



Inservice Testing Improvements for New Reactors

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Introduction

- NRC regulations in 10 CFR Part 52 certify new reactor designs for reference by applicants for combined licenses (COLs) to construct and operate new nuclear power plants.
- Nuclear industry has submitted applications for new and amended design certifications (DCs) and COLs under Part 52.
- NRC is evaluating DC and COL applications to determine whether Part 52 requirements are satisfied.

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NRC Regulations

- 10 CFR 52.79(a)(11) requires COL applicants to describe programs and implementation to ensure that systems and components meet ASME Code per 10 CFR 50.55a
- 52.79(a)(37) requires COL applicants to include information to demonstrate how operating experience was incorporated into plant design
- 50.55a(f)(4)(i) requires initial IST program to meet ASME Code incorporated in 50.55a 12 months before fuel loading

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Commission Guidance

- Commission Papers SECY-90-016, 93-087, and 95-132, and their Staff Requirements Memoranda, discuss design aspects related to IST programs for new reactors.
- Commission Paper SECY-05-0197 indicates that COL applicants must fully describe their IST programs.
- Regulatory Guide 1.206 provides guidance for COL applicants to describe their IST programs, and other application information.

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IST Lessons Learned for New Reactors

- Full-flow pump testing capability
- Functional qualification improvements in ASME Standard QME-1-2007 and RG 1.100 (Rev. 3)
- Motor-operated valve (MOV) design-basis capability and periodic verification
- Application of MOV lessons learned to other valves
- Bi-directional testing of check valves
- Potential adverse flow effects from hydrodynamic loads and acoustic resonance

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ASME IST Activities for New Reactors

- White paper on improvement of IST provisions for new reactors in ASME *Code for Operation and Maintenance of Nuclear Power Plants (OM Code)*.
- First phase includes new OM section for full flow pump testing and clarification of other sections.
- Second phase will address additional lessons learned and new reactor issues.
- Non-mandatory appendix to ASME OM Code to provide guidance for system and component design to support IST activities for new reactors.

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IST Improvement Areas

- Development of effective functional qualification of IST components
- Performance of full flow testing of pumps
- Demonstration of MOV design-basis capability and periodic verification
- Application of MOV lessons learned to other valves
- Performance of bi-directional testing of check valves
- Development of IST surveillance for pyrotechnic-actuated (squib) valves based on design, qualification, and safety significance

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IST Improvement Areas

(continued)

- Surveillance for potential adverse flow effects from flow-induced vibration caused by hydrodynamic loads and acoustic resonance
- Surveillance of equipment within scope of Regulatory Treatment of Non-Safety Systems (RTNSS)
- Surveillance of equipment within risk-informed IST programs
- Surveillance provisions for software-based digital technology in pumps and valves

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Summary

- New reactor designs provide an opportunity to implement more effective and efficient IST activities.
- ASME developing improved IST provisions for new reactors in OM Code.
- NRC staff reviewing COL applications for full descriptions of IST programs that satisfy NRC regulations.
- NRC staff will continue to work with ASME to develop IST improvements in the OM Code.

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