Station Blackout Mitigation Strategies Draft Regulatory Basis

Category 3 Public Meeting

May 13, 2013

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Meeting Purpose

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- Discuss with stakeholders the NRC staff's draft regulatory basis for the Station Blackout Mitigation Strategies (SBOMS) Rulemaking.
- Afford stakeholders an opportunity to ask the NRC staff questions concerning the draft regulatory basis.
- Enable an exchange that results in a more accurate and informed understanding of all parties and in turn supports improved feedback and comment on the draft regulatory basis.
  - The feedback supports our efforts to finalize the regulatory basis
- The meeting is not intended to solicit or receive comments - use the guidance in the FRN dated April 10, 2013 to provide your written comment by May 28, 2013.

SBOMS Rulemaking Background

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- Previously issued an ANPR – March 2012
  - Considered the input received in response to the ANPR to develop the draft regulatory basis
- Since March 2012:
  - EA-12-049 – imposed mitigation strategies requirements on licensees
  - Very large scope that largely addresses NTTF recommendation 4
  - The majority of feedback that influenced the staff ‘s development of the draft regulatory basis was from the interactions to support development of EA-12-049 implementation guidance
  - Staff developed and sent to the Commission - COMSECY-13-0002 (dated 1/25/2013)
    - Recognized that EA-12-049 addresses safety issues in the near term
    - Requested consolidation of NTTF Recommendation 4 and 7 regulatory activities
    - Requested revised rulemaking schedule to align with implementation of EA-12-049
  - Commission agreed in SRM-COMSECY-13-0002 (dated 3/4/13)

Background

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- Draft regulatory basis provides background relating to station blackout, the March 2011 events at Fukushima, and the mitigation strategies
- This information is similar to that provided in SBO ANPR issued March 2012.
- The newer information reflects actions associated with the mitigation strategy order, the supporting guidance, and the staff's efforts to consolidate regulatory efforts and revise the schedule in light of the order (i.e., from COMSECY-13-0002)
- Issued SBOMS draft regulatory basis for 45 day comment period
  - Federal Register published on April 10, 2013 (78 FR 21275)
  - Comment period ends May 28, 2013
  - Regulations.gov – NRC-2011-0299

Basis for SBOMS Rulemaking

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- Requirements issued to power reactor licensees via EA-12-049 (and equivalent license conditions) need to be made generically-applicable
  - EA-12-049 issued March 12, 2012
  - Imposes additional measures (defense-in-depth) at licensed power reactors
  - These measures (strategies and guidance) are intended to address uncertainties associated with beyond design basis external events
  - The new requirements enable the NRC to continue to have reasonable assurance of continued adequate protection of public health and safety

- Current station blackout requirements (sec. 50.63) do not address:
  - Station blackouts involving damage to both the onsite and offsite ac power sources (including unavailability of alternate ac power)
  - Site-wide events (i.e., multiple power reactors in a station blackout)
  - Station blackouts that extend indefinitely
  - Spent fuel pool cooling
  - All modes of operation

Basis for SBOMS Rulemaking

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- In summary there is a need and a basis for proceeding with rulemaking:
  - The staff is using these interactions (both the ANPR from March 2012 and the draft SBOMS regulatory basis issuance) as opportunities to interact with external stakeholders
  - The additional feedback enhances the rulemaking process and improves the rulemaking product
  - We welcome your feedback on all elements of the draft regulatory basis

Basis for SBOMS Rulemaking

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- Mitigating strategies are designed to address an extended loss of ac power condition (ELAP):
  - This is a more severe loss of ac power condition than addressed in sec. 50.63
  - At the procedural/guidance level, implementation results in a direct link between the mitigating strategies and the current SBO requirements through the emergency operating procedure for station blackout
  - At the regulatory level, proper integration of the mitigating strategies requirements into the current regulations results in the need to amend sec. 50.63
    - The result is to extend the current SBO coping capability to become “indefinite coping”
- The revised rulemaking scope incorporates NTTF Recommendation 7 regulatory activities:
  - EA-12-051 was issued to require SFP level instrumentation
  - SFP level instrumentation supports the SFP mitigating strategies
  - SFP strategies involve the use of self-powered portable pumps
  - Existing spray capabilities (required by sec. 50.54(hh)(2)) will also be used
  - The current approach (implementing EA-12-049 and EA-12-051) addresses many elements in NTTF Recommendation 7 and is readily addressed in implementing guidance that would be part of this rulemaking

Applicability/ELAP Overview

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- Draft Regulatory basis envisions that requirements would apply to all power reactor licensees and designs (Part 50 and Part 52)
  - EA-12-049 was imposed on current licensees and Vogtle Units 3 and 4
  - Equivalent license conditions were imposed on VC Summer Units 2 and 3
- The current concept is for the requirements to be structured to address a defined condition: ELAP
- ELAP is an onsite condition (or damage state) that provides a practical means to enable strategies, guidance, and relied-upon equipment to be put in place that provides an additional defense-in-depth capability to address uncertainties associated with beyond design basis external events

ELAP Definition

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- Currently the concept for an ELAP definition is that it is an “SBO” that extends indefinitely
- Since this can involve severe external events the ELAP definition would assume that ac power sources (both the 1E sources and the SBO alternate ac source) are not available and can not be readily recovered in the near term
- Specifically the current concept would include:
  - Complete loss of ac power to the essential and nonessential switchgear busses
  - Loss of offsite power that results in a reactor trip and concurrent turbine trip
  - Unavailability and non-recoverability of onsite emergency ac power sources and offsite ac power sources continuing beyond the duration determined by the licensee per sec. 50.63
  - Unavailability and non-recoverability of a sec. 50.63 alternate ac power source (if relied upon to meet sec. 50.63 requirements)
  - ac power is available from inverters fed by safety-related batteries
  - If requirements are put in place by this rulemaking to allow for a “supplemental ac power source” – then this source would be available to restore power
  - Portable mitigating strategies equipment can be used to maintain/restore functions

ELAP Definition Cont'

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- Similar to EA-12-049 it is expected that the rule would contain requirements for contingencies if the conditions are more severe than the initial assumed ELAP condition
- Loss of normal access to the ultimate heat sink
  - ELAP condition results in the unavailability of all ac powered pumps which in turn leads to a loss of normal access to the ultimate heat sink for current designs that rely on ac power pumps to remove heat to the ultimate heat sink
  - The current concept in the draft regulatory basis is that a loss of normal access to the ultimate heat sink is a consequence of ELAP and not a separate condition
  - This is different than EA-12-049 and this concept is intended to gather feedback to determine what should be the defined condition

Mitigating Strategies

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- Concepts for mitigation strategies requirements are similar to the approach in EA-12-049:
  - Develop, implement, and maintain guidance and strategies to maintain/restore core cooling, containment, and SFP cooling capabilities
  - Guidance and strategies would be required to be adapted for all modes
  - Equipment would be required to be of sufficient design and capacity considering the nominal conditions expected
  - Mitigating strategies would be required to consider contingencies
  - The strategies would be required to be integrated into existing station blackout procedures
  - The strategies would be required to accommodate the use of offsite assistance and resources including consideration of damage to transportation infrastructure
  - The regulatory framework would integrate with NTTF Recommendation 8 rulemaking requirements

Design Requirements

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- Concepts for equipment (ELAP mitigation) design requirements are described:
  - Equipment would be designed to perform functions relied upon for ELAP mitigation
  - Portable equipment would be independent of installed SSCs
  - Portable equipment would be designed, stored, and protected to minimize common mode and common cause failure
  - Portable equipment would need to be protected from the effects of severe external events
  - Portable equipment would be designed, staged, and deployed to minimize potential damage or impairment to installed safety-related equipment
  - There needs to be sufficient sets of portable equipment to enable maintenance and testing
  - Design would enable periodic testing and inspection
  - A test program would need to be established to provide assurance of continued functionality

Supplemental AC Power Source

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- Concepts for a supplemental ac power source are described with the intent of providing potential design flexibility:
  - Would be electrically independent from emergency ac power sources
  - May need to be diverse in design from current emergency ac power sources
  - Would be physically located to minimize common cause failure from severe external events (dependent on nature and magnitude of the external events applicable to the site)
  - Would need to have a combined capacity and capability to operate equipment necessary to maintain or restore core cooling, containment, and spent fuel pool cooling following a severe external events, for all units on a site
  - Would supply power through physically and electrically separate pathways to multiple distribution systems or motor control centers that in turn provide power to the equipment important for core cooling, containment, and SFP cooling
  - Would be designed for, protected from severe external events to a margin ≥ supplied equipment (at least one train of equipment)
  - Would need to designed to interact with connected SSCs

Change Control

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- Recognizing the “adequate protection” pedigree of these requirements change control appears to be appropriate to control the configuration of the strategies, guidance and equipment relied upon over time

- Current change control requirements would be applied but sec. 50.59 would typically not be effective for changes to the strategies, guidance, and equipment since it applies to beyond design basis events

- Straight-forward concept would be to ensure that changes continue to meet the new requirements or otherwise follow the sec. 50.90 amendment process and obtain prior NRC review and approval

Link to 10 CFR 50.63

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- Mitigation of ELAP is linked into the current plant procedures in the emergency operating procedures applicable to a loss of all ac condition (i.e., the station blackout EOP)
- This results in a direct linkage between mitigating strategies and current station blackout procedures
- Linking these requirements (sec. 50.63 and the new sec. 50.xxx) aligns the regulatory framework with implementation
- Current concept is to amend sec. 50.63 to indicate that if a station blackout exceeds the specified duration (including the failure of an alternate ac power source) then the mitigating strategies are to be implemented

Implementation

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- This portion of the regulatory basis recognizes the implementation of EA-12-049 and its impact on the rule
- Objective is to avoid implementation challenges between the rule and EA-12-049:
  - Note that the revised rulemaking schedule was intended, in part to facilitate this objective (i.e., final rule now due in December 2016 to the Commission)
- Most of this portion of the basis document addresses the Part 52 licensing regimes which essentially simplifies to requiring a licensee to implement these requirements before initial fuel load
- NRC will use its cumulative effects of regulations (CER) process during the final rule stage (2016 time frame) and make any appropriate adjustments to the rule implementation provisions if CER challenges exist

Questions

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- NRC is using this opportunity to gather additional stakeholder input
- This input helps with efforts to draft proposed rule provisions within the framework outlined in the preceding draft rule concepts portion of the document (i.e., performance-based framework)
- The draft regulatory basis contains additional questions:
  - Should the NRC consider a broader, more integrated rule combining sec 50.54(hh)(2)+ sec. 50.63 + new 50.xxx requirements?
  - New reactors have superior designs, external events design bases/siting, and benefit from decades of operating experience from current reactors and as such stakeholder feedback is requested on application of station blackout mitigation strategies to new reactors
  - How should human reliability be considered for these extreme scenarios ?
  - Impacts/costs : Feedback is requested to support NRC's regulatory analysis for the proposed rule

Wrap-up

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- The staff hopes this was informative and helpful – we appreciate everyone's participation.
- Please submit written comments by the May 28, 2013 comment deadline as described in the draft regulatory basis FRN.
- Regulations.gov, Docket ID: NRC-2011-0299.