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United States Nuclear Regulatory Commission
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Public Meeting on the Pre-Decisional Draft Version of RG 1.247

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Overview

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Purpose

To discuss views and perspectives on PRA acceptability for NLWRs as it relates to the pre-decisional draft of RG 1.247

Background

- NEIMA signed into law in January 2019; Staff immediately began organizing effort to endorse the NLWR PRA standard
- Staff issued draft white paper on NLWR PRA acceptability issues 1/15/2021 (ML21015A434)
- ASME/ANS RA-S-1.4-2021, "Probabilistic Risk Assessment Standard for Advanced Non- Light Water Reactor Nuclear Power Plants," published 2/8/2021
- NEI 20-09, Rev. 1, transmitted on 5/5/2021 (ML21125A284)
- Published draft of the trial use RG 1.247, 9/7/2021 (ML21246A216)
- NRC has participated throughout the consensus standards development process, including providing feedback on proposed PRA standards and industry guidance documents

RG 1.247 Regulatory Paradigm

- RG 1.247 may be used to meet regulatory requirements related to the use of PRA
- The use of RG 1.247 helps *reduce* the need for an in-depth review of the PRA (RG 1.200 relates to *obviating* the need)
  - Section C of RG 1.247 provides the staff position on PRA acceptability for NLWRs
  - Appendix A provides the staff endorsement of the consensus PRA standard
- RG 1.247 defines an application more broadly to accommodate design, construction, and operational regulatory activities
- Peer reviews are important for establishing confidence in a PRA for RIDM and required by the NLWR PRA standard

RG 1.247 Development Approach

- RG 1.200 is the starting point for RG 1.247
- RG 1.247 addresses all sources of radioactivity, all hazards, all plant operating states, and all levels of analysis
- Staff positions in RG 1.247 included consideration of relationships between similar requirements in the NLWR and LWR PRA standards

RG 1.247 v. RG 1.200 Comparison

Some Similarities	Some Differences
Both provide guidance to applicants and licensees on: • What is an acceptable PRA • The use of voluntary consensus standards and an acceptable peer review process • Demonstrating the acceptability of a PRA for an application • PRA documentation needed to support a regulatory decision	RG 1.247 provides staff positions on the acceptability of PRA technical aspects for NLWRs that have either not been addressed or have been addressed more broadly in RG 1.200 • Plant Operating State Analysis for all POSs • Internal fire PRA for LPSD-types of POSs • Radiological consequence • Risk Integration
Both provide an endorsement of a national consensus PRA standard in a mark-up format and endorsement of industry guidance on PRA peer review	RG 1.247 provides specific guidance on determining risk significance and the use of relative and absolute importance measures
Both address all hazards and hazard groups	There are relatively few pieces of application-specific guidance for risk-informed NLWR regulatory activities

Notable Staff Positions in RG 1.247

PRA Element	Some Staff Position Considerations
Plant Operating States for all POSs	• Considers that there may be more than one type of at-power POS (e.g., online refueling) • Considers the potential future need for a related LWR staff position
Internal fire PRA for LPSD-types of POSs	• Considers the potential for developing similar staff position for LWRs in the future • NRC initiating a research project to develop guidance
Radiological Consequence	• LMP applications evaluate frequency and radiological consequence risk • Commission expectations should be met as expressed in various policy statements • Commission direction in SRM-SECY-82-102 dictates that risk surrogates may be used
Risk Integration	• Staff position relates to meeting Commission expectations, as expressed in the Advanced Reactor Policy Statement, which references the Safety Goal Policy Statement and the importance of meeting the QHOs • Unless justified, relative risk-significance criteria should be used to develop the PRA. • Staff determination of PRA acceptability does not include consideration of risk reporting thresholds

Regulatory and Applicability Aspects

- RG 1.247 applies to risk-informed NLWR regulatory activities under:
  - 10 CFR Part 50 (construction permit, operating license)
  - 10 CFR Part 52 (standard design certification, combined license, standard design approval, manufacturing license)
- RG 1.247 is being coordinated with 10 CFR Part 53 rulemaking effort
- RG 1.247 applies to stationary NLWRs only

Endorsed Technical Elements

- All 18 technical elements in NLWR PRA standard:

1. Plant Operating State Analysis
2. Initiating Event Analysis
3. Event Sequence Analysis
4. Success Criteria Development
5. Systems Analysis
6. Human Reliability Analysis
7. Data Analysis
8. Internal Flood PRA
9. Internal Fire PRA
10. Seismic PRA
11. Hazards Screening Analysis
12. High Wind PRA
13. External Flooding
14. Other Hazards PRA
15. Event Sequence Quantification
16. Mechanistic Source Term Analysis
17. Radiological Consequence Analysis
18. Risk Integration

- … and ASME/ANS RA-S-1.4-2021:
  - Definitions and risk assessment application
  - PRA configuration control
  - Notes in the nonmandatory appendices
  - Peer review requirements
  - Newly developed methods

NRC Endorsement Efforts

- NRC staff member provided support to the standard development working group
- NRC supported the JCNRM ballot of the ANLWR PRA Standard
  - NRC staff submitted 489 comments during the first consideration ballot (May 2020)
  - NRC staff submitted 70 comments during recirculation ballot (August 2020)
- Appendix A of RG 1.247 shows a total of 147 staff positions
  - 33 qualifications
  - 114 clarifications
- Staff positions may change after considering ACRS comments and public feedback

Staff Position Categories

Each staff position is categorized into:

- **No objection -** The staff has no objection to the requirement
- **No objection with clarification -** The staff has no objection to the requirement, however, clarified its understanding of these requirements
  - Generally speaking, this includes cases where a statement is judged to be ambiguous enough to be mis-interpreted and the acceptability of the PRA may be impacted
- **No objection subject to the following qualification -** The staff has a technical concern with the requirement and provided a qualification to resolve the concern
  - Generally speaking, this includes cases where a statement is judged to have a specific technical issue and the acceptability of the PRA may be impacted

Bases for the Staff Positions

- JCNRM did not address about 20 staff comments during ballot process stating that comment needs to be addressed first in the LWR Level 1/LERF PRA standard
- 8 comments were considered as regulatory issues
- Some comments were not addressed consistent with NRC's proposed resolution during balloting
- Staff positions in RG 1.247 were developed to be consistent with the staff positions in RG 1.200, Rev. 3
- Additional considerations after balloting

Endorsement of NEI 20-09

- NRC staff received NEI 20-09, Rev. 0 on June 1, 2020
- Staff reviewed and provided observations during a public meetings
- NEI addressed and submitted Rev. 1 of NEI 20-09 on May 5, 2021
- NEI 20-09, Rev. 1, is based on a related industry PRA peer review guidance document, NEI 17-07, Rev. 2, "Performance of PRA Peer Reviews Using the ASME/ANS PRA Standard," as endorsed by RG 1.200, Rev. 3
- The staff finds that the guidance in NEI 20-09, Rev. 1, is acceptable and thus endorses NEI 20-09, Rev. 1, without exception, in RG 1.247, Section C.2.2

Next Steps

- Consider feedback from ACRS
- Consider additional views and perspectives from stakeholders
- Issue RG 1.247 for trial use – early 2022
- Duration of the trial-use period will depend on current rulemaking efforts and feedback from early use
- Brief ACRS on future changes to the RG
- Continuous public engagement

Acronyms

- ACRS - Advisory Committee on Reactors Safeguards
- ANS - American Nuclear Society
- ASME - American Society of Mechanical Engineers
- 10 CFR – Title 10 of the Code of Federal Regulations
- JCNRM - Joint Committee on Nuclear Risk Management
- LERF - large early release frequency
- LPSD - low-power and shutdown
- LWR - light-water reactor
- NEI - Nuclear Energy Institute
- NEIMA - Nuclear Energy Innovation and Modernization Act
- NLWR - non-light water reactor
- NRC - Nuclear Regulatory Commission
- QHO - quantitative health objective
- POS - plant operating state
- PRA - probabilistic risk assessment
- RG - regulatory guide
- RIDM - risk-informed decision making