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Reliability Assurance Program for 10 CFR 52 Applicants

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Reliability Assurance Program (RAP) for 10 CFR 52 Applicants

Presentation Outline

- Objectives of Presentation
- Background
- RAP Process
- Conclusions

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Objectives of Presentation

- Describe the RAP process taking into consideration the lessons learned and insights gained from previous reviews of the RAP in new reactor applications

- Clarify the RAP acceptance criteria contained in SRP Section 17.4

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Background

- RAP for new reactors ensures that the reliability of risk-significant systems, structures, and components (SSCs) is maintained over the life of a plant
- The RAP is implemented according to Commission's policy provided in staff requirements memorandum for SECY-95-132 ("Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems (RTNSS) in Passive Plant Designs")
- RAP for new reactors is required through each design-specific rulemaking (Design Certification). This becomes part of an application for a combined license that references a certified design
- RAP for new reactors is established using the guidance contained in:
  - SECY-95-132, Item E ("Reliability Assurance Program")
  - Standard Review Plan (SRP) Section 17.4, "Reliability Assurance Program"

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Background (continued)

- Due to the wording in the RAP guidances (i.e., SECY-95-132 and SRP 17.4), new reactors applications generally did not adequately address all aspects of the RAP, and staff reviews of the RAP were often difficult and inconsistent
- Staff composed Interim Staff Guidance (ISG) DC/COL-ISG-018 (ML103010113) to address these issues:
  - Incorporates lessons learned and insights gained from previous RAP reviews
  - Describes the RAP process
  - Clarifies the RAP acceptance criteria contained in SRP Section 17.4

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Purpose of RAP

- Ensure the plant is designed, constructed, and operated consistent with the risk insights and key assumptions from the probabilistic, deterministic, and other methods of analysis used to identify and quantify risk
- Ensure the RAP SSCs do not degrade to an unacceptable level of reliability, availability, or condition during plant operations
- Ensure the frequency of transients that challenge these SSCs is minimized
- Ensure these SSCs will function reliably when challenged

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Stages of RAP

- First stage applies to RAP activities conducted during the plant design/construction phases prior to initial fuel load (i.e., design reliability assurance program, D-RAP)
- The second stage applies to RAP activities conducted during the operations phase of the plant's life cycle

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D-RAP Implementation

- Objective of D-RAP is to ensure that the plant is designed and constructed consistent with risk insights and key assumptions from the probabilistic, deterministic, and other methods of analysis used to identify and quantify risk

- D-RAP objective can be achieved through the following:
  - Establish and apply the essential elements of D-RAP
  - Subject the non-safety-related RAP SSCs to quality assurance (QA) controls (SRP Section 17.5, Part V, "Non-Safety-Related SSC Quality Controls")

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D-RAP Implementation (continued)

- Essential elements of D-RAP are processes and controls that ensure the risk insights and key assumptions are consistent with the designed and constructed plant, and that the list of RAP SSCs is appropriately developed, maintained, and communicated to the appropriate organizations:
  - Organizational interfaces
  - Design and quality controls for D-RAP activities
  - Corrective action process for D-RAP activities
  - Procedures or instructions for D-RAP activities
  - Maintain records of D-RAP activities
  - Conduct audits of D-RAP activities

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D-RAP Implementation (continued)

- Methodology for Identifying RAP SSCs:

  a) Methodology includes, but is not limited to, the use of information obtained from the following sources:

  - Risk evaluations that cover the full spectrum of potential events and the range of plant operating modes considered in SRP Section 19.0, which includes the use of non-fault tree/event tree-type risk evaluations (e.g., fire-induced vulnerability evaluation or seismic margins analysis)

    Examples include:

    - Importance measures (e.g., RAW, FV)
    - Risk insights and key assumptions
    - SSCs implicitly assumed in important operator actions

  - Industry operating experience
  - Expert panel

  b) SSCs that are not modeled in the PRA are also evaluated for inclusion in RAP (e.g., by using deterministic or other methods of analysis)

  c) RAP includes all SSCs subject to regulatory treatment of non-safety systems (RTNSS)

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D-RAP Implementation (continued)

- Design Certification (DC) Applicant's Responsibilities:
  - Describe the details of the D-RAP (e.g., scope, purpose, objectives, framework, and phases of D-RAP)
  - Establish and apply the essential elements of D-RAP during DC design activities
  - Determine the RAP SSCs (within the scope of the DC) using a combination of probabilistic, deterministic, and other methods of analysis
  - Subject the non-safety-related RAP SSCs to QA controls during DC design activities (SRP Section 17.5, Part V, "Non-Safety-Related SSC Quality Controls")
  - Propose a D-RAP ITAAC (Malcolm Patterson to discuss)

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D-RAP Implementation (continued)

- Combined License (COL) Applicant's Responsibilities:
  - Establish and apply the essential elements of D-RAP during COL design activities
  - Determine the RAP SSCs in the COL's D-RAP by introducing plant-specific information
  - Subject the non-safety-related RAP SSCs to QA controls during COL design activities
  - Propose a process for integrating RAP into operational programs

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D-RAP Implementation (continued)

- COL Holder's Responsibilities:
  - Apply the essential elements of D-RAP during COL design and construction activities (which includes updating the list of RAP SSCs as changes are made to the plant-specific design and PRA)
  - Subject the non-safety-related RAP SSCs to QA controls during design and construction activities
  - Complete the D-RAP ITAAC
  - Before initial fuel load, integrate RAP into operational programs (e.g., maintenance rule, quality assurance, surveillance testing, inservice inspection, inservice testing, and maintenance programs)

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RAP During Operations Phase

- Objective of RAP during the operations phase is to ensure that the reliability and availability of RAP SSCs are maintained commensurate with their risk significance
- This objective can be achieved by integrating RAP into existing operational programs.

  For example:

  - Maintenance rule program
  - QA program for safety-related SSCs (10 CFR Part 50, Appendix B)
  - QA controls for non-safety-related RAP SSCs (SRP Section 17.5. Part V)
  - Inservice inspection, inservice testing, surveillance testing, and maintenance programs for the RAP SSCs

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Conclusions

- RAP for new reactors is established using the guidance contained in Item E of SECY-95-132
- The lessons learned and insights gained from previous RAP reviews were used to clarify the RAP process and are captured in DC/COL-ISG-018
- NRC reviews the RAP for new reactor applications in accordance with SRP Section 17.4 (as clarified or changed by DC/COL-ISG-018)