

SMR Design Phase Security Development

NRC SMR Licensing Workshop

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Presentation Topics

- SMR Physical Security Plan (PSP)
 - Security paper scope
 - Existing Criterion for PSP
 - Radiological Sabotage
 - In Terms of the Design Basis Threat
 - In Terms of the Public Impact
 - Primary Performance Objectives of a PSP
 - Analysis Moving Forward
 - Important Considerations
 - Path forward

Security Paper Scope

- In-depth evaluation of security requirements as applicable to SMRs
- Discussion of SMR-unique considerations
- Outline of technical analyses used to support exemption process
- Limited scope discussion
 - Cyber security
 - Aircraft impact
- Excluded from scope
 - Loss of large areas

Existing Criterion for PSP

- General performance objective and requirements of §73.55(b)(1) are defined to, “provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety.”
- As a basis, §73.55(b)(2) states, “To satisfy the general performance objective of paragraph (b)(1) of this section, the physical protection program must protect against the design basis threat of radiological sabotage as stated in §73.1.”

Radiological Sabotage & The DBT

- §73.1(a)(1) defines Radiological Sabotage
 - A determined violent external assault, attack by stealth, or deceptive actions, including diversionary actions, by an adversary force
 - A single group attacking through one entry point
 - Multiple groups attacking through multiple entry points
 - A combination of one or more groups and one or more individuals attacking through multiple entry points
 - Individuals attacking through separate entry points

Radiological Sabotage & The DBT (continued)

- Adversary force should be considered to have the following attributes, assistance, and equipment
 - Well-trained and dedicated individuals
 - Knowledgeable inside assistance
 - Suitable weapons
 - Hand-carried equipment
 - Land and water threat
 - A cyber attack

No recognized need for different DBT-related criteria for near-term SMR designs

Radiological Sabotage & The Public Impact

- § 73.2 defines Radiological Sabotage as any deliberate act directed against a plant or transport in which an activity licensed pursuant to the regulations in this chapter is conducted, or against a component of such a plant or transport which could directly or indirectly endanger the public health and safety by exposure to radiation

Primary Performance Objectives for any proposed SMR PSP

- Any proposed SMR specific new performance criteria should be based on ensuring that a facility retains the capability to safely shutdown the reactor and assure long-term heat removal from both the reactor system and spent fuel storage
- These assurances must be maintained in the face of an act of attempted radiological sabotage by the design basis threat against the facility

Primary Performance Objectives of a PSP

- In the prevention of radiological sabotage, it may be useful to consider the following as they relate to prevention of significant core or spent fuel damage and protection of critical safety functions, e.g.
 - reactivity control
 - reactor coolant makeup for maintaining reactor and
 - spent fuel pool inventory
 - reactor and spent fuel pool heat removal
 - containment of radioactive materials
 - process monitoring necessary to perform and control the above functions
 - actions necessary to support the operation of the equipment used for safe shutdown

Alternative Approaches to Meeting PSP Primary Performance Objectives

- Key to affecting changes to the PSP requirements applicable to any SMR type is understanding the applicable source term and dispersal modes achievable through application of the existing DBT as defined within §73.1(a)(1)
 - Consistent with proposed approach to EP
 - Provides consistent basis for expectations of protection of public health and safety (e.g. quantitative health objectives)

Analysis Moving Forward

- Define how SMR designs are capable of satisfying the “could directly or indirectly endanger the public health and safety by exposure to radiation” criterion defined within §73.2
- Based upon each specific SMR design, define
 - Existing Target Sets
 - Design Feature Changes
 - Protection Strategies
 - PSP Development, Evaluation, Training & Implementation

Analysis Moving Forward

- Consider alignment of expectations for protection against radiological consequences for EP and security
- Evaluate possible use of risk information in target set development (per existing RG 5.81 guidance)
- Analyze interface with National Response Framework

Important Considerations

- Design- and site-specific considerations are key to effective implementation of security requirements
 - Detection and assessment
 - Response time
 - Safety features
 - Physical size
- Opportunity for integration of security into design to meet performance objectives
 - Plant layout
 - Ingress/egress control

Cyber Security

- Technical details not within scope of paper
- Extensive vendor-specific work underway
 - Proactively reviewing software design requirements
 - Early staff feedback valuable and desired
- Need to define parameters for staff review acceptance for vendor reports regarding design-related cyber security

Path Forward

- In depth evaluation of application of current security requirements to SMRs
- Define scope of technical analysis to support approaches to meeting security requirements
- Paper completion anticipated January 2012
- Separately discuss acceptance of vendor reports on design-related cyber security for review

Questions?

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Multi-Module Licensing

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Background

- Industry position paper on multi-module licensing issued in December 2010
 - Individual reactor module licenses
- SECY 11-0079 (License Structure for Multi-Module Facilities) issued June 2011
 - Several alternatives evaluated
 - Alternative 1: Single facility license
 - Alternative 2: Master facility license and individual reactor module licenses
 - Alternative 3: Individual reactor module licenses
 - Proposed approach: Alternative 3

Alternative 3 Open Issue: Licensing of Shared SSCs

- In SECY 11-0079, NRC staff identified shared SSCs as an issue meriting follow-on evaluation
- SECY 11-0079 offers two alternative approaches
 - Alternative 3a: Address in license for first module
 - Alternative 3b: Use a license appendix
- Specific considerations
 - Decommissioning
 - License renewal

Suggested Resolution

- Alternative 3a is preferred approach
 - Implement by using approach for shared SSCs at current multi-unit sites
- Do not anticipate large time lag between reactor deployment for near-term designs
- Exceptions can be dealt with on a design- and site-specific basis