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Use of Risk Insights in Support of USNRC Reviews of New Reactor Applications

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Background

- USNRC reviews new reactor license applications in accordance with NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (the SRP)
- The SRP guides staff in conducting safety reviews of new reactor applications
- While the SRP provides a useful list of areas to review, it does not necessarily indicate the importance of a given review area
- Given the review may emphasize or de-emphasize particular aspects of an SRP section, the use of risk insights in support of an application review provides valuable input in determining the depth of review

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Objective

- Facilitate efficient and effective reviews of new reactor applications by:
  - Reviewing topics in applications in accordance with the SRP and at appropriate depth and level of detail commensurate with their contribution to plant risk
  - Developing risk insights to facilitate identification of potential design and performance issues that could be adverse to plant risk

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Key Attributes of Approach

- It is a logical extension of USNRC Policy on the use of PRA in regulatory activities (Commission's PRA Policy Statement)
- Embodies the five key principles of USNRC Regulatory Guide (RG) 1.174 on use of PRA in risk-informed decisionmaking
  - Approach meets current regulations
  - Approach is consistent with defense-in-depth philosophy
  - Approach maintains sufficient safety margins
  - Approach does not result in more than a minimal increase in risk
  - Use of performance measurement strategies to monitor change
- It is risk-informed and not risk-based
  - It considers probabilistic evaluations and deterministic (traditional) evaluations

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Approach

1) Identify plant systems, structures, and components (SSCs) and associated functions that are in scope of risk-informed SRP reviews using:

   - Risk evaluations submitted under Chapter 19 of new reactor application
   - Reliability Assurance Program (RAP) submitted under Chapter 17.4 of application
   - Regulatory Treatment of Nonsafety-Related Systems (RTNSS) process submitted as part of application for passive plant designs

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Approach (continued)

2) Prioritize the review of these SSCs that are in scope of risk-informed SRP reviews:

   - SSCs included in RAP or RTNSS are considered risk-significant

   - SSCs not included in RAP and not included in RTNSS are preliminarily considered low risk-significant (these should be verified to ensure that they are appropriate and embody the principles of RG 1.174)

   - SSCs are reviewed in accordance with the SRP and at a depth and level of detail (e.g., high, normal, and low efforts of review) commensurate with their risk significance

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Approach (continued)

3) Develop risk insights to facilitate identification of potential design and performance issues that could be adverse to plant risk, such as:
   - PRA assumptions that if different could significantly alter the PRA results and insights
   - Areas having a high level of uncertainty
   - Important dependencies (e.g., support systems) and common cause failures
   - Important human interactions and recoveries
   - Risk significant SSCs and important failure modes

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Approach (continued)

4) Document risk insights in a user-friendly template for use by technical reviewers

   - Verify that documented risk insights reasonably reflect the current design/plant-specific features and are updated as appropriate

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Conclusions

- Use of risk insights in support of USNRC reviews of new reactor applications facilitates efficient and effective reviews of new reactor applications by:
  - Reviewing topics in applications in accordance with the SRP and at appropriate depth and level of detail commensurate with their contribution to plant risk
  - Developing risk insights to facilitate identification of potential design and performance issues that could be adverse to plant risk
- Use of risk insights is consistent with the USNRC Policy on the use of PRA in regulatory activities