

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

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Introduction

- NRC staff is reviewing descriptions of inservice testing (IST) and motor-operated valve (MOV) testing operational programs for Design Certification (DC) and Combined License (COL) Applications under 10 CFR Part 52
- Staff is following NRC regulations and guidance in reviewing those applications
- Focus of NRC staff review of operational programs is different for DC and COL Applications

NRC Regulations

- 10 CFR Part 52 for Design Certification and COL Application requirements
- 10 CFR Part 50, Appendix A, General Design Criteria, and Appendix B, Quality Assurance Criteria
- 10 CFR 50.55a for IST requirements

Design Certifications

- 10 CFR 52.47(a)(9) requires Design Certification Applications to evaluate nuclear power plant design against NRC Standard Review Plan (SRP) in effect 6 months before docket date
- 10 CFR 52.47(a)(22) requires Design Certification Applications to address operating experience

COL Applications

- 10 CFR 52.79(a)(11) requires COL Applicant to describe programs and implementation necessary to ensure that systems and components meet ASME Boiler & Pressure Vessel Code and Code for Operation and Maintenance of Nuclear Power Plants per 10 CFR 50.55a
- 10 CFR 52.79(a)(37) requires COL Applications to include information necessary to demonstrate how operating experience was incorporated into plant design
- 10 CFR 50.55a(f)(4)(i) requires initial IST program to meet ASME Code incorporated in 10 CFR 50.55a 12 months before fuel loading

Regulatory Guidance

- NRC Standard Review Plan Section 3.9.6, “Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints”
- NRC Regulatory Guide 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition)”
- Commission Paper SECY-05-0197, “Review of Operational Programs in a Combined License Application and General Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria [ITAAC]”

Commission Paper SECY-05-0197

- Operational programs include, e.g., preservice testing, IST, MOV testing, and environmental qualification
- COL Applicants should “fully describe” operational programs to avoid need for ITAAC
- Program is clearly and sufficiently described in terms of scope and level of detail to allow reasonable assurance finding of acceptability
- Program should be described at functional level and increasing level of detail where implementation choices could materially and negatively affect program effectiveness and acceptability

Operating Reactor Lessons Learned

- Weaknesses in past functional design and qualification of MOVs, safety and relief valves, and check valves
- Potential adverse flow effects not adequately addressed based on power uprate lessons
- Inadequacy of stroke-time testing to assess operational readiness of MOVs per ASME Code IST requirements
- Applicability of lessons learned from MOV functional design, qualification, and IST programs to other power-operated valves
- Improvements to ASME Codes and standards based on operating experience (e.g., ASME OM Code Appendix III and ASME Standard QME-1-2007)

Design Certification Review

- In the past, DC Design Control Document provided significant flexibility for COL Applicants to develop IST/MOV operational programs
- NRC staff review of DCD focuses on system design and accessibility for performance of IST activities and general description of IST and MOV programs per SRP Section 3.9.6
- If COL Applicants plan to rely on DCD to help fully describe IST/MOV operational programs, DCD will need to provide more specific information

COL Application Review

- COL Application needs to support NRC decision that operational programs will provide reasonable assurance of safe plant operation
- COL Applicants may rely on a combination of DCD and Final Safety Analysis Report (FSAR) information to fully describe operational programs
- March 26-27 public meeting held to discuss IST/MOV program description for AP1000 DCD revision and Bellefonte Units 3 and 4 COL Application
- May 22 public meeting held to discuss IST/MOV program description for ESBWR DCD and North Anna Units 3 and 4 COL Application

Summary

- DC Application may provide general information on operational programs to allow flexibility by COL Applicant in developing plant-specific operational programs, or more specific information if COL Applicant plans to rely on DCD to help fully describe operational programs
- COL Applicants need to ensure full description of operational programs per Commission direction through DCD and FSAR
- Recent public meetings were successful in identifying aspects of DC and COL Applications that need to be supplemented to fully describe IST/MOV operational programs