U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

August 2016

Revision 0

REGULATORY GUIDE

Technical Leads
Eric Bowman
Charles Murray

REGULATORY GUIDE 1.228

(New Regulatory Guide, draft was issued as DG-1319, dated November 2015)

INTEGRATED RESPONSE CAPABILITIES FOR BEYOND-DESIGN-BASIS EVENTS

A. INTRODUCTION

Purpose

This regulatory guide (RG) identifies methods and procedures the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for nuclear power reactor applicants and licensees to demonstrate compliance with NRC regulations covering integrated planning and preparedness for beyond-design-basis events as required by U.S. Code of Federal Regulations, Title 10, "Energy," Part 50, "Domestic Licensing of Production and Utilization Facilities," (10 CFR 50) (Ref. 1), Section 50.155, "Mitigation of Beyond-Design-Basis Events," (10 CFR 50.155).

Applicability

This RG endorses, with clarifications, the methods and procedures promulgated by the Nuclear Energy Institute (NEI) in the following documents as methods the NRC staff considers acceptable for meeting portions of the regulations in 10 CFR 50.155:

- NEI 12-01, "Guidelines for Assessing Beyond-Design-Basis Accident Response Staffing and Communication Capabilities," Revision 0, dated May 2012 (Ref. 2). This NEI document was previously endorsed by the NRC in a letter from Mr. David Skeen to Ms. Susan Perkins-Grew dated May 15, 2012 (Ref. 3).

- NEI 13-06, "Enhancements to Emergency Response Capabilities for Beyond-Design-Basis Events and Severe Accidents," Revision 1, dated February 2016 (Ref. 4), and

- NEI 14-01, "Emergency Response Procedures and Guidelines for Beyond-Design-Basis Events and Severe Accidents," Revision 1, dated February 2016 (Ref. 5)

Written suggestions regarding this guide or development of new guides may be submitted through the NRC's public Web site under the RGs document collection of the NRC Library at http://www.nrc.gov/reading-rm/doc-collections/reg-guides/contactus.html.

Electronic copies of this RG, previous versions of this guide, and other recently issued guides are available through the NRC's public Web site under the RGs document collection of the NRC Library at http://www.nrc.gov/reading-rm/doc-collections/. The RG is also available through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under ADAMS Accession No. ML16218A236. The regulatory analysis may be found in ADAMS under Accession No. MLXXXXXXXXX and the staff responses to the public comments on DG-1319 may be found under ADAMS Accession No. ML16218A237.

Pre-Decisional Draft provided to ACRS and made publicly available
to support October 19, 2016 Fukushima Subcommittee Meeting

Applicable Regulations

- U.S. *Code of Federal Regulations*, Title 10, "Energy," Chapter I, "Nuclear Regulatory Commission," Part 50, "Domestic Licensing of Production and Utilization Facilities" (10 CFR Part 50). Part 50, referenced subsections, and appendix provide the requirements that support this guidance.

- 10 CFR 50.155(b), "Integrated Response Capability," requires licensees to develop, implement, and maintain an integrated response capability that includes mitigation strategies for beyond-design-basis external events, strategies or alternative approaches for reevaluated hazards as applicable, and extensive damage mitigation guidelines. Section 50.155(b) also requires nuclear power reactor licensees to integrate these strategies and guidelines with existing Emergency Operating Procedures (EOPs), provide sufficient staffing and a supporting organizational structure with defined roles, responsibilities, and authorities to support implementation of the integrated response capability.

- 10 CFR 50.155(c)(4) requires licensees to provide sufficient communications capability, both onsite and offsite, to support the capabilities required under 10 CFR 50.155(b)(1) to mitigate beyond-design-basis external events from natural phenomena.

- 10 CFR 50.155(d), "Training requirements," requires licensees to provide training and qualification of personnel that perform activities in accordance with the strategies and guidelines required by 10 CFR 50.155(b).

- 10 CFR 50.155(e), "Drills or Exercises," requires licensees to perform drills or exercises to demonstrate the capability to use the strategies and guidelines required by 10 CFR 50.155(b).

Purpose of Regulatory Guides

The NRC issues RGs to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated events, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations and compliance with them is not required. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

Paperwork Reduction Act

This RG contains and references information collections covered by 10 CFR Parts 50, 52, or 54, that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501, et. seq.) These information collections were approved by the Office of Management and Budget (OMB) control numbers 3150-0011, 3150-0151, and 3150-0155 respectively.

Public Protection Notification

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

Pre-Decisional Draft provided to ACRS and made publicly available
to support October 19, 2016 Fukushima Subcommittee Meeting

B. DISCUSSION

Reason for Issuance

One of the primary lessons learned from the events at Fukushima Dai-ichi was the significance of the challenge presented by a loss of safety-related systems following the occurrence of a beyond-design-basis external event. In the case of Fukushima Dai-ichi, the extended loss of ac power condition caused by the tsunami led to loss of core cooling and a significant challenge to containment. The design basis for U.S. nuclear power plants includes bounding analyses with margin for external events expected at each site. Extreme external events (e.g., seismic events, external flooding) beyond those accounted for in the design basis are highly unlikely but could present challenges to nuclear power plants.

The regulations in 10 CFR 50.155 require each nuclear power plant licensee to have an integrated response capability to address the impact of beyond-design-basis external events affecting multiple units on a site, where applicable.

This RG addresses these challenges by endorsing, with clarifications, the guidance in three NEI documents, NEI 12-01, 13-06, and 14-01. The NRC staff concludes that the guidance in these three NEI documents will enable licensees to comply with the portions of the Mitigation of Beyond-Design-Basis Events rule that address integrated response capability.

Background

Following the March 11, 2011 events at the Fukushima Dai-ichi nuclear power plant, the NRC established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF conducted a systematic and methodical review of the NRC regulations and processes to determine if the agency should make additional improvements to these programs in light of the events at Fukushima Dai-ichi. As a result of this review, the NTTF developed a comprehensive set of recommendations, documented in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated July 12, 2011 (Ref. 6). As directed in staff requirements memorandum (SRM) for SECY-11-0093, (Ref. 7) the NRC staff reviewed the NTTF recommendations within the context of the NRC's existing regulatory framework and considered the various regulatory vehicles available to the NRC to implement the recommendations. The NRC staff also considered the input obtained from interactions with stakeholders. Documentation of the staff's efforts is contained in SECY-11-0124, "Recommended Actions to be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011 (Ref. 8) and SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011 (Ref. 9).

After receiving the Commission's direction in SRM-SECY-11-0124 (Ref. 10) and SRM-SECY-11-0137 (Ref. 11), the NRC staff issued a request for information (RFI) (Ref. 12) asking each licensee to assess its current communications system and equipment under conditions of on-site and off-site damage and prolonged loss of all ac power and perform a staffing study to determine the number and qualifications of staff required to fill all necessary positions in response to a multi-unit event on a single site. The NRC staff also conducted a series of public meetings (a list of public meeting summaries is included as Ref. 13) to discuss the implementation guidance for enhanced emergency response capabilities for beyond-design-basis events.

In SECY-15-0065 (Ref. 14), the NRC staff provided the draft proposed rule for mitigation of beyond-design-basis events to the Commission. This draft of the proposed regulation 10 CFR 50.155 included a section that would have required severe accident management guidelines (SAMGs). In SRM-

SECY-15-0065 (Ref. 15), the Commission approved publication of the proposed rule subject to the removal of the proposed requirements for SAMGs. The Commission further directed that "[t]he staff should ensure that any NRC-endorsed guidance for the proposed rule will provide for appropriate coordination of the FLEX support guidelines, extreme damage mitigating guidelines, and voluntarily maintained SAMGs with the existing Emergency Operating Procedures (EOPs) at each plant (e.g., appropriate transition criteria between EOPs and guidelines and clarity of command and control)."

The issuance of 10 CFR 50.155 strengthens and integrates onsite emergency response processes, procedures, training and exercises. The new regulations also incorporate elements that result in enhanced on-site emergency response capabilities. This RG provides implementation guidance for those aforementioned portions of 10 CFR 50.155 by adopting, with clarifications, NEI 12-01, 13-06, and 14-01 as acceptable methods for licensees to demonstrate compliance.

Harmonization with International Standards

The International Atomic Energy Agency (IAEA) has established a series of technical reports, safety guides and standards constituting a high level of safety for protecting people and the environment. IAEA guides present international good practices and identify best practices to help users striving to achieve high levels of safety. This RG and the NEI technical document endorsed by it contain guidance about beyond-design-basis external event mitigation similar to guidance under revision by the IAEA.

Documents Discussed in Staff Regulatory Guidance

This RG endorses, in part, the use of one or more codes, standards, or guidance documents developed by external organizations. These codes, standards, and third party guidance documents may contain references to other codes, standards, or third party guidance documents ("secondary references"). If a secondary reference has itself been incorporated by reference into NRC regulations as a requirement, then licensees and applicants must comply with that standard as set forth in the regulation. If the secondary reference has been endorsed in an RG as an acceptable approach for meeting an NRC requirement, then the standard constitutes a method acceptable to the NRC staff for meeting that regulatory requirement as described in the specific RG. If the secondary reference has neither been incorporated into NRC regulations nor endorsed in an RG, the secondary reference is neither a legally-binding requirement nor a "generic" NRC approved acceptable approach for meeting an NRC requirement. However, licensees and applicants may consider and use the information in the secondary reference, if appropriately justified, consistent with current regulatory practice, and consistent with applicable NRC requirements.

C. STAFF REGULATORY GUIDANCE

The NRC staff considers the following NEI technical reports acceptable for use subject to the following:

NEI 12-01 Guidelines for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities, Rev. 0, dated May 2012

The regulations in 10 CFR 50.155 require a power reactor applicant or licensee to provide sufficient staffing to support an integrated response capability. Performing a detailed analysis demonstrating sufficient staff is available to respond to a beyond-design-basis external event affecting all units on a site is one method for the determination of the appropriate level of staffing necessary to support compliance with the 10 CFR 50.155 staffing requirement. This section of the regulations also requires a

power reactor applicant or licensee to provide sufficient communications capability both onsite and offsite to support implementation of the mitigation strategies and guidelines required by 10 CFR 50.155(b)(1).

Staff Position: NEI 12-01 provides an acceptable method to assess staffing and communication capabilities and needs when responding to a beyond-design-basis external event.

NEI 13-06 Enhancements to Emergency Response Capabilities for Beyond Design Basis Events and Severe Accidents, Rev. 1, dated February 2016

The regulations in 10 CFR 50.155(d) require licensees to provide training and qualification of personnel that perform activities in accordance with the strategies and guidelines required by 10 CFR 50.155(b). The regulations in 10 CFR 50.155(e) require licensees to perform drills or exercises to demonstrate the capability to use the strategies and guidelines required by 10 CFR 50.155(b).

Staff Position: NEI 13-06 provides an acceptable method for enhancing the on-site emergency response capabilities for beyond-design-basis events through training, drills or exercises, and facilities and equipment to support a multi-unit event response.

NEI 14-01 Emergency Response Procedures and Guidelines for Beyond Design Basis Events and Severe Accidents, Rev. 1, dated February 2016

The regulations in 10 CFR 50.155(b), in part, require each applicant and licensee to develop, implement, and maintain an integrated response capability that includes the beyond-design-basis event mitigation strategies in 10 CFR 50.155(b)(1), reevaluated seismic and flooding hazard mitigation in 10 CFR 50.155(b)(2), and the extensive damage mitigation guidelines in 10 CFR 50.155(b)(3). The regulations also require, in part, integration of these capabilities with existing EOPs under 10 CFR 50.155(b)(4) and a supporting command and control structure under 10 CFR 50.155(b)(6).

NEI 14-01 provides guidance for the integration of the capabilities required by 10 CFR 50.155(b)(1)-(3) with EOPs as required by 10 CFR 50.155(b)(4) and command and control for beyond-design-basis events (required by 10 CFR 50.155(b)(6)).

Staff Position: NEI 14-01 provides an acceptable method for implementing those elements of an integrated response capability under the above identified portions of 10 CFR 50.155(b) with the following clarifications:

- NEI 14-01, Section 2 provides guidance to licensees intended to result in a set of integrated capabilities (with existing EOPs). The guidance identifies considerations in Section 2.4 that provide appropriate elements licensees should consider to achieve compliance with 10 CFR 50.155(b)(4), with regard to integration and includes appropriate coordination with the voluntarily maintained severe accident management guidelines.

- NEI 14-01, Section 4 provides guidance to licensees for assessing existing command and control structures to ensure that the key functions of directing a response to beyond-design-basis events and severe accidents can be performed. The NRC staff finds the guidance in Section 4 is limited principally to the role of an ultimate decision making authority. Specifically, Section 4.3 identifies appropriate considerations for assessing the authorities and responsibilities of an ultimate decision maker as part of the command and control structure required under 10 CFR 50.155(b)(6).

D. IMPLEMENTATION

The purpose of this section is to provide information on how applicants and licensees[1] may use this guide and information regarding the NRC's plans for using this RG. In addition, it describes how the NRC staff complies with 10 CFR 50.109, "Backfitting" and any applicable finality provisions in 10 CFR Part 52 "Licenses, Certifications, and Approvals for Nuclear Power Plants" (Ref. 16).

Use by Applicants and Licensees

Applicants and licensees may voluntarily[2] use the guidance in this document to demonstrate compliance with the underlying NRC regulations. Methods or solutions that differ from those described in this RG may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative demonstrates compliance with the appropriate NRC regulations.

Licensees may use the information in this RG for actions which do not require NRC review and approval such as changes to a facility design under 10 CFR 50.59, "Changes, Tests, and Experiments," that do not require prior NRC review and approval. Licensees may use the information in this RG or applicable parts to resolve regulatory or inspection issues.

Use by NRC Staff

The NRC staff does not intend or approve any imposition or backfitting of the guidance in this RG. The NRC staff does not expect any existing licensee to use or commit to using the guidance in this RG, unless the licensee makes a change to its licensing basis. The NRC staff does not expect or plan to request licensees to voluntarily adopt this RG to resolve a generic regulatory issue. The NRC staff does not expect or plan to initiate NRC regulatory action which would require the use of this RG. Examples of such unplanned NRC regulatory actions include issuance of an order requiring the use of the RG, requests for information under 10 CFR 50.54(f) as to whether a licensee intends to commit to use of this RG, generic communication, or promulgation of a rule requiring the use of this RG without further backfit consideration.

During regulatory discussions on plant specific operational issues, the staff may discuss with licensees various actions consistent with staff positions in this RG, as one acceptable means of meeting the underlying NRC regulatory requirement. Such discussions would not ordinarily be considered backfitting. However, unless this RG is part of the licensing basis for a facility, the staff may not represent to the licensee that the licensee's failure to comply with the positions in this RG constitutes a violation.

If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this RG and (2) the specific subject matter of this RG is an essential consideration in the staff's determination of the acceptability of the licensee's request, then the staff may request that the licensee either follow the guidance in this RG or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting as defined in 10 CFR 50.109(a)(1) or a violation of any of the issue finality provisions in 10 CFR Part 52.

1 In this section, "licensees" refers to holders of, and "applicants" refers to applicants for, the following: (1) licenses for nuclear power plants under 10 CFR Parts 50 and 52; and (2) construction permits for nuclear power plants under 10 CFR Part 50.

2 In this section, "voluntary" and "voluntarily" means that the licensee is seeking the action of its own accord, without the force of a legally binding requirement or an NRC representation of further licensing or enforcement action.

If a licensee believes that the NRC is either using this RG or requesting or requiring the licensee to implement the methods or processes in this RG in a manner inconsistent with the discussion in this Implementation section, then the licensee may file a backfit appeal with the NRC in accordance with the guidance in NUREG-1409, "Backfitting Guidelines," (Ref. 17) and the NRC Management Directive 8.4, "Management of Facility-Specific Backfitting and Information Collection" (Ref. 18).

Pre-Decisional Draft provided to ACRS and made publicly available
to support October 19, 2016 Fukushima Subcommittee Meeting

REFERENCES[3]

1. *U.S. Code of Federal Regulations*, *Title* 10, "*Energy*," Chapter 1, "Nuclear Regulatory Commission," Part 50, "Domestic Licensing of Production and Utilization Facilities."

2. Nuclear Energy Institute (NEI) technical report NEI 12-01, "Guidelines for Assessing Beyond-Design-Basis Accident Response Staffing and Communication Capabilities," Revision 0, dated May 2012, Washington, DC. (ADAMS Accession No. ML12125A412)

3. Skeen, David L., U.S. Nuclear Regulatory Commission, letter to Susan Perkins-Grew, Nuclear Energy Institute, May 15, 2012, endorsement of NEI 12-01, Revision 0, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," May 2012. (ADAMS Accession No. ML12131A043)

4. NEI, technical report NEI 13-06, "Enhancements to Emergency Response Capabilities for Beyond-Design-Basis Events and Severe Accidents," Revision 1, dated February 2016, Washington, DC. (ADAMS Accession No. ML16224A618)

5. NEI, technical report NEI 14-01, "Emergency Response Procedures and Guidelines for Beyond-Design-Basis Events and Severe Accidents," Revision 1, dated February 2016, Washington, D.C. (ADAMS Accession No. ML16224A619)

6. NRC, SECY-11-0093, "Recommendations for Enhancing Reactor Safety in the 21st Century, the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated July 12, 2011, Washington, DC. (ADAMS Accession No. ML11186A950)

7. NRC, SRM-SECY-11-0093, "Staff Requirements – SECY-11-0093 – Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," dated August 19, 2011, Washington, D.C. (ADAMS Accession No. ML112310021)

8. NRC, SECY-11-0124, "Recommended Actions to be Taken without Delay from the Near-Term Task Force Report," dated September 9, 2011, Washington, DC. (ADAMS Accession No. ML11245A158)

9. NRC, SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011, Washington, DC. (ADAMS Accession No. ML11272A111)

10. NRC, SRM-SECY-11-0124, "Staff Requirements - SECY-11-0124 - Recommended Actions to be Take without Delay from the Near-Term Task Force Report," dated October 18, 2011, Washington, DC. (ADAMS Accession No. ML112911571)

11. NRC, SRM-SECY-11-0137, "Staff Requirements - SECY-11-0137 - Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated December 15, 2011, Washington, DC. (ADAMS Accession No. ML113490055)

3 Publicly available NRC published documents are available electronically through the NRC Library on the NRC's public Web site at http://www.nrc.gov/reading-rm/doc-collections/ and through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html The documents can also be viewed online or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD. For problems with ADAMS, contact the PDR staff at 301-415-4737 or (800) 397-4209; fax (301) 415-3548; or e-mail pdr.resource@nrc.gov.

Pre-Decisional Draft provided to ACRS and made publicly available to support October 19, 2016 Fukushima Subcommittee Meeting

12. NRC, Request for Information (RFI) pursuant to Title 10 of the *Code of Federal Regulations* 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)

13. NRC, Public Meetings regarding implementation guidance for enhanced emergency response capabilities for beyond-design-basis events, Washington, DC
--- December 12, 2011, (ADAMS Accession No. ML11343A050)
--- January 19, 2012, (ADAMS Accession No. ML11361A036)
--- February 7, 2012, (ADAMS Accession No. ML12025A046)
--- March 5, 2012, (ADAMS Accession No. ML12082A006)
--- January 3, 2013, (ADAMS Accession No. (ML12354A483)

14. NRC, SECY-15-0065, "Proposed Rule: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)," dated April 30, 2015, Washington, DC. (ADAMS Accession No. ML15049A201)

15. NRC, SRM-SECY-15-0065, "Staff Requirements – SECY-15-0065 - Proposed Rule: Mitigation of Beyond-Design-Basis Events (RIN 3150-AJ49)," dated August 27, 2015, Washington, DC. (ADAMS Accession No. ML15239A767)

16. CFR, *Title* 10, "*Energy*," Chapter 1, "Nuclear Regulatory Commission," Part 52, "Licenses, Certifications, and Approvals of Nuclear Power Plants," (10 CFR Part 52).

17. NRC, NUREG 1409, "Backfitting Guidelines," July 1990, Washington, DC. (ADAMS Accession No. ML032230247)

18. NRC, Management Directive 8.4, "Management of Facility specific Backfitting and Information Collection," Washington, DC.

Pre-Decisional Draft provided to ACRS and made publicly available
to support October 19, 2016 Fukushima Subcommittee Meeting