NRC Staff Presentation

2025 ASME/NRC OM Symposium

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U.S. Nuclear Regulatory Commission

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Topics

1. ISI/IST Code or Record (COR) interval and Code Case Final Rule (Revision 40) includes Snubber Program Interval
2. Steam Generator Snubbers

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1. ISI/IST Program and Snubber Program COR Interval

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10 CFR 50.55a and Snubber Program

- 10 CFR 50.55a and Snubber Program and Code of Record (COR) details were presented during Snubber User Group (SNUG), July 14 through 16, 2025 (ML 25189A239). Highlights are:
  - When using COR earlier than 2017 Edition of the ASME OM Code, Snubber Program Interval shall be aligned with 10-year ISI/IST interval.
  - When using 2017 and later Edition of the ASME OM Code, Snubber Program Interval shall be aligned with COR of ISI/IST Interval.

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2. Steam Generator Snubber and 10 CFR 50.69 Categorization

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10 CFR 50.69 Regulation

- A nuclear power plant licensee or applicant may request implementation of 10 CFR 50.69, “Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Plants.” Implementation of 10 CFR 50.69 allows for risk-informed treatment of structures, systems, and components (SSCs) as an alternative to certain special treatment requirements (STRs) in the NRC regulations.
- 10 CFR 50.69 defines risk-informed safety class (RISC) of SSCs as follows:
  - RISC-1 SSCs: safety-related SSCs that perform safety significant functions.
  - RISC-2 SSCs: nonsafety-related SSCs that perform safety significant functions.
  - RISC-3 SSCs: safety-related SSCs that perform low safety significant functions.
  - RISC-4 SSCs: nonsafety-related SSCs that perform low safety significant functions.

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Background-Snubber

- Snubbers are used to support various piping systems and components along with rigid and spring hangers in nuclear power plants. In plant normal operation mode, the snubber permits slow, normal movement (thermal), but becomes rigid and holds the piping and components when it senses sudden motion, such as seismic events or a line break or a water hammer.

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Background- Snubber and Steam Generator

- Snubbers are used to support large components (such as PWR SGs and reactor coolant pumps (RCPs), and BWR reactor recirculation pumps) in nuclear power plants.
- Hydraulic snubbers are used in SG upper support systems because of the snubber's ability to accommodate the large thermal movement of a SG during plant heatup and cooldown while providing restraint to the Reactor Coolant Loop (RCL) for dynamic events, such as postulated pipe ruptures and earthquakes.
- Because of the complexity of the design of the SG upper support system, several factors can significantly affect the performance of the hydraulic snubbers and contribute to the continuing need to monitor and test the functionality of the snubbers. In some cases, snubber malfunctions have caused extended plant outages.

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Background- Snubber

- Typically, snubbers are not modeled in probabilistic risk assessments (PRAs) for nuclear power plants.
- In the past, system functional safety significance was deemed to be an adequate surrogate measure of the safety significance of snubbers.
- A snubber is active under transient loads, water hammer, and earthquakes, but is a passive element under normal conditions.
- Most snubber examination and test program requirements are based on 10 CFR 50.55a and the ASME OM Code, Subsection ISTD.
- Regulatory Guide 1.29, states that at the interface between seismic Category I and non-seismic Category 1 SSCs, the seismic Category 1 dynamic analysis requirements should be extended to either the first anchor point in the non-seismic system or a sufficient distance into the non-seismic Category 1 system so that the seismic Category 1 analysis remains valid.

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Background- Safety Significant of Snubber

- **ASME OM Code Case OMN-10** (2000), "Requirements for Safety Significant Categorization of Snubbers Using Risk Insights and Testing Strategies for Inservice Testing of LWR Power Plants," which the NRC has not accepted. RG 1.193 provides a statement of concerns:
  - The method used for categorizing snubbers could result in certain snubbers being inappropriately categorized as having low safety significance.
  - These snubbers would not be adequately tested or inspected to provide assurance of their operational readiness.
  - In addition, unexpected extensive degradation in feedwater piping has occurred which would necessitate a more rigorous approach to snubber categorization than presently contained in this Code Case OMN-10. [ASME Code Case OMN-10 was developed by EPRI TR 110381 (May1998).

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Background- Safety Significant of Snubber

ASME OM Code Case OMN-10, Section: 4.2.3 "Expert Panel Decision Criteria," states

(a) Level A Inclusive Criteria Any of the following contributors to snubber importance above stated threshold will potentially make snubber HSSC [high safety significant component]:

(1) Level A-1. All snubbers protecting the following components:
(-a) PWRs: steam generators, reactor coolant pumps
(-b) BWRs: recirculation pumps

Definitions from Code Case OMN-10:

- ***Level 1 PRA****:* a PRA that identifies accident sequences that can lead to core damage, calculates the frequency of each sequence, and sums those frequencies to obtain CDF.

- ***high safety significant components*** *(HSSCs):* components that have been designated as more important to plant safety by a blended process of PRA risk ranking and Expert Panel evaluation.

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Background- Safety Significant of Snubber

- **EPRI TR 110381 (May 1998**), "Risk-Based Snubber Inspection and Testing Guidelines- Pilot Project Studies," which references EPRI TR 105396, PSA [Probabilistic Safety Assessment] Application Guide, dated August 1995.
  - EPRI TR 110381 was developed to provide a cost-effective, risk-informed inservice testing (RI-IST) strategy for snubbers and to deliver guidelines, pilot demonstrations, licensing evaluations, and a proposed ASME code case on RI-IST acceptance of nuclear piping snubbers.
  - All plants' SG Snubbers listed in EPRI TR 110381 are Class 1, HSSC.
  - EPRI TR 110381, Appendix C, is same as ASME Code Case OMN-10.

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Background

- **ASME/BPVC Case N-660**, "Risk-Informed Safety Classification for Use in Risk-Informed Repair/Replacement Activities Section XI, Division 1," Section I-3.2.2 Classification Considerations part (d), states, "A component support or snubber shall have the same classification as the highest-ranked piping segment within the piping analytical model in which the support is included. The Owner may further refine the classification ranking by more extensive application of the process defined in these requirements. These analyses shall be documented."

  - **ANO-2 method** ANO2-R&R-004, Revision 1, "Request to Use Risk-Informed Safety Classification and Treatment for Repair/ Replacement Activities in Class 2 and 3 Moderate Energy Systems," dated April 7, 2007 (ML071150108) Section I-3.2.2 Classification Considerations part (d), states, "A component support, hanger, or snubber shall have the same classification as the highest-ranked piping segment within the piping analytical model in which the support is included."

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Conclusion- SG Snubber

- ASME Code Case OMN-10 and EPRI indicates SG snubbers should be Class 1.
- Licensee is not required to categorize the snubbers associated with a Class 1/RISC-1 component under 10 CFR 50.69.
- In that case, the snubbers would retain their original design classification, and any special treatments would continue to apply.

QUESTIONS?