station Blackout Mitigation Strategies rulemaking to address station blackout mitigation capability at all operating and new reactors for design-basis and beyond-design-basis external events, including enhancing spent fuel pool makeup capability (NTTF Recommendations 4 and 7)
- Onsite Emergency Response Capabilities rulemaking to address strengthening and integrating onsite emergency response capabilities such as EOPs, SAMGs, and EDMGs. The new rule will also include training, qualification, and evaluation requirements for key personnel expected to implement the procedures and strategies (NTTF Recommendation 8)
- Requirements for facility emergency plans to address prolonged station blackout and multiunit events, and enhancement of emergency planning guideline topics related to decision making, radiation monitoring, and public education (portions of NTTF Recommendations 9, 10, and 11)

- Items currently being implemented by industry (e.g., FLEX guidance in NEI 12-06)

In addition, the draft proposed rule language is designed to make Order EA-12-049 generically applicable to all power reactor facilities by requiring an integrated response capability that includes mitigation strategies for beyond-design-basis external events, EDMGs, and SAMGs. The draft proposed rule language would also make generically applicable those requirements previously imposed by Order EA-12-051 to install instrumentation and equipment to remotely monitor spent fuel pool wide-range level.

DISCUSSION

The staff has provided numerous opportunities for public interaction and comment in the development of the components of this consolidated rulemaking package. The draft proposed consolidated rule should be issued for public comment after consideration of our recommended changes discussed below. The development of the final rule should continue to strive to achieve stability and finality with respect to the Orders and actions initiated as a result of the Fukushima accident.

The proposed consolidated rulemaking package is detailed and complex. The staff has developed several Specific Requests for Comments, which deserve thorough consideration and feedback from stakeholders. Accordingly, we recommend that the public comment period be extended beyond the proposed 75 days to allow ample opportunity for this important review.

Different portions of the consolidated rulemaking have different backfitting and issue finality bases. Requirements stemming from Orders EA-12-049 and EA-12-051 would typically not be new impositions, since these Orders have already been imposed. Any requirement extending beyond these Orders would need to be justified in accordance with any applicable backfitting or issue finality provision.

The following sections summarize our observations, comments, and recommendations on selected issues from the proposed rulemaking and its supporting documentation.

Draft Regulatory Guides

The staff proposes to issue three draft regulatory guides as part of this rulemaking package. We did not have the opportunity for detailed interaction with the staff on these documents, but plan to meet with the staff to review these draft regulatory guides. The following comments should be addressed by the staff prior to release of the rulemaking package for public comment.

Draft Regulatory Guide DG-1301 endorses, with clarifications, Revision 1 of NEI 12-06. At our subcommittee meeting on March 19, 2015, NEI indicated that they were finalizing Revision 1 to incorporate lessons learned from implementing Order EA-12-049 and to incorporate the results of the latest interactions with the staff and the public. This is the fundamental basis document for implementation of compliance with Order EA-12-049. The draft proposed rule and Draft Regulatory Guide DG-1301 should not be issued until NEI 12-06, Revision 1, is published in final form, and the staff confirms that its guidance is acceptable.

The staff's position in Draft Regulatory Guide DG-1301, Section C.6, "Treatment of Re-evaluated Hazards under the Request for Information of March 12, 2012," is not included. The staff has not completed this section, pending their response to the Commission's March 30, 2014 SRM regarding COMSECY-14-0037. Before the rulemaking package is released for public comment, the staff should develop this section, consistent with the direction given by the Commission in SRM-COMSECY-14-0037.

Design Features for New Reactors

NEI 12-06, Revision 1, does not provide specific guidance on proposed requirements for new reactor applicants subject to section 10 CFR 50.155(d), "Design Features." This section of the proposed rule aims to enhance coping durations and minimize reliance on human actions to maintain or restore core cooling, spent fuel cooling, and containment during an extended loss of AC power concurrent with the loss of normal access to the ultimate heat sink. Accordingly, the staff developed Appendix A to Draft Regulatory Guide DG-1301 to provide this guidance. While these requirements have a goal to enhance the safety of advanced reactor designs, the guidance does not clearly describe criteria or evaluation methods for these features. A member of the NRC staff has filed a non-concurrence document related to this proposed requirement, and we were briefed on details of those concerns during our meeting. As stated above, we intend to review Draft Regulatory Guide DG-1301 in more detail.

Training Requirements

The training requirements under section 10 CFR 50.155(e) of the rule are general and do not specify which activities need to be subject to the systematic approach to training and which are exempt. In the associated *Federal Register* notice, the staff clarifies in Specific Request for Comment 8 the general intention of the rule language and requests that additional issues be identified. We agree that the staff should assure training program requirements do not expand without commensurate benefit. Coincidentally, training program changes should be evaluated to assure the proper balance between prevention and mitigation of accident progression.

Severe Accident Management Guidelines

In this rulemaking, the staff proposes to require that licensees develop, implement, and maintain SAMGs consistent with NTF Recommendation 8. Quantitative evaluations and qualitative considerations are provided. The staff's quantitative insights are derived partly from the recent analytical evaluations in support of the Containment Protection and Release Reduction (CPRR) rulemaking regulatory process. Those analyses indicate that while post-core damage strategies such as SAMGs result in a safety benefit, they could not be justified under the staff's cost-benefit backfit criteria. The staff's conclusion is based on an analysis that was intended only to examine potential benefits from requiring filtered venting systems for boiling water reactors with Mark I and Mark II containments. The evaluation considered only a limited set of potential damage scenarios. That limited analysis is not sufficient to justify broad conclusions about the quantitative benefits from SAMGs for a complete spectrum of events across the entire U.S. operating reactor fleet. The staff has not performed comprehensive Level 2 risk assessments for a variety of plant designs to compare the risk with and without SAMG functions. Although such a comparison may not demonstrate that SAMGs are universally cost-beneficial, it may better reveal their risk benefits.

The staff attributed their conclusions to the NRC's regulations that effectively keep the frequency of core damage very low and the capability of the containment very high, and ensure through Emergency Preparedness requirements that the surrounding population is unlikely to experience health effects from any potential release of radionuclides. The staff should assure that the technical evaluation and bases for the CPRR analysis are made available to the public as it has been referenced in this proposed rulemaking package. We will provide a separate letter report on the CPRR analyses and their implications.

The staff concludes further that cost-benefit analysis is not a complete measure of SAMG safety benefits and proposes that SAMG regulatory requirements would result in additional protection for public health and safety based on qualitative reasons. The staff states that SAMGs directly support maintenance of containment integrity in the event of severe accidents, and indirectly support the protective action recommendations made by the emergency response organization in such circumstances. Thus, SAMGs have an important link to the NRC's defense-in-depth framework: containment and emergency preparedness. Based on this qualitative argument to justify imposing rule requirements, the staff proposes to implement SAMG requirements with a regulatory framework informed by risk insights; that is, the proposed intent for regulatory oversight is through inspection.

In our meetings with the staff, industry, and stakeholders, we find that there is wide-spread acceptance of the benefit from SAMGs and their implementation. As the staff documents in the regulatory analysis, the industry through their Owners Groups has invested resources to revise and update the generic SAMGs to reflect lessons learned through significant NRC and industry efforts. This major work was completed and documented in October 2014. The next steps for implementation are in progress.

The SAMGs provide significant value to the operators because they contain guidance beyond that provided by the EOPs, which enhances the operators' capability to respond and cope with beyond-design-basis conditions and, while doing so, further protect the public. At issue is not whether SAMGs should be developed, implemented, trained upon, and exercised, but whether these activities are maintained and monitored through regulatory requirements or by a strengthened voluntary initiative. Given the extremely low likelihood that an event will lead to the use of SAMGs, regulatory requirements should not impose unnecessary burden or divert attention from more important safety objectives.

We recognize the importance of the staff's proposal regarding SAMG development. However, we consider how the requirement is imposed to be as important as how the requirement is implemented. Rather than obligating that development of SAMGs be required by rulemaking, thus triggering backfit considerations, voluntary compliance can accomplish the intended outcome effectively, but only if there is regulatory and public confidence that the SAMG programs remain current and effective throughout the life of each site. To achieve the timely objectives of the proposed rulemaking, the staff should ensure that formal commitments to develop, implement, and maintain SAMGs are documented by each licensee, thus providing an opportunity for their periodic examination and confirmation.

Procedure and Guideline Integration

Paragraph 50.155(b)(4) of the proposed rule requires "Integration of strategies and guidelines in paragraphs (b)(1)-(b)(3) of this section with the Emergency Operating Procedures (EOPs)." The specific sets of guidance that define a plant's integrated response capability in the context of this rulemaking are:

- FLEX Support Guidelines (FSGs), which are being developed to address paragraph (b)(1) of the proposed rule
- Extensive Damage Mitigation Guidelines (EDMGs), which were originally developed in response to the requirements from 10 CFR 50.54(hh)(2) and are subsumed in paragraph (b)(2) of the proposed rule
- Severe Accident Management Guidelines (SAMGs), which were developed as a voluntary industry initiative and are being updated to address paragraph (b)(3) of the proposed rule

We have commented previously on the need for carefully integrated guidance in our letters, dated October 13, 2011 and March 13, 2012. We went further to recommend including fire response procedures in the integration process. Unfortunately, the statements of consideration for the proposed rule note that fire response procedures are explicitly excluded from the integration process. The discussion presents the rationale for that exclusion in the context of "firefighting activities" and "firefighting strategies". Strategies and guidance for firefighting activities that involve efforts to extinguish a fire and limit its damage can be separated from the proposed integration framework. However, fire response procedures often contain instructions for operator actions that further affect plant status, such as preemptively deenergizing power supplies, locally aligning alternative flow paths, or relocating operators from the Main Control Room. In many cases, those operational responses include activities and strategies that are similar, if not identical, to those included in the FSGs, EDMGs, and SAMGs. The staff acknowledges that there is extensive overlap in actions among these procedures and guidance. Operating experience from actual fires and from events when the operating crew was unsure whether a fire was in progress has shown that parallel execution of EOPs and fire response procedures can be difficult and can introduce operational complexity.

The proposed integration framework in 10 CFR 50.155 and Draft Regulatory Guide DG-1319 treats FSGs, EDMGs, and SAMGs as separate and distinct sets of guidelines, each with its own links to the EOPs. Each set of guidelines applies for a particular suite of boundary conditions and assumptions. For example, the FSGs are applicable specifically to "beyond-design-basis events from natural phenomena that result in an extended loss of all ac power concurrent with a loss of normal access to the ultimate heat sink." The nominal plant status and the corresponding FSG operational strategies are based on those assumed conditions. In a similar manner, the EDMGs are applicable specifically to a subset of possible events that involve the loss of specific large areas of the plant due to explosions and fires. The fire response procedures are applicable to less extensive damage that is confined to particular locations that are defined in the plant's fire protection program. Although not addressed explicitly in the rulemaking statements of consideration, guidance for response to flooding events is similarly based on damage that may occur in specific plant locations.

Symptom-based EOPs were developed after the accident at Three Mile Island through a comprehensive process that completely revamped the previous event-based procedures in favor of more fundamental guidance intended to maintain the operators' primary focus on the key functions that are needed to prevent core damage and to assure containment performance. The operators are trained to confirm that those functions are maintained or restored, regardless of the initiating event or specific equipment malfunctions that may have placed the plant in a particular evolving scenario. The symptom-based EOPs and, in particular, their integrated emphasis on maintaining critical safety functions, have served the industry well. They have contributed to measurably enhanced operator performance with commensurate safety benefits. We agree with the staff's conclusion that the symptom-based EOP framework should remain largely unaffected by this proposed rulemaking.

On the other hand, the current sets of guidance for operator responses to fires, floods, and extensive damage to specific areas of the plant have evolved largely from compliance with separate and distinct regulatory requirements. In many cases, that guidance has departed from the integrated functional perspective of the EOPs. As presented in the proposed rulemaking and its regulatory guidance, the distinct scopes and applicability of the FSGs, EDMGs, and SAMGs perpetuate and extend that event-based paradigm. They effectively compel licensed operators, supervisory personnel, and first responders from the Emergency Response Organization to make difficult decisions about which particular options and strategies may be most appropriate during an evolving scenario that may not mirror the presumed plant conditions for any of the discrete guidance sets. These event-based decision requirements are contrary to the symptom-based and function-based framework of the EOPs. They add complexity to a challenging situation, rather than providing integrated guidance that should simplify the operators' decision making. Should actual events not match the *a priori* assumptions, there will assuredly be delays, and possibly confusion, in a situation where timely response can be essential for controlling and mitigating an accident scenario.

A framework for the integration of response capabilities during plant conditions that extend beyond the bounds of the EOPs should not be based on an increasing number of discrete sets of guidance that have been developed individually for specific focused purposes. That framework should retain an integrated perspective of the critical functions that are needed to protect public health and safety, what equipment (installed, portable, or remotely accessible) is available to maintain or restore those functions, and the corresponding strategies to achieve those objectives, without regard to the specific events that may have placed the plant in a complex and evolving scenario. As it is currently structured, the proposed framework will not achieve that desirable degree of integration.

For this rulemaking to actually improve plant safety, licensed Reactor Operators, Senior Reactor Operators, and training supervisors must be involved in the integration process. The proposed rule, the draft regulatory guidance, and the endorsed NEI guidance should not be adopted without their substantial consideration. Direct participation by the front-line responders who might someday need to implement these strategies is not only fair, but is one key to achieving success.

We look forward to our continuing interactions with the staff on all important matters related to the Fukushima efforts, including the draft final version of this proposed rulemaking.

Sincerely,

/RA/

John W. Stetkar
Chairman

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3. NRC, Draft Proposed Environmental Assessment, "Mitigation of Beyond-Design-Basis Events," (ML15068A277)
4. NRC, Draft Regulatory Guide DG-1301, "Flexible Mitigation Strategies for Beyond-Design-Basis Events," (ML15072A171)
5. NRC, Draft Regulatory Guide DG-1317, "Wide-Range Spent Fuel Pool Level Instrumentation," (ML15068A325)
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11. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, August 21, 2012 (ML12054A735)

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16. NRC, EDO Response, "COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards,"" February 18, 2015 (ML15007A483)
17. NRC, COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," November 21, 2014 (ML14309A256)
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19. NRC, SRM to 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," July 9, 2014 (ML14190A347)
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