Functional Design, Qualification, and Inservice Testing of Pumps, Valves, and Dynamic Restraints

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Challenge

- Current nuclear power plants are extending their operating lives and uprating their power levels
- Applications for new nuclear power plants are anticipated to be submitted in 2007
- We have a shared responsibility to ensure that functional design, qualification, and inservice testing that incorporate risk insights and performance-based provisions continue to provide assurance of operational readiness of pumps, valves, and dynamic restraints.

Summary Estimate of New Nuclear Power Plants

(as of 7/3/06)

	COLs	Units
AP 1000	6	11
ESBWR	3	3
EPR	5	5
ABWR	2	4
Unspecified	3	3
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Total	19	26

Number of Reference COLs: 4
Number of Environmental Reviews: 19+

Common Goals of NRC, ASME, and Nuclear Industry

- Safe and reliable operation of existing nuclear power plants
- Practical requirements for functional design, qualification, and inservice testing (IST) of pumps, valves, and dynamic restraints
- Adequate functional design, qualification, and inservice testing
- Effective preparation for, and licensing and operation of, safe and reliable new nuclear power plants

Transition of Functional Design, Qualification, and Inservice Testing

- In the past, functional design, qualification, and IST focused on deterministic parameters and approaches (e.g., valve stroke time)
- Risk insights and performance-based parameters and approaches are being incorporated (e.g., valve diagnostics and comprehensive pump testing)
- Importance of maintaining performance capability that supports Probabilistic Risk Assessment assumptions

ASME Roles

- Prepare and update functional design and qualification provisions for pumps, valves, and dynamic restraints in ASME Standard QME-1
- Prepare and update IST provisions to assess operational readiness of pumps, valves, and dynamic restraints in *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code)
- Develop OM Code cases to provide safe and reliable alternatives to specific Code provisions
- Respond to questions on implementation of specific Code provisions

NRC Roles

- Adopt consensus Codes and Standards where safe, reliable, and relevant
- Participate on ASME QME and OM committees to provide input related to regulatory issues
- Review updates to OM Code for incorporation by reference in 10 CFR 50.55a
- Review ASME QME-1 standard for generic acceptance
- Review plant-specific IST program updates, requests for relief from Code provisions, and alternatives to Code
- Review OM Code cases for acceptance in Regulatory Guide (RG) 1.192
- Prepare for operating and new reactor applications

NRC Activities on Functional Design, Qualification, and Inservice Testing

- Rulemaking to update 10 CFR 50.55a to reference recent edition of ASME OM Code on IST provisions
- Regulatory guide will be developed for QME-1 standard on functional design and qualification
- Regulatory guide being considered for NUREG-1482 on IST guidance
- Standard Review Plan and other regulatory guidance being updated to support review of operating and new nuclear power plant applications

NRC Risk-Informed Initiatives

- Apply risk insights to support safe operation of current and new nuclear power plants
- Evaluate plant-specific requests for application of risk-informed inservice testing
- Review risk-informed OM Code cases for acceptance in RG 1.192
- Issued 10 CFR 50.69 to allow risk-informed treatment of plant components and RG 1.201 to provide guidance on categorization
- Developing review and inspection guidance for 10 CFR 50.69

Industry Roles

- Participate in ASME QME and OM committees as technical experts
- Establish programs that satisfy QME-1 standard and OM Code provisions
- Prepare IST program updates, requests for relief from applicable Code provisions, and proposed alternatives to Code, as necessary
- Develop new technology to provide improved and more efficient implementation of QME-1 and OM provisions
- Develop guidance for implementing 10 CFR 50.69
- Standardize new reactor designs

Risk Insights and Performance-based Methods

- Application of risk insights in functional design, qualification, and IST requires understanding of PRA and component performance
- Risk-informed IST programs need to provide efficient and effective implementation of risk insights
- Performance-based methods need to maintain reasonable confidence in design-basis capability of low-risk safety-related components
- Treatment guidance can help provide appropriate implementation of 10 CFR 50.69

Meeting the Challenge

- Focus on common goals for
  - Safe and reliable nuclear power plant operation
  - Practical requirements for functional design, qualification, and inservice testing
  - Adequate functional design, qualification, and inservice testing
- Strengthen roles and interactions
- Improve performance-based provisions
- Implement efficient and effective risk-informed programs