

Mitigation of Beyond-Design-Basis Events Rulemaking
Preliminary Proposed Rule Language
November 12, 2014

The following preliminary proposed rule language is only intended to facilitate discussion. The language is not being provided to solicit comments on the specific language. This preliminary proposed rule language DOES NOT constitute an official Nuclear Regulatory Commission (NRC) position and is for discussion only.

This rulemaking would address, either in requirements or through supporting implementation guidance, regulatory actions that stem from all of the recommendations in Near-Term Task Force (NTTF) Recommendations 4, 7, 8, 9.1, 9.2, 9.3, with one exception (maintenance of Emergency Response Data System (ERDS) capability throughout the accident), 10.2, and 11.1. Also, the current intent is to include a regulatory action stemming from NTTF 9.4, ERDS (modernization only).

All requirements in this proposed rulemaking would be subject to backfitting and issue finality requirements, and more importantly, different portions of the consolidated rulemaking would have different backfitting and issue finality bases. Requirements stemming from Order EA-12-049 (i.e., making the Order requirements generically-applicable) would typically not be new impositions, since Order EA-12-049 has already been imposed. Any requirement extending beyond EA-12-049 would need to be justified under any applicable backfitting or issue finality provision.

Stakeholders should also recognize that this preliminary proposed rule language represents a snapshot in time (as of November 12, 2014) and that a proposed rule could differ from the concepts presented here. It could contain similar requirements or new requirements not identified here, or portions of the concepts may not be proposed as requirements.

§ 50.xxx 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 after the Commission has made the finding under § 52.103(g), before the NRC's docketing of the license holder's certifications described in section § 50.82(a)(1) or § 52.110(a) of this chapter, shall comply with the requirements of this section and section VII of appendix E to 10 CFR part 50.
- (2) Each applicant for an operating license for a nuclear power reactor under this part and each holder of a combined license under part 52 of this chapter before the Commission has made the finding under § 52.103(g) shall comply with the requirements of this section and section VII of appendix E to 10 CFR part 50 no later than the date on which the Commission issues the operating license under § 50.57 or makes the finding under § 52.103(g), respectively.
- (3) When the NRC has docketed the certifications described in § 50.82(a)(1) or § 52.110(a) of this chapter, submitted by an entity subject to the requirements of this section and section VII of appendix E to 10 CFR part 50, then that entity shall comply with the requirements of §§ 50.xxx(b)-(f) associated with maintaining or restoring secondary containment, if applicable, and spent fuel pool cooling capabilities, but not with § 50.xxx(c)(4) and section VII of appendix E to 10 CFR part 50, for the unit described in the § 50.82(a)(1) or § 52.110(a) certifications until the spent fuel pool(s) is empty of all irradiated fuel.
- (4) The requirements in paragraph (d) of this section apply to applicants for:
 - (i) Construction permits for nuclear power reactors issued under this part after [EFFECTIVE DATE];
 - (ii) Operating licenses for nuclear power reactors issued under this part for which a construction permit was issued after [EFFECTIVE DATE];
 - (iii) (A) Standard design certifications issued under part 52 of this chapter after [EFFECTIVE DATE];
(B) Renewal of standard design certifications in effect on [EFFECTIVE DATE] which have not been amended to comply with the requirements of paragraph (d) of this section by the time of application for renewal;
 - (iv) Standard design approvals issued under part 52 of this chapter after [EFFECTIVE DATE];
 - (v) Combined licenses issued under part 52 of this chapter after [EFFECTIVE DATE] that:

- (A) Do not reference a standard design certification, standard design approval, or manufactured reactor; or
 - (B) Reference a standard design certification issued before [EFFECTIVE DATE] which has not been amended to address the requirements of this paragraph (d) of this section; and
- (vi) Manufacturing licenses issued under part 52 of this chapter that:
- (A) Do not reference a standard design certification or standard design approval; or
 - (B) Reference a standard design certification issued before [EFFECTIVE DATE] which has not been amended to address the requirements of paragraph (d) of this section.

(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 result in an extended loss of all ac power concurrent with a loss of normal access to the ultimate heat sink or, for a plant for which the Final Safety Analysis Report references Appendix D or E to 10 CFR Part 52, 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.

(2) 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 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.

(3) Severe Accident Management Guidelines (SAMGs).

Strategies and guidelines for mitigating the consequences of events that result in significant damage to fuel in the reactor vessel or spent fuel pool to support actions intended to:

- (i) Arrest the progression of fuel damage,
- (ii) Maximize the duration for which containment capability is maintained, and,
- (iii) Minimize radiological releases.

- (4) Integration of guidelines in paragraphs(b)(1) - (b)(3) of this section with the Emergency Operating Procedures (EOPs).
- (5) Sufficient staffing to support implementation of the guidelines in paragraphs (b)(1) - (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 guidelines in paragraphs (b)(1) – (b)(3) of this section.

(c) *Equipment.*

- (1) The equipment relied on for the mitigation strategies required by paragraph (b)(1) of this section must have sufficient capacity and capability such that core cooling, containment, and spent fuel pool cooling capabilities can be simultaneously maintained or restored for all the power reactor units within the licensee's site boundary.
- (2) The equipment relied on for the mitigation strategies required by paragraph (b)(1) of this section must be reasonably protected from the effects of severe natural phenomena that are as severe as the design basis external events in the licensing basis for the facility.
- (3) The equipment relied on for the mitigation strategies in paragraph (b)(1) of this section must receive adequate maintenance such that the equipment is capable of fulfilling its intended function following a beyond-design-basis external event.
- (4) The equipment relied on for the mitigation strategies in paragraph (b)(1) of this section must include reliable means to remotely monitor wide-range spent fuel pool levels to support effective prioritization of event mitigation and recovery actions.

(d) *Design features.*

Each applicant listed in paragraph (a)(4) shall, in addition to the applicable requirements in this section, perform a design-specific assessment of the effects of an extended loss of all ac power concurrent with a loss of normal access to the ultimate heat sink or, for a plant for which the Final Safety Analysis Report incorporates by reference Appendix D or E to 10 CFR Part 52, a loss of normal access to the normal heat sink. The applicant shall incorporate into the design those features that minimize reliance on human actions, enhance coping durations, and demonstrate the ability to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities.

(e) *Training requirements.*

Each licensee shall provide for the training and qualification of personnel that perform activities in accordance with the strategies and guidelines identified in paragraphs (b)(1) – (b)(3) of this section using the systems approach to training as defined in 10 CFR 55.4 unless otherwise required by NRC regulations.

(f) *Drills and 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) - (b)(3) of this section and the use of communications equipment required in 10 CFR part 50, appendix E, section VII no more than 12 months before issuance of the first operating license for full power (one authorizing operation above 5 percent of rated thermal power) for the unit described in the license application.
- (2) A holder of a combined license issued under 10 CFR part 52 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) - (b)(3) of this section and the use of communications equipment required in 10 CFR part 50, appendix E, section VII no more than 12 months before the date specified for completion of the last inspections, tests, and analyses in the ITAAC completion schedule required by 10 CFR 52.99(a) for the unit described in the combined license.
- (3) Once the Commission issues the first operating license to the entity as described in paragraph (f)(1) of this section or makes the finding under § 52.103(g) for the entity described in paragraph (f)(2) of this section, the licensee shall conduct subsequent drills, exercises, or both that collectively demonstrate a capability to use the strategies and guidelines in paragraphs (b)(1) - (b)(3) of this section in succeeding 8-year intervals. The drills and exercises performed to demonstrate this capability must include transitions from other procedures and guidelines as applicable, and the use of communications equipment required in 10 CFR part 50, appendix E, section VII. Each licensee shall not exceed 8 years between any consecutive drills or exercises.
- (4) A holder of an operating license issued under this part or a combined license under 10 CFR part 52 for which the Commission has made the finding specified in 10 CFR 52.103(g) as of [INSERT EFFECTIVE DATE], shall conduct initial drills, exercises, or both that collectively demonstrate a capability to use the strategies and guidelines in paragraphs (b)(1) - (b)(3) of this section by [INSERT DATE 4 YEARS AFTER EFFECTIVE DATE]. The drills and exercises performed

to demonstrate this capability must include transitions from other procedures and guidelines as applicable, and the use of communications equipment required in 10 CFR part 50, appendix E, section VII. Subsequent drills, exercises, or both must be conducted in succeeding 8-year intervals, and each licensee shall not exceed 8 years between any consecutive drills or exercises.

(g) *Change Control.*

- (1) A licensee may make changes in the implementation of the requirements in this section and 10 CFR part 50, appendix E, section VII without NRC approval, *provided* that before implementing each such change, the licensee performs an evaluation demonstrating that the provisions of this section and 10 CFR part 50, appendix E, section VII continue to be met.
- (2) Documentation of all changes, including the evaluation required by paragraph (g)(1) of this section, shall be maintained until the requirements of this section and section VII of appendix E to 10 CFR part 50 no longer apply.
- (3) Changes in the implementation of requirements in this chapter subject to change control processes other than paragraph (g) of this section and resulting from changes in the implementation of the requirements in this section and 10 CFR part 50, appendix E, section VII must be processed via their respective change control processes.

(h) Implementation

[Placeholder TBD]

- (1) Change control (i.e., specifically when will licensees need to have in place a § 50.xxx(g) change control process)
- (2) Training (i.e., specifically when will licensee need to have identified all new training necessary for § 50.xxx, revised the training program to include the new training, and completed the training)
- (3) Command/control (i.e., when will licensees need to have reviewed existing command/control processes and make any revisions to meet the new requirements)
- (4) Staffing capability (i.e., when will licensees need to have completed a determination that they meet the staffing capability requirements – or have adjusted staffing to meet the requirements – note this is not the analysis – this is to meet (b)(5))
- (5) SAMGs (i.e., when will licensees need to have reviewed the revised/updated Owners Groups SAMGs, made changes to their current SAMGs to reflect the new versions, ensured that in the process new mitigation capabilities are

referenced, and ensured SAMGs are now within the configuration management programs including new § 50.xxx(g))

- (6) Guideline integration (i.e., when will licensees have reviewed all interconnections and transition between of SAMGs, SBOMs/FLEX, and EDMGs with EOPs, made any additional changes needed for the different sets of guidelines to connect to each other).
- (7) Equipment requirements (i.e., when will licensees need to have identified any new equipment requirements beyond EA-12-049 and EA-12-051 for proposed 50.xxx(c), and made changes to implement anything needed for the new requirements - note this should not impact current licensee who comply with EA-12-049 and EA-12-051 but it will take an analysis to confirm that regardless – it is more likely to only be an impact on new applicants)

10 CFR Part 50, Appendix E

Section IV:

B. Assessment Actions

1. The means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials, including from all reactor core and spent fuel pool sources, shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring. By June 20, 2012, for nuclear power reactor licensees, these action levels must include hostile action that may adversely affect the nuclear power plant. The initial emergency action levels shall be discussed and agreed on by the applicant or licensee and state and local governmental authorities, and approved by the NRC. Thereafter, emergency action levels shall be reviewed with the State and local governmental authorities on an annual basis.

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E. Emergency Facilities and Equipment

Adequate provisions shall be made and described for emergency facilities and equipment, including:

- 1. Equipment at the site for personnel monitoring;
- 2. Equipment for determining the magnitude of and for continuously assessing the impact of the release of radioactive materials, including from all reactor core and spent fuel pool sources, to the environment;

F. Training * * *

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, ~~implementation of strategies, procedures, and guidance developed under § 50.54(hh)(2)~~, 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 eight-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 Part 52, the first eight-year exercise cycle begins in the calendar year of the initial exercise required by Section IV.F.2.a.

VI. Emergency Response Data System

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3. Maintaining Emergency Response Data System:

- a. Any hardware and software changes that affect the transmitted data points identified in the ERDS Data Point Library⁹ (site specific data base residing on the ERDS computer) must be submitted to the NRC within 30 days after the changes are completed.
- b. Hardware and software changes, with the exception of data point modifications, that could affect the transmission format and computer communication protocol to the ERDS must be provided to the NRC as soon as practicable and at least 30 days prior to the modification.
- c. In the event of a failure of ~~the~~ NRC-supplied ~~onsite modemequipment~~, a replacement ~~unit~~ will be furnished by the NRC for licensee installation.

Section VII. Communications and Staffing Requirements for the Mitigation of Beyond Design Basis Events

The change control provisions of 10 CFR 50.54(q) do not apply to proposed changes associated with implementation of the requirements in this section. Instead changes associated with implementation of these requirements are subject to 10 CFR 50.xxx(g).

1. Each nuclear power reactor applicant or licensee shall perform a detailed analysis demonstrating that sufficient staff is available to implement the guidelines and strategies to respond to a beyond design basis external event resulting in impeded access to the nuclear power plant, an extended loss of ac power sources and loss of access to ultimate heat sink, and affecting all units on-site.

- a. An applicant for an operating license issued under this part shall perform this analysis at least 2 years before the issuance of the first operating license for full power (one authorizing operation above 5 percent of rated thermal power).
- b. A holder of a combined license issued under 10 CFR part 52 before the Commission has made the finding under § 52.103(g) shall perform this analysis at least two years before the date specified for completion of the last inspections, tests, and analyses in the ITAAC completion schedule required by 10 CFR 52.99(a) for the plant.
- c. Each holder of an operating license or combined license for which the Commission has made the finding specified in 10 CFR 52.103(g) as of [INSERT EFFECTIVE DATE] shall perform this analysis no later than [INSERT DATE 365 DAYS AFTER EFFECTIVE DATE].

2. Each nuclear power reactor applicant or licensee shall make adequate provisions for at least one onsite and one offsite communications system capable of remaining functional during an extended loss of alternating current power including the effects of the loss of the local communications infrastructure.

- a. An applicant for an operating license issued under this part shall make these provisions no later than the issuance of the first operating license for full power (one authorizing operation above 5 percent of rated thermal power).
- b. A holder of a combined license issued under 10 CFR part 52 before the Commission has made the finding under § 52.103(g) shall make these provisions no later than the date specified for completion of the last inspections, tests, and analyses in the ITAAC completion schedule required by 10 CFR 52.99(a) for the plant.
- c. Each holder of an operating license issued under this part or a combined license issued under 10 CFR part 52 for which the Commission has made the finding specified in 10 CFR 52.103(g) as of [INSERT EFFECTIVE DATE] shall make these provisions no later than [INSERT DATE 365 DAYS AFTER EFFECTIVE DATE].

Information Submissions:

Part 50 Applicants:

10 CFR 50.34(i) *Mitigation of beyond design basis events.*

(1) Each application for an operating license under this part submitted after [INSERT EFFECTIVE DATE] must describe an integrated response capability including a description and plans for implementation of the strategies and guidelines intended to:

- (i) maintain or restore core cooling, containment, and spent fuel pool cooling capabilities to mitigate a beyond-design-basis external event, as required by 10 CFR 50.XXX(b)(1), including descriptions of the equipment upon which the strategies and guidelines rely and the planned locations of the equipment, and information to demonstrate that the equipment satisfies the requirements of 10 CFR 50.XXX(c)(1)-(4);

- (ii) maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with the loss of large areas of the plant due to explosions or fire, as required by 10 CFR 50.XXX(b)(2); and
- (iii) arrest the progression of fuel damage, maximize the duration for which containment capability is maintained, and minimize radiological releases under circumstances associated with the consequences of events that result in significant damage to fuel in the reactor vessel or spent fuel pool, as required by 10 CFR 50.XXX(b)(3);).

(2) Each application for a construction permit or operating license under this part which is subject to 10 CFR 50.xxx(a)(4) must include the information required by 10 CFR 50.XXX(d).

Part 52 Applicants:

§ 52.47

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(b)

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(3) For applications for standard design certifications which are subject to 10 CFR 50.xxx(a)(4), the information required by 10 CFR 50.XXX(d).

§ 52.59

(a) The Commission shall issue a rule granting the renewal if the design, either as originally certified or as modified during the rulemaking on the renewal, complies with the Atomic Energy Act and the Commission's regulations applicable and in effect at the time the certification was issued, provided, however, that the first time the Commission issues a rule granting the renewal:

(1) For a standard design certification in effect on July 13, 2009, the Commission shall, in addition, find that the renewed design complies with the applicable requirements of 10 CFR 50.150, and

(2) For a standard design certification in effect on [INSERT EFFECTIVE DATE], the Commission shall, in addition, find that the renewed design complies with the requirements of 10 CFR 50.XXX(d).

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§52.80

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(d) For an application for a combined license under 10 CFR part 52 submitted after [INSERT EFFECTIVE DATE], a description of the integrated response capability, including a description and plans for implementation of the strategies and guidelines intended to:

(1) maintain or restore core cooling, containment, and spent fuel pool cooling capabilities to mitigate a beyond-design-basis external event, as required by 10 CFR 50.XXX(b)(1), including descriptions of the equipment upon which the strategies and guidelines rely and the planned

locations of the equipment, and information to demonstrate that the equipment satisfies the requirements of 10 CFR 50.XXX(c)(1)-(4);
 (2) maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with the loss of large areas of the plant due to explosions or fire, as required by 10 CFR 50.XXX(b)(2);
 (3) arrest the progression of fuel damage, maximize the duration for which containment capability is maintained, and minimize radiological releases under circumstances associated with the consequences of events that result in significant damage to fuel in the reactor vessel or spent fuel pool, as required by 10 CFR 50.XXX(b)(3); and
 (e) for an application for a combined license which is subject to 10 CFR 50.xxx(a)(4), the information required by 10 CFR 50.XXX(d).

§ 52.137

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(c) An application for approval of a standard design subject to 10 CFR 50.xxx(a)(4) must include the information required by 10 CFR 50.XXX(d).

§ 52.158

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(c) For an applications for manufacturing licenses which are subject to 10 CFR 50.xxx(a)(4), the information required by 10 CFR 50.XXX(d).

§ 50.54

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(hh) (1) Each licensee shall develop, implement and maintain procedures that describe how the licensee will address the following areas if the licensee is notified of a potential aircraft threat:

- (i) Verification of the authenticity of threat notifications;
- (ii) Maintenance of continuous communication with threat notification sources;
- (iii) Contacting all onsite personnel and applicable offsite response organizations;
- (iv) Onsite actions necessary to enhance the capability of the facility to mitigate the consequences of an aircraft impact;
- (v) Measures to reduce visual discrimination of the site relative to its surroundings or individual buildings within the protected area;
- (vi) Dispersal of equipment and personnel, as well as rapid entry into site protected areas for essential onsite personnel and offsite responders who are necessary to mitigate the event; and
- (vii) Recall of site personnel.

~~(2) Each licensee shall develop and implement guidance and strategies intended 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 due to explosions or fire, to include strategies in the following areas:~~

- ~~(i) Fire fighting;~~
- ~~(ii) Operations to mitigate fuel damage; and~~
- ~~(iii) Actions to minimize radiological release.~~

(32) This section does not apply to a nuclear power plant for which the certifications required under § 50.82(a)(1) or § 52.110(a) of this chapter have been docketed by the NRC and the spent fuel pool(s) is empty of all irradiated fuel.

Information collections:

§ 50.8

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(b) The approved information collection requirements contained in this part appear in §§50.30, 50.33, 50.34, 50.34a, 50.35, 50.36, 50.36a, 50.36b, 50.44, 50.46, 50.47, 50.48, 50.49, 50.54, 50.55, 50.55a, 50.59, 50.60, 50.61, 50.61a, 50.62, 50.63, 50.64, 50.65, 50.66, 50.68, 50.69, 50.70, 50.71, 50.72, 50.74, 50.75, 50.80, 50.82, 50.90, 50.91, 50.120, 50.150, 50.XXX, and appendices A, B, E, G, H, I, J, K, M, N,O, Q, R, and S to this part.

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