U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

3.9.6 FUNCTIONAL DESIGN, QUALIFICATION, AND INSERVICE TESTING PROGRAMS FOR PUMPS, VALVES, AND DYNAMIC RESTRAINTS

REVIEW RESPONSIBILITIES

Primary - Organization responsible for the review of component performance and testing
Secondary - None

I. AREAS OF REVIEW

This Standard Review Plan (SRP) section addresses the areas of the applicant's final safety analysis report (FSAR) that cover the functional design and qualification provisions and inservice testing (IST)[1] programs for safety-related[2] pumps, valves, and dynamic restraints (snubbers) designated as Class 1, 2, or 3 under Section III of the American Society of

[1]The term "inservice testing" or IST used in developing programs for nuclear power plants to satisfy the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (ASME OM Code) encompasses preservice and inservice testing for pumps and valves, and preservice and inservice examination and testing for dynamic restraints. The term "inservice inspection" or ISI used in developing programs for nuclear power plants to satisfy the ASME *Boiler and Pressure Vessel Code*, Section XI, includes preservice and inservice examination and testing for dynamic restraints. To simplify the multiple acronyms in this SRP section, "IST program" for pumps, valves, and dynamic restraints is used to identify preservice and inservice testing programs for pumps and valves, and preservice and inservice examination and testing programs for dynamic restraints.

[2] Safety-related is defined in Section 50.2, "Definitions," of Title 10 of the *Code of Federal Regulations*.

USNRC STANDARD REVIEW PLAN

This Standard Review Plan (SRP), NUREG-0800, has been prepared to establish criteria that the U.S. Nuclear Regulatory Commission (NRC) staff responsible for the review of applications to construct and operate nuclear power plants intends to use in evaluating whether an applicant/licensee meets the NRC's regulations. The SRP is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide an acceptable method of complying with the NRC regulations.

The SRP sections are numbered in accordance with corresponding sections in Regulatory Guide (RG) 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Not all sections of RG 1.70 have a corresponding review plan section. The SRP sections applicable to a combined license application for a new light-water reactor (LWR) are based on RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)." These documents are made available to the public as part of the NRC's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Individual sections of NUREG-0800 will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience. Comments may be submitted electronically by email to NRO_SRP@nrc.gov

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Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code). The review should also include any other pumps, valves, and dynamic restraints not categorized as ASME BPV Code Class 1, 2~~,~~ or 3 that have a safety-related function.[3] Conformance with the specific guidance in Subsection II of this SRP section will provide reasonable assurance that the functional design and qualification of pumps, valves, and dynamic restraints within the scope of this SRP section and their associated IST programs satisfy the applicable requirements of Section 50.55a, "Codes and Standards," of Title 10 of the *Code of Federal Regulations*, particularly the IST program requirements of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code)[4];~~;~~ General Design ~~Criteria~~Criterion (GDC) 1, "Quality Standards and Records," GDC 2, "Design Bases for Protection against Natural Phenomena," GDC 4, "Environmental and Dynamic Effects Design Bases," GDC 14, "Reactor Coolant Pressure Boundary," GDC 15, "Reactor Coolant System Design," GDC 37, "Testing of Emergency Core Cooling System," GDC 40, "Testing of Containment Heat Removal System," GDC 43, "Testing of Containment Atmosphere Cleanup Systems," GDC 46, "Testing of Cooling Water System," and GDC 54, "Systems Penetrating Containment," in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing ~~Of~~of Production ~~And~~and Utilization Facilities~~,";"~~ Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50; 10 CFR 52.47(b)(1), 10 CFR 52.79(a)(11), and 10 CFR 52.80(a).

The requirements for preservice and inservice examination and testing of dynamic restraints have been transferred from Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME BPV Code to the ASME OM Code. The NRC regulations in 10~~-~~ CFR 50.55a address the relationship between Section XI of the ASME BPV Code and the ASME OM Code for dynamic restraints. Because ASME has transferred the preservice and inservice examination and testing provisions for dynamic restraints from the ASME BPV Code to the ASME OM Code, ~~future~~the NRC regulations require applicants ~~will need~~ to satisfy ~~the NRC regulations regarding~~ the provisions in the ASME OM Code for dynamic restraints.
The level of detail of the information describing the functional design and qualification, and IST programs for pumps, valves, and dynamic restraints to be provided by an applicant will depend on whether the application is for an operating license (OL) submitted under the provisions of 10 CFR Part 50, or a design certification (DC) or a combined license (COL) submitted under the provisions of 10 CFR Part 52, "Licenses, Certifications, and Approvals ~~For~~for Nuclear Power Plants." In implementing the specific provisions of this SRP section, the NRC technical reviewer will distinguish between a program review for an OL application and a program description review for a COL application.
The OL applicant under 10 CFR Part 50 must establish its functional design, qualification, and IST programs for pumps, valves, and dynamic restraints to support OL issuance.

The COL applicant is required under 10 CFR 52.79(a)(11) to provide in its FSAR a description of the program(s), and their implementation, necessary to ensure that the systems and components meet the requirements of the ASME BPV Code and the ASME OM Code in accordance with 10 CFR 50.55a. In satisfying this requirement, the COL applicant should follow the Commission guidance in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses,

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[3] In a rulemaking issued for public comment on September 18, 2015 (80 *Federal Register* 56820), the NRC staff proposed the alignment of the scope of 10 CFR 50.55a(f)(4) and the ASME OM Code for pumps and valves in the IST program. The NRC technical reviewer should consider the latest issued version of 10 CFR 50.55a when implementing this SRP section.

[4] ASME reformatted the OM Code in the 2009 Edition with the title of "Operation and Maintenance of Nuclear Power Plants," where Division 1 contains the OM Code, Division 2 contains OM Standards; and Division 3 contains OM Guides.

and Acceptance Criteria," and its Staff Requirements Memorandum (SRM). In particular, the COL applicant should provide a full description of the IST programs for pumps, valves, and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic restraints) in its FSAR, with information in the DC application incorporated by reference in the COL applicant's FSAR. A COL applicant typically references the DC application for ~~a~~part of the description of the functional design and qualification of pumps, valves, and dynamic restraints. ~~Per~~The NRC regulations in 10 CFR 52.63(c~~),~~) require the COL applicant (or its applicable DC applicant) ~~will need~~ to make available information normally contained in procurement specifications and construction and installation specifications for NRC staff audit if the information is necessary for the Commission to make its safety determinations. In preparation for startup of the COL plant, the staff will conduct inspections of the IST program and motor-operated valve (MOV) program established by the COL licensee to verify that the programs satisfy the provisions specified in the COL application.

The NRC staff review of information provided by an applicant for certification of a nuclear power plant design under 10 CFR Part 52 will differ from a COL application review. For a DC application, the staff will review the DC applicant's provisions for the functional design and qualification of pumps, valves, and dynamic restraints in its FSAR (also referred to as the Design Control Document [DCD]). The staff will verify that the DC applicant has specified that the design of its nuclear power plant will provide accessibility for IST activities. The staff will review the COL Action Items specified by the DC applicant. The staff will also review the description of the IST program for pumps, valves, and dynamic restraints provided by the DC applicant in its FSAR or DCD for acceptability for reference by a COL applicant in its FSAR. The staff will review the Tier 2* information specified by the DC applicant for the functional design and qualification of pumps, valves, and dynamic restraints. Similar to COL applications, the DC applicant must, in accordance with 10 CFR 52.47, "Contents of Applications; Technical Information," make available for NRC staff audit information normally contained in procurement specifications and construction and installation specifications if the information is necessary for the Commission to make its safety determinations. The staff will verify that the DC applicant has specified inspections, tests, analyses, and acceptance criteria (ITAAC) for the functional qualification of pumps, valves, and dynamic restraints; preoperational testing of pumps and valves; and installation of dynamic restraints. Operational programs, such as IST and MOV programs, are not completely reviewed and approved as part of the DC review, and they do not have finality as part of a DC review.

The NRC describes its policy positions regarding new reactor designs in several Commission papers. These policy papers include SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs," SECY-94-084, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs," and SECY-95-132, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems (RTNSS) in Passive Plant Designs (SECY-94-084)," and their associated SRMs. This SRP section incorporates the Commission policy positions for new reactors with respect to functional design, qualification, and IST programs for pumps, valves, and dynamic restraints.

One policy issue related to new reactor designs involves the RTNSS program for nuclear power plants with passive safety systems that rely on natural forces to supply safety injection water and to provide reactor core and containment cooling. Active systems in such passive reactor designs are categorized as non-safety systems with limited exceptions. Active systems in passive reactor designs provide the first line of defense to reduce challenges to the passive

systems in the event of a transient at the nuclear power plant. The Commission has determined that those active systems that provide a defense-in-depth function in passive reactor designs ~~need~~will not be required to meet all of the acceptance criteria for safety-related systems. However, there should be a high level of confidence that these active systems will be available and reliable when challenged. Multiple activities will provide confidence in the capability of these active systems to perform their defense-in-depth functions, and are referred to together as the RTNSS program. This SRP section provides guidance for NRC reviewers to address functional design and qualification provisions and IST activities for RTNSS pumps, valves, and dynamic restraints in passive new reactors.

As discussed in this SRP section, the IST program for pumps, valves, and dynamic restraints includes preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic restraints depending on the specific components and regulatory or code provisions and guidance implemented by the applicant or licensee.

The specific areas of review are as follows:

1. Functional Design and Qualification of Pumps, Valves, and Dynamic Restraints

   A. The staff reviews system and component designs and equipment qualification provisions to ensure that pumps, valves, and dynamic restraints are designed, manufactured, tested, and installed to perform their applicable safety functions and to accommodate anticipated inservice examination or inspection and testing.

   B. This SRP section provides guidance for the assessment of the functional design and qualification of pumps, valves, and dynamic restraints with safety-related functions.[5] This SRP section also provides guidance for the assessment of the functional design and qualification of pumps, valves, and dynamic restraints with RTNSS functions in passive new reactors. SRP Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," provides guidance for the assessment of the seismic and dynamic qualification of components.

   C. SRP Section 3.9.3, "ASME Code Class 1, 2, and 3 Components, and Component Supports, and Core Support Structures," provides guidance for the assessment of the design and installation of safety and relief valves.

   D. Dynamic restraints for plant piping and components do not provide a load path or force transmission during normal plant operations, but function as rigid supports when subjected to dynamic transient loads. SRP Section 3.9.3 provides guidance for staff assessment of the design and qualification of dynamic restraints.

   E. The staff will conduct an audit of the information normally contained in design and procurement specifications for pumps, valves, and dynamic restraints for DC and COL applications.

   F. The technical staff in the NRC Office of New Reactors (NRO) will provide direct or indirect assistance to vendor or region inspection activities to evaluate the

[5] ~~Nonsafety~~Some nonsafety-related pumps, valves, and dynamic restraints that have functions important to safety, such as fire protection and response to station blackout and anticipated transient without scram, are reviewed under other SRP sections.

implementation of the functional design and qualification programs for pumps, valves, and dynamic restraints, as necessary. This is particularly important for first of a kind (FOAK) equipment to be used in nuclear power plants (such as new squib valve designs).

2. Inservice Testing Program

A. In its review of an OL application under 10 CFR Part 50, the staff will review the IST program described in the applicant's FSAR to verify that it complies with the applicable edition and addenda of the ASME OM Code incorporated by reference in 10 CFR 50.55a prior to issuance of the OL license.[6]

B. In its review of a COL application under 10 CFR Part 52, the staff will review the full description of the IST program for pumps, valves, and dynamic restraints provided by the applicant through reference to the DC application and the supplemental information specified in the applicant's FSAR. Commission Paper SECY-05-0197 summarizes the NRC position regarding the full description of operational programs to be provided by COL applicants. Section C.IV.4 of Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," provides guidance for COL applicants with respect to fully describing plant operational programs. The staff will conduct inspections of the IST and MOV operational programs in preparation for plant startup.

C. For a DC application, the staff will review the design provisions specified in the applicant's DCD to ensure accessibility for the performance of IST activities. The staff will also review the description of the IST program for pumps, valves, and dynamic restraints provided by the DC applicant in its DCD for acceptability for reference by a COL applicant in its FSAR. Operational programs, such as IST and MOV programs, are not completely reviewed and approved as part of the DC review, and they do not have finality as part of a design certification review.

D. For passive new reactors, the staff will review the COL applicant's description of the IST activities for pumps, valves, and dynamic restraints within the scope of the RTNSS program consistent with the Commission policy in SECY-95-132 as described in the public NRC memorandum dated July 24, 1995, on RTNSS equipment.

E. The staff will review the applicant's plans to follow the guidance in NUREG-1482, Revision 2, "Guidelines for Inservice Testing at Nuclear Power Plants," October 2013.

F. The staff will verify that the COL application includes provisions for the implementation of the IST programs for pumps, valves, and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic restraints), and MOV testing program, and their milestones for completion in accordance with the regulatory

[6] ASME BPV Code, Section XI, rather than the ASME OM Code, might be applicable for preservice and inservice examination and testing of dynamic restraints if an applicant references a previous edition of the ASME BPV Code.

requirements in 10 CFR 50.55a(f) and 10 CFR 50.55a(g), and specified license conditions.

G. For COL applications, the staff will specify license conditions to require that:

i. prior to initial fuel load, the licensee shall implement preservice testing of pumps and valves, MOV testing, and preservice examination and testing of dynamic restraints (such license conditions are not necessary for the inservice activities for pumps, valves, and dynamic restraints because their implementation is mandated by 10 CFR 50.55a(f) and 10 CFR 50.55a(g), respectively), and

ii. no later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational programs listed in FSAR Table XX.X, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table XX.X have been fully implemented.

3. Inservice Testing Program for Pumps

A. The staff will review the descriptive information in the FSAR covering the IST program for safety-related pumps. For passive new reactors, the staff will review the descriptive information provided by the COL applicant in the FSAR covering the IST activities for pumps with RTNSS functions.

B. The staff will review the applicant's plans for testing for speed, fluid pressure, flow rate, and vibration at normal pump operating conditions.

C. The staff will review test schedules and parameters for pumps that are operated continuously or routinely during operation, cold shutdown, or refueling operations (Group A pumps), and pumps that are not operated routinely except for testing (Group B pumps). For pre-2000 plants, this information will be reviewed under Subsection ISTB, "Inservice Testing of Pumps in Light-Water Reactor Nuclear Power Plants – Pre-2000 Plants." The ASME OM Code defines pre-2000 plants as those receiving a construction permit or COL license prior to January 1, 2000. The staff will review this information for all pumps in the IST program for post-2000 plants under Subsection ISTF, "Inservice Testing of Pumps in Light-Water Reactor Nuclear Power Plants – Post-2000 Plants." The ASME OM Code defines post-2000 plants as those receiving a construction permit or COL license on or after January 1, 2000.

D. The staff will review the methods described in the FSAR for establishing and measuring the reference values and IST values for the pump parameters.

E. The staff will review the applicant's plans for establishing the accuracy and range of instruments used for pump testing.

F. The staff will review the applicant's plans for establishing the duration of testing for Group A tests, Group B tests, and comprehensive tests. For pre-2000

plants, this will be done under Subsection ISTB, and for post-2000 plants, this will be done under Subsection ISTF.

G. The staff will review the IST table for pumps provided in the applicant's FSAR or DCD.

4. Inservice Testing Program for Valves

A. The staff will review the descriptive information in the FSAR covering the IST program for safety-related valves. For passive new reactors, the staff will review the descriptive information provided by the COL applicant in the FSAR for valves with RTNSS functions.

B. The staff will review the applicant's plans for testing valves defined by the ASME OM Code in Subsection ISTC, "Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants," as Category A (valves with seat leakage limitations), Category B (valves where seat leakage is inconsequential), Category C (self-actuating valves), and Category D (one operation valves).

C. The staff will review the applicant's justifications for the schedules of cold shutdown and refueling outage tests.

D. The staff will review the methods described in the FSAR for measuring the reference and inservice parameter values for power-operated valves (POVs), including MOVs, air-operated valves (AOVs), hydraulic-operated valves (HOVs), and solenoid-operated valves (SOVs).

E. The staff will review the applicant's plans for the qualification of valve testing equipment.

F. The staff will review the valve IST table provided in the applicant's FSAR or DCD.

5. Inservice Testing Program for Dynamic Restraints

A. The staff will review the descriptive information in the FSAR covering the IST program for safety-related dynamic restraints. For passive new reactors, the staff will review the descriptive information provided by the COL applicant in the FSAR for dynamic restraints with RTNSS functions.

B. The staff will review the applicant's plans for IST program activities related to dynamic restraints. Visual examination is required by the OM Code to check for degradation, missing parts, and leakage, and functional testing is necessary to assure operational readiness. In addition, the staff will review the applicant's plans for Service Life Monitoring of dynamic restraints. The dynamic restraints can be mechanical or hydraulic.

C. The staff will review the applicant's plans for establishing the duration (frequency) of IST program activities for dynamic restraints.

D. The staff will review the applicant's functional testing criteria or parameters for dynamic restraints.

E. The staff will use SRP Section 3.9.3 for additional guidance on the design and testing of dynamic restraints.

6. Relief Requests and Alternative Authorizations to ASME Codes

A. Pursuant to 10 CFR 50.55a(z), the Commission may authorize alternatives to ASME Code requirements if the alternatives will provide an acceptable level of quality and safety, or compliance will result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. An applicant or licensee may submit a request for use of an alternative to specific ASME Code provisions for review by the NRC staff. The NRC provides guidance for the submittal of requests for alternatives to the ASME Code in NUREG-1482 (Revision 2).

B. The ASME BPV Code and OM Code provide for alternatives to specific Code provisions for the code user in Code Cases. The NRC staff identifies acceptable code cases in RG 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," and RG 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code," with appropriate conditions, as incorporated by reference in 10 CFR 50.55a.

C. Pursuant to 10 CFR 50.55a(f)(6)(i) for pumps and valves, and 10 CFR 50.55a(g)(6)(i) for dynamic restraints, the Commission may grant relief – from the ASME OM Code requirements or ASME BPV Code, Section XI requirements, if conformance would be impractical for the facility ~~C.~~ (10 CFR 50.55a(f)(5)(iii) or 10 CFR 50.55a(g)(5)(iii), as applicable) and may impose such alterative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result from imposing the requirements. The staff will review any requests for relief to determine if the proposed exceptions will degrade overall plant safety.

D. Pursuant to 10 CFR 50.55a(f)(6)(ii) for pumps and valves, the Commission may require the licensee to follow an augmented program for pumps and valves for which the Commission deems that added assurance of operational readiness is necessary. Pursuant to 10 CFR 50.55a(g)(6)(ii) for dynamic restraints, the Commission may require the licensee to follow an augmented program for dynamic restraints for which the Commission deems that added assurance of structural reliability is necessary.

E. Under 10 CFR 50.55a(f)(4)(iv) and 10 CFR 50.55a(g)(4)(iv), a nuclear power facility may meet the requirements for pumps and valves, and for dynamic restraints, respectively, in subsequent editions and addenda of the applicable ASME Code that are incorporated by reference in 10 CFR 50.55a, subject to the conditions in 10 CFR 50.55a, and subject to NRC approval.

F. The staff does not expect new reactor applicants to need alternatives based on hardship or relief based on impracticality because of the lead time available for the design of plant systems to allow the ASME OM Code provisions to be satisfied.

7. Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC). For DC and COL reviews, the applicant's proposed information on the ITAAC associated with the systems, structures, and components (SSCs) related to this SRP section is reviewed in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria." The staff recognizes that the review of ITAAC is performed after review of the rest of this portion of the application against acceptance criteria contained in this SRP section. Furthermore, the ITAAC are reviewed to assure that all SSCs in this area of review are identified and addressed as appropriate in accordance with SRP Section 14.3.

8. COL Action Items and Certification Requirements and Restrictions. For a DC application, the review will address COL action items and requirements and restrictions (e.g., interface requirements and site parameters). With respect to the IST program, the DC application must include a COL action item specifying that the COL applicant must provide a full description of the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints.

   For a COL application referencing a DC, the COL applicant must address COL action items (referred to as COL license information in certain DCs) included in the referenced DC. Additionally, a COL applicant must address requirements and restrictions (e.g., interface requirements and site parameters) included in the referenced DC.

9. Operational Program Description and Implementation. For a COL application, the staff reviews the IST program for pumps, valves, and dynamic restraints (including the preservice and inservice testing program for pumps and valves, and the preservice and inservice examination and testing program for dynamic restraints), and the MOV testing program descriptions and the proposed implementation milestones. The staff also reviews FSAR Table 13.x to ensure that the applicable operational programs and associated milestones are included.

10. Tier 2* Information.[7] For a DC application, the applicant's FSAR (or DCD) should specify as Tier 2* information that the functional design and qualification of safety-related pumps, valves, and dynamic restraints shall be performed in accordance with ASME Standard QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," as accepted in RG 1.100 (Revision 3), "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants." The applicant may reference a more recent edition of ASME QME-1 that has been accepted in a later revision to RG 1.100.

Review Interfaces

Other SRP sections interface with this section as follows:

1. SRP Section 3.2.2, "System Quality Group Classification," addresses the classification system and quality group for pumps and valves.

[7] The NRC technical reviewer should consider the NRC staff position on Tier 2* options when conducting the review using this SRP section.

2. SRP Section 3.9.2, "Dynamic Testing and Analysis of Systems, Structures, and Components," addresses dynamic testing and analysis of safety-related pumps, valves, and dynamic restraints.

3. SRP Section 3.9.3, "ASME Code Class 1, 2, and 3 Components, and Component Supports, and Core Support Structures," addresses the structural design of safety-related pumps, valves, and dynamic restraints.

4. SRP Section 3.9.7, "Risk-Informed Inservice Testing," addresses risk-informed IST activities.

5. SRP Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," addresses the seismic and dynamic qualification of safety-related pumps and valves.

6. SRP Section 3.11, "Environmental Qualification of Mechanical and Electrical Equipment," addresses the environmental qualification of safety-related pumps and valves.

7. SRP Section 3.12, "ASME Code Class 1, 2, and 3 Piping Systems, Piping Components and their Associated Supports," addresses the design and leak testing provisions of pressure-retaining systems and components that interface with the reactor coolant system as part of the primary review responsibility for intersystem loss-of-coolant accidents.

8. SRP Section 3.13, "Threaded Fasteners - ASME Code Class 1, 2, and 3," addresses programs for ensuring bolting and threaded fastener adequacy and integrity.

9. SRP Section 5.2.1.1, "Compliance with the Codes and Standards Rule, 10 CFR 50.55a," addresses the applicant's references to specific editions and addenda of the ASME BPV Code and ASME OM Code, and the use of any ASME Code Cases.

10. SRP Section 5.2.2, "Overpressure Protection," addresses the number and size of valves specified for the reactor coolant pressure boundary (RCPB).

11. SRP Sections 5.4.7 ~~and 6.3~~, "Residual Heat Removal (RHR) System," and 6.3, "Emergency Core Cooling System," address residual heat removal and emergency core cooling system piping, respectively, that is connected to the reactor coolant system and is subject to thermally stratified flow, thermal striping, and/or thermal cyclic effects.

12. SRP Section 6.2.1.2, "Subcompartment Analysis," addresses the applicant's analyses of subcompartment differential pressures resulting from postulated pipe breaks.

13. SRP Section 6.2.2, "Containment Heat Removal Systems," addresses the design and qualification testing provisions for pumps and valves due to post loss-of-coolant (LOCA) generated debris.

14. SRP Sections 6.2.4 ~~and 6.2.6~~, "Containment Isolation System," and 6.2.6, "Containment Leakage Testing," address the containment isolation system and the overall containment leakage testing program, respectively.

15. SRP Section 9.2.1, "Station Service Water System," addresses surveillance, testing, inspection, and maintenance programs of service water systems.

16. SRP Section 10.3, "Main Steam Supply System," addresses the number and size of valves specified for the steam and feedwater systems.

17. For COL reviews of operational programs, the review of the applicant's implementation plan is performed under SRP Section 13.4, "Operational Programs."

18. SRP Section 14.2, "Initial Plant Test Program - Design Certification and New License Applicants," addresses the preoperational tests ~~that will need~~ to be coordinated with preservice testing activities specified in the ASME OM Code.

19. SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria," addresses the review of ITAAC for DC and COL applications.

20. SRP Section 19.3, "Regulatory Treatment of Non-Safety Systems (RTNSS) for Passive Advanced Light Water Reactors," addresses the high level provisions for the review of RTNSS equipment.

The specific acceptance criteria and review procedures are contained in the referenced SRP section.

II. ACCEPTANCE CRITERIA

Requirements

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:

1. 10 CFR 50.54(jj), 10 CFR 50.55(i) and 10 CFR Part 50, Appendix A, GDC 1 as they relate to pumps, valves, and dynamic restraints important to safety being designed, fabricated, constructed, erected, tested, and inspected to quality standards commensurate with the importance of the safety functions to be performed.

2. GDC 2, as it relates to pumps, valves, and dynamic restraints important to safety being designed to withstand the effects of natural phenomena combined with the effects of normal and accident conditions, without a loss of capability to perform their safety functions.

3. GDC 4, as it relates to designing pumps, valves, and dynamic restraints important to safety to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents.

4. GDC 14, as it relates to designing, fabricating, erecting, and testing pumps, valves, and dynamic restraints that form the reactor coolant boundary so as to have an extremely low probability of abnormal leakage, rapidly propagating failure, and gross rupture.

5. GDC 15, as it relates to pumps, valves, and dynamic restraints that form the reactor coolant system and associated auxiliary, control, and protection systems being designed with sufficient margin to ensure that the design conditions of the reactor coolant pressure

boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.

6. GDC 37, as it relates to designing the emergency core cooling system to permit periodic pressure and functional testing to ensure the leak tight integrity and operability and performance of its active components.

7. GDC 40, as it relates to designing periodic pressure and functional testing of the containment heat removal system to ensure the leak tight integrity and operability and performance of its active components.

8. GDC 43, as it relates to designing the containment atmospheric cleanup systems to permit periodic pressure and functional testing to ensure the leak tight integrity and the operability and performance of the active components.

9. GDC 46, as it relates to designing the cooling water system to permit periodic pressure and functional testing to ensure the leak tight integrity and operability and performance of the active components.

10. GDC 54, as it relates to designing piping systems penetrating containment with the capability to test periodically the operability of the isolation valves and associated apparatus and determine valve leakage acceptability.

11. Appendix B to 10 CFR Part 50, as it relates to quality assurance in the design, fabrication, construction, testing, and records control of safety-related pumps, valves, and dynamic restraints.

12. 10 CFR 50.55a(c)-(e), in so far as they relate to the ASME BPV Code, Section III, for the qualification of mechanical equipment and supports.

13. 10 CFR 50.55a(f) for pumps and valves, and 10 CFR 50.55a(g) for dynamic restraints, , as they relate to assessing operational readiness.

14. 10 CFR 50.55a(b)(3), as it relates to requirements for specific aspects of the IST program ~~(including an MOV testing program).~~ for pumps, valves, and dynamic restraints.

15. 10 CFR 52.47(b)(1), which requires that a DC application contain the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the DC has been constructed and will be operated in accordance with the DC, the provisions of the Atomic Energy Act, and the NRC's rules and regulations;

16. 10 CFR 52.79(a)(11), which specifies that the COL applicant provide in its FSAR a description of the program(s), and their implementation, necessary to ensure that the systems and components meet the requirements of the ASME BPV Code and the ASME OM Code in accordance with 10 CFR 50.55a.

17. 10 CFR 52.80(a), which requires that a COL application contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are

performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the COL, the provisions of the Atomic Energy Act, and the NRC's rules and regulations.

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for the review described in this SRP section. The SRP is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide acceptable methods of compliance with the NRC regulations.

Additional guidance regarding the historical and current perspectives on the regulatory requirements for IST programs is available in NUREG-1482, Revision 2, which includes information on the suggested format and content for IST programs and alternative/relief requests, examples of alternative/relief requests, clarification of issues described in NRC communications on IST, and information regarding current staff positions on IST. RG 1.192 as incorporated by reference in 10 CFR 50.55a addresses the acceptability of OM Code cases related to IST programs.

RG 1.206 provides guidance for COL applicants to use in preparing applications to construct and operate their proposed nuclear power plants, including information for describing the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints.

In Section C.IV.9, "Regulatory Treatment of Nonsafety Systems," of RG 1.206, the staff summarizes the Commission guidance provided in the Commission papers and SRMs on the treatment of RTNSS equipment in new reactors. The NRC staff prepared SRP Section 19.3 to provide high-level guidance for the evaluation of the scope of RTNSS equipment and its treatment that should be established by DC and COL applicants for nuclear power plants with passive post-accident heat removal systems. SRP Section 19.3 indicates that the NRC staff reviewer will verify that the applicant has provided sufficient information to address the regulatory criteria on RTNSS equipment.

As an alternative to deterministic IST programs, a risk-informed approach may be used to prioritize and adjust IST activities, such as the frequency of individual tests, selection of components to be tested, and IST testing approaches. The risk-informed IST program needs to provide reasonable assurance that components will remain capable of performing their intended functions until the next scheduled test. SRP Section 3.9.7 contains the acceptance criteria necessary for the review and their methods of application. In SRP Section 3.9.7, the NRC staff describes procedures and acceptance guidelines for its review of proposed plant-specific, risk-informed changes to a licensee's IST program. The review procedures are consistent with acceptable methods implementing a risk-informed IST program that follow RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and RG 1.175, "An Approach for Decisions on Plant-Specific Risk-Informed Decisionmaking: Inservice Testing." Alternatively, an applicant may use NRC-approved risk-informed ASME Code cases referenced in RG 1.192 to construct a risk-informed approach for IST programs.

Subsection ISTD, "Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code incorporates

alternative provisions for determining dynamic restraint visual inspection intervals and corrective actions, which the staff recommended in Generic Letter (GL) 90-09, "Alternative Requirements for Snubber Visual Inspection Intervals and Corrective Actions."

1. Functional Design and Qualification of Pumps, Valves, and Dynamic Restraints

   A. For new plant applications, safety-related pump, valve, and piping designs are acceptable where they specify provisions for testing of pumps and valves at the maximum flow indicated in the plant accident analyses.

   B. Functional design and qualification of each safety-related pump and valve are acceptable where each pump and valve is capable of performing its intended function under the full range of fluid flow, differential pressure, electrical conditions, and temperature conditions with debris-laden coolant fluids up to and including design-basis accident conditions. ASME Standard QME-1-2007 includes provisions for the functional design and qualification of active mechanical equipment in nuclear power plants. The NRC staff has accepted the use of ASME QME-1-2007 in Revision 3 to RG 1.100 with specific conditions.

   C. Acceptance criteria for the design of dynamic restraints are provided in SRP Section 3.9.3.

   D. Acceptance criteria for the design and installation of safety and relief valves are provided in SRP Section 3.9.3.

   E. Acceptance criteria for the seismic and dynamic qualification of mechanical and electrical equipment are provided in SRP Section 3.10.

   F. As required by GDC 14, safety-related valves that are part of the RCPB are acceptable where designed and tested such that these valves will not experience any abnormal leakage, or increase in leakage, from their loading, as addressed in SRP Section 3.10.

   G. As required by GDC 15, pumps, valves, and dynamic restraints associated with the reactor coolant system and associated auxiliary, control, and protection systems are acceptable where designed with sufficient margin to demonstrate that the design conditions are not exceeded.

   H. For plants with passive emergency cooling systems, the COL applicant is expected to address the functional design and qualification of RTNSS pumps, valves, and dynamic restraints consistent with the Commission policy in SECY-95-132. The public NRC memorandum dated July 24, 1995, provides a consolidated list of the approved policy and technical positions associated with RTNSS equipment in passive plant designs discussed in the applicable Commission papers, and their associated SRMs. For example, the designer should establish graded requirements for SSCs based on the importance to safety of their functional reliability and availability missions. The application of ASME QME-1-2007 as accepted in Revision 3 to RG 1.100 is one acceptable method for demonstrating the functional design and qualification of RTNSS pumps, valves, and dynamic restraints. An applicant may justify other methods to demonstrate the functional design and qualification of RTNSS pumps, valves, and dynamic restraints.

I. Pump and valve motors are acceptable where designed to tolerate anticipated frequency and voltage variations due to degraded electrical power supply line conditions.

J. The DC and COL applicants are expected to have available information related to the functional design and qualification provisions normally contained in the design and procurement specifications for pumps, valves, and dynamic restraints consistent with the application documentation. The applicants ~~need to~~should notify the NRC staff when this information is available for audit. The NRC staff will select a sample of pumps, valves, and dynamic restraints, and request that the applicant make the information normally contained in the design and procurement specifications for these pumps, valves, and dynamic restraints available for audit. The NRC staff may rely on the audit of the DC application information to help satisfy its audit of COL application information. The NRC staff will document its audit findings in an audit report that is made publicly available and reference the audit report in its safety evaluation for the DC and COL applications.

K. The applicant's plans for addressing flow-induced vibration are acceptable where potential adverse flow effects from flow-induced vibration on pumps, valves, and dynamic restraints within the scope of the IST program will be avoided. The applicant may include these plans as part of its preoperational tests specified in Section 14.2 of its FSAR.

L. Where technical assistance is provided to vendor or region inspections, the functional design and qualification of pumps, valves, and dynamic restraints are acceptable where the applicable regulatory requirements and DCD and FSAR provisions are satisfied.

M. Acceptance criteria for the design and qualification testing of pumps and valves due to post-LOCA generated debris are provided in SRP Section 6.2.2.

2. Inservice Testing Program

A. In its FSAR, the OL or COL applicant is expected to specify the edition and addenda of the ASME OM Code incorporated by reference in 10 CFR 50.55a proposed to be implemented in its IST program for the initial 10-year IST program interval. The applicant should specify the most recent edition and addenda of the ASME OM Code that has been incorporated by reference in 10 CFR 50.55a in recognition of the requirement in 10 CFR 50.55a(f) or 10 CFR 50.55a(g) that for the initial 10-year IST program interval, it must implement the most recent edition and addenda of the ASME OM Code incorporated by reference in 10 CFR 50.55a 12 months before issuance of the OL (for OL applicants) or 12 months before scheduled fuel load (for COL applicants).

B. For an OL application, the IST program is acceptable if it complies with the applicable edition and addenda of the ASME OM Code as incorporated by reference in 10 CFR 50.55a that is specified in the OL application.

C. For a COL application, the full description of the IST program for pumps, valves, and dynamic restraints provided by the applicant through reference to the DC application and the supplemental information specified in the applicant's FSAR is

acceptable if it complies with the applicable edition and addenda of the ASME OM Code incorporated by reference in 10 CFR 50.55a and Commission policy for new reactors. The staff will conduct inspections of the IST and MOV operational programs in preparation for startup of the COL plant.

D. For a DC application, the design is acceptable with respect to IST activities if it provides accessibility for the performance of IST activities in accordance with 10 CFR 50.55a. The description of the IST program for pumps, valves, and dynamic restraints provided by the DC applicant in its DCD is acceptable for reference by a COL applicant in its FSAR if it complies with the applicable edition and addenda of the ASME OM Code incorporated by reference in 10 CFR 50.55a and Commission policy for new reactors. The review of the IST and MOV programs are not completely reviewed and approved as part of the DC review, and they do not have finality as part of the DC review.

E. For passive new reactors, the COL applicant's description of the IST activities for pumps, valves, and dynamic restraints within the scope of the RTNSS program is acceptable if it is consistent with the Commission policy in SECY-95-132 as described in the public NRC memorandum dated July 24, 1995, on RTNSS equipment.

F. The applicant's plans for implementing the IST program are acceptable where they follow the guidance in NUREG-1482, Revision 2.

G. For COL applications, the schedule and implementation of the IST program for pumps, valves, and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic restraints), and MOV testing program are acceptable if they satisfy the requirements specified in 10 CFR 50.55a(f) and 10 CFR 50.55a(g), and applicable license conditions.

H. For COL applications, license conditions for implementation of preservice testing of pumps and valves, preservice examination and testing of dynamic restraints, and MOV testing, and for the overall operational program implementation schedule, are acceptable where they specify that:

i. Prior to initial fuel load, the licensee shall implement preservice testing of pumps and valves, preservice examination and testing of dynamic restraints, and MOV testing.

ii. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO, or the Director's designee, a schedule for implementation of the operational programs listed in FSAR Table XX.X, including the associated estimated date for initial loading of fuel. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until all the operational programs listed in FSAR Table XX.X have been fully implemented.

3. Inservice Testing Program for Pumps

A. The scope of the applicant's IST program for pumps is acceptable if it includes all safety-related pumps described in 10 CFR 50.55a(f) and the OM Code. The COL applicant for a passive new reactor ~~will also need to~~may address the IST activities for RTNSS pumps as part of its IST program or by other acceptable means.

B. The applicant's IST program for pumps is acceptable where the provisions of Subsection ISTB of the applicable OM Code (for pre-2000 plants) are satisfied, or the provisions of Subsection ISTF of the applicable OM Code (for post-2000 plants) are satisfied.

C. The pump test program is acceptable if it meets the requirements for establishing reference values and the periodic testing schedule described in Subsection ISTB-3000 (or ISTF-3000, as applicable) of the OM Code. Subsections ISTB-3000, ISTB-5000, and ISTB-6000 (or ISTF-3000, ISTF-5000, and ISTF-6000, as applicable) of the OM Code establish the allowable ranges of IST quantities (e.g., flow rates and pressure differential), corrective actions, and vibration tests. The pump test schedule is required to comply with these rules.

D. The frequency of ISTs and test parameters are acceptable if the provisions of Subsection ISTB-3000 (or ISTF-3000, as applicable) of the OM Code are met.

E. The methods of measurement are acceptable if the test program meets the requirements of Subsection ISTB-5000 (or ISTF-5000, as applicable) of the OM Code with regard to instruments, pressure measurements, rotational speed, vibration measurements, and flow measurements.

F. The instruments are acceptable if they meet the accuracy and range requirements of Subsection ISTB-3500 (or ISTF-3500, as applicable) of the OM Code.

G. The duration of the test is acceptable if the provisions of Subsection ISTB-5000 (or ISTF-5000, as applicable) of the OM Code are met.

H. The provisions for IST activities for RTNSS pumps specified by a COL applicant for a passive new reactor are acceptable if consistent with the Commission policy in SECY-95-132 as described in the public NRC memorandum dated July 24, 1995, on RTNSS equipment.

I. The applicant's table of pumps within the scope of the IST program in its FSAR (or referenced in the DC application with appropriate site-specific pumps) is acceptable where the pump IST table includes each pump identification number, pump description, pump type, ASME Code Class, ASME OM Code Group, and the test parameters and frequency, such as pump rotational speed, discharge and differential pressure, flowrate, and vibration, as applicable. The range and accuracy of the instruments used to measure pressure, flowrate, speed, vibration, and differential pressure ~~need~~are required to satisfy the requirements in Subsection ISTB or ISTF, as applicable, of the ASME OM Code as incorporated by reference in 10 CFR 50.55a, unless relief or an alternative is requested~~.~~ and authorized. In IST table notes for each applicable pump, the applicant should provide its justifications for IST frequencies extended to cold

shutdowns or refueling outages, and should reference applicable relief and alternative requests.

4. Inservice Testing Program for Valves

A. The scope of the IST program for valves is acceptable if it contains all safety-related valves required by 10 CFR 50.55a(f) and the OM Code. The COL applicant for a passive new reactor ~~will also need to~~may address the IST activities for RTNSS valves as part of its IST program or by other acceptable means.

B. The valve test procedures, acceptance criteria, and corrective actions are acceptable if the provisions of Subsection ISTC of the OM Code, as incorporated by reference in 10 CFR 50.55a, are met with regard to valve testing. For example, the application should address overall IST provisions, such as determination of reference values and prohibition of preconditioning, conducting preservice testing of each valve as near as practicable to IST conditions, conducting full stroke testing where practicable, and retesting following maintenance.

C. The applicant's table of valves within the scope of the IST program in its FSAR (or referenced in the DC application with appropriate site-specific valves) is acceptable where the valve IST table includes the valve identification number, description and valve function, valve type, valve actuator, ASME Code Class, ASME OM Code Category, Active or Passive Function, Safety Position, Required~~ ~~ Tests, and Test Frequency. The valve test parameters and frequencies specified in the IST table ~~need~~are required to satisfy the applicable requirements in Subsection ISTC of the ASME OM Code as incorporated by reference in 10 CFR 50.55a, unless relief or an alternative is requested~~.~~ and authorized. In IST table notes for each applicable valve, the applicant should provide its justifications for IST frequencies extended to cold shutdowns or refueling outages, and should reference applicable relief and alternative requests.

D. The provisions for IST activities for RTNSS valves specified by a COL applicant for a passive new plant are acceptable if consistent with the Commission policy in SECY-95-132 as described in the NRC public memorandum dated July 24, 1995, on RTNSS equipment.

E. The following provides additional acceptance criteria for specific valve or actuator types, and leak testing:

i. Inservice Testing Program for Motor-Operated Valves

(1) The applicant ~~needs to~~should describe its IST program attributes for meeting the IST provisions in the ASME OM Code for MOVs as incorporated by reference in 10 CFR 50.55a. In addition to the IST program requirements in the ASME OM Code, 10 CFR 50.55(b)(3)(ii) requires establishment of a program to ensure that the MOVs continue to be capable of performing their design-basis safety functions. The Joint Owners Group (JOG) MOV Periodic Verification Program established in response to

GL 96-05, “Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves,” as accepted in the NRC safety evaluation dated September 25, 2006, and NRC supplement to the safety evaluation dated September 18, 2008, may be used to address the potential degradation in operating thrust and torque requirements for the periodic verification of MOV design-basis capability. The actuator output capability was not addressed as part of the JOG program and, therefore, will ~~need to~~ be addressed separately ~~by the applicant~~.

ASME Code Cases OMN-1, “Alternative Rules for Preservice and Inservice Testing of Active Electric Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants,” and OMN-11, “Risk-Informed Testing for Motor-Operated Valves,” as accepted by the NRC staff with conditions in RG 1.192, provide an alternative method to MOV stroke-time testing that also satisfies the requirement in 10 CFR 50.55a to supplement the OM Code IST provisions with a program to ensure that MOVs continue to be capable of performing their design-basis safety functions.

When incorporated by reference in 10 CFR 50.55a, the 2009 Edition (and later editions) of the ASME OM Code will specify implementation of Appendix III, “Preservice and Inservice Testing of Active Electric Motor Operated Valve Assemblies in Light-Water Reactor Power Plants,” that will replace the quarterly stroke-time testing of MOVs with periodic exercising and verification testing. Where applicable, the NRC regulations will require the applicant ~~will need~~ to satisfy Appendix III to the ASME OM Code as incorporated by reference in 10 CFR 50.55a; this will also satisfy the periodic verification provision in 10 CFR 50.55a(b)(3)(ii).

(2) Periodic testing should be conducted that objectively demonstrates continuing MOV capability to perform its safety functions to open and close, as applicable, under design-basis conditions. Where testing is not conducted under design-basis conditions (e.g., under environmental conditions), an analysis combined with test results should demonstrate the continued design-basis capability of the MOV.

(3) The interval between testing demonstrating continued design-basis capability should not exceed 5 years or three refueling outages, whichever is longer, unless a longer interval can be justified. Longer design-basis verification intervals may be justified through implementation of ASME Code Case OMN-1, as accepted in RG 1.192 as incorporated by reference in 10 CFR 50.55a, or Appendix III to the ASME OM Code when incorporated by reference in 10 CFR 50.55a.

(4) Acceptance criteria for successful completion of MOV testing should include the following:

(a) Consistent with the safety function, the valve should fully open and/or the valve fully close or both. Test equipment should indicate hard seat contact.

(b) The testing should demonstrate adequate margin with respect to the design basis, including consideration of test equipment inaccuracies, degraded voltage, control switch repeatability, load sensitive MOV behavior, and margin for degradation.

(c) The maximum torque and/or thrust (as applicable) achieved by the MOV, allowing sufficient margin for test equipment inaccuracies and control switch repeatability, should not exceed the allowable structural and undervoltage motor capability limits for the individual parts of the MOV.

ii. Inservice Testing Program for Power-Operated Valves Other Than Motor-Operated Valves

(1) The applicant ~~needs to~~should describe its IST program attributes for meeting the IST provisions in the ASME OM Code for power-operated valves (POVs) other than MOVs as incorporated by reference in 10 CFR 50.55a.

(2) In addition to ASME OM Code provisions, NRC Regulatory Issue Summary (RIS) 2000-03, "Resolution of Generic Safety Issue 158: Performance of Safety-Related Power-Operated Valves Under Design Basis Conditions," provides guidance for the development of IST programs for POVs that incorporate the lessons learned from MOV analysis and tests in response to GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." With respect to AOVs, the following attributes meet the intent of RIS 2000-03:

(a) Setpoints for AOVs will be defined based on current vendor information or valve qualification testing, such that the valve is capable of performing its design-basis functions.

(b) Periodic static testing will be performed to identify potential degradation, unless those valves are periodically cycled during normal plant operation under conditions that meet or exceed the worst case operating conditions within the licensing basis of the plant for the valve, which would provide adequate periodic demonstration of AOV capability. If necessary based on valve qualification or operating experience, periodic dynamic testing will be performed to re-verify the capability of the valve to perform its safety functions.

(c) Sufficient testing will be used to collect relevant data (e.g., valve stem thrust and torque, fluid pressure and temperature, stroke time, operating and/or control air pressure, etc.) to verify the valve meets the functional requirements of the qualification specification.

(d) Test frequency will be specified and evaluated each refueling outage based on data trends as a result of testing. Frequency for periodic testing will be in accordance with the JOG AOV Program Document and the NRC staff comments on this program in an NRC staff letter dated October 8, 1999, from Eugene V. Imbro.

(e) Safety-related AOVs are assigned the highest category according to the JOG AOV program.

(f) Post-maintenance procedures will include appropriate instructions and criteria to demonstrate baseline testing is re-performed as necessary when maintenance on a valve, valve repair, or replacement has the potential to affect valve functional performance.

(g) Guidance is included to address lessons learned from other valve programs in procedures and training specific to the AOV program.

(h) Documentation from AOV testing, and maintenance records and records from the corrective action program, will be retained and periodically evaluated as part of the AOV program.

(3) With respect to POVs other than AOVs and MOVs, the attributes of the AOV testing program, to the extent that they apply to and can be implemented on those POVs (such as electro-hydraulic valves), are acceptable.

(4) Class 1E SOVs should be verified to function as designed. Each SOV should be verified, to the extent practical, to be capable of performing its safety functions for the electrical power supply amperage and voltage at design basis extremes.

iii. Inservice Testing Program for Check Valves

(1) The applicant ~~needs to~~should describe its IST program attributes for meeting the IST provisions in the ASME OM Code for check valves as incorporated by reference in 10 CFR 50.55a. For example, preservice tests should be conducted on each check valve. In addition, the ASME OM Code specifies that each check valve be tested in the open and closed direction, consistent with the safety function and under normal operating system conditions.

Piping system design features should be able to accommodate all applicable check valve testing equipment and procedures.

(a) Test equipment or nonintrusive techniques that monitor internal component conditions or measure such parameters as fluid flow, disk position, disk movement, disk impact forces, leak tightness, leak rates, degradation, and disk stability should be used, if practical, for preoperational testing and later during IST. The equipment and its operating principles should be described and the techniques justified. The operation and accuracy of the test equipment and techniques should be verified during preoperational testing.

(b) To the extent practical, testing should be performed under temperature and flow conditions that would exist during normal operation as well as cold shutdown. Testing at temperature and flow conditions that may exist in other modes should also be conducted if such conditions are significant.

(c) Test results should identify the minimum flow that will open the valve to the full-open position.

(d) Testing should include the effects of rapid pump starts and stops, as expected for system operating conditions. The testing should include any other reverse flow conditions that may occur during expected system operating conditions.

(2) Nonintrusive techniques should be used to periodically assess degradation and the performance characteristics of check valves.

(3) Acceptance criteria for the successful completion of the preservice and inservice testing of check valves should include the following:

(a) During all test modes that simulate expected system operating conditions, the valve disk should fully open or fully close as expected based on the direction of the differential pressure across the valve.

(b) Valve disk positions should be determinable without disassembly.

(a) Testing should verify that there is free disk movement to and from the seat.

(b) The valve disk should be stable in the open position under normal and other minimum system operating fluid flow conditions.

(c) For passive plant designs, testing should verify that the valve disk moves freely off the seat under normal and other minimum expected differential pressure conditions.

(4) In 10 CFR 50.55a(b)(3)(iv), the regulations specify conditions for the voluntary application of Appendix II, "Check Valve Condition Monitoring Program," to the OM Code. Those requirements must be satisfied when applying Appendix II to the OM Code.

iv. Pressure Isolation Valve Leak Testing

(1) Pressure isolation valves (PIVs) are the two normally closed valves, in series, within the RCPB (defined in 10 CFR Part 50) that isolate the reactor coolant system from an attached low-pressure system. PIVs are classified as A or A/C in accordance with the provisions of Subsection ISTC-1300 of the OM Code.

(2) PIV seat leakage rate tests should be conducted on each individual PIV in accordance with Subsection ISTC-3630 of the OM Code. The FSAR should specify the allowable leak rates and test intervals for each PIV. If leakage rates are not specified, the maximum allowable leak rate for each PIV at full reactor pressure should be less than 1.9 liters per minute (L/m) (0.5 gallons per minute (gpm)) per nominal inch of valve size, and not to exceed 19 L/m (5 gpm). The test interval should be 18 months or every refueling outage, whichever is longer.

v. Containment Isolation Valve Leak Testing

(1) ~~Containment~~The NRC regulations require that containment isolation valves (CIVs) ~~need to~~ be leak tested in accordance with Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to 10 CFR Part 50.

(2) The applicant's FSAR should provide a list of CIVs that includes the allowable leak rate for each valve or valve combination.

vi. Inservice Testing Program for Safety and Relief Valves

(1) Safety and relief valves, including thermal relief valves and vacuum relief valves, are pressure relief devices that protect systems (or portion of systems) that perform a function in shutting down the reactor to the safe-shutdown condition, maintaining the safe-shutdown condition, or mitigating the consequences of an accident.

(2) ~~Safety~~The NRC regulations in 10 CFR 50.55a require safety and relief valve tests ~~need~~ to be conducted in accordance with Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," to the OM Code.

(3) Stroke tests should be performed for dual-function safety and relief valves (e.g., boiling-water reactor main steam automatic depressurization system safety/relief valves).

(4) ~~Power~~The NRC regulations in 10 CFR 50.55a require power-operated~~ ~~ relief valves ~~need~~ to be tested in accordance with Subsection~~ ~~ ISTC-5100 for Category B valves and Subsection ISTC-5240 for Category C valves.

(5) The test equipment, including gages, transducers, load cells, and calibration standards, used to determine valve set-pressure is acceptable if the overall combined accuracy does not exceed ±1 percent of the indicated (measured) set pressure.

(6) The applicant's FSAR should provide a list of safety and relief valves that includes the set pressure and allowable tolerances for each valve.

vii. Inservice Testing Program for Manually Operated Valves

(1) The applicant's FSAR should provide a list of manually operated valves, including their safety-related function.

(2) In 10 CFR 50.55a(b)(3)(vi), the regulations take exception to the 5-year exercise interval for manually operated valves allowed in specific editions and addenda of the OM Code. In accordance with the regulations, manual valves must be exercised on a 2-year interval, provided that adverse conditions do not require more frequent testing.

(3) The valve should exhibit the full range of obturator position set forth in the design bases.

viii. Inservice Testing Program for Explosively Actuated Valves

(1) In some editions and addenda of the ASME OM Code prior to the 2012 Edition, Subsection ISTC-5260, "Explosively Actuated Valves," in the ASME OM Code specifies that at least 20 percent of the charges in explosively actuated (i.e., squib) valves shall be fired and replaced at least once every 2 years. If a charge fails to fire, the ASME OM Code states that all charges with the same batch number shall be removed, discarded, and replaced with charges from a different batch. When incorporated by reference in 10 CFR 50.55a, the 2012 Edition of the ASME OM Code will specify additional requirements for squib valves in post-2000 nuclear power plants, which are defined by ASME as plants receiving their construction permit or COL license on or after January 1, 2000.

(2) The applicant's FSAR should specify that industry and regulatory guidance will be considered in the development of the IST program for squib valves. The applicant's FSAR also should

state that the IST program for squib valves will incorporate lessons learned from the design and qualification process for these valves, such that surveillance activities provide reasonable assurance of the operational readiness of squib valves to perform their safety functions.

(3) Where the applicant has not specified in its FSAR the application of the 2012 Edition of the ASME OM Code, when incorporated by reference in 10 CFR 50.55a, a license condition should be included for preservice and inservice surveillance activities consistent with the license conditions for squib valves in the COLs for the Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3 nuclear power plants. For example, an acceptable squib valve license condition would be as follows:

Implement a surveillance program for explosively actuated valves (squib valves) that includes the following provisions in addition to the requirements specified in the edition of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code) as incorporated by reference in 10 CFR 50.55a.

(a) Preservice Testing

All explosively actuated valves shall be preservice tested by verifying the operational readiness of the actuation logic and associated electrical circuits for each explosively actuated valve with its pyrotechnic charge removed from the valve. This must include confirmation that sufficient electrical parameters (voltage, current, and resistance) are available at the explosively actuated valve from each circuit that is relied upon to actuate the valve. In addition, a sample of at least 20% of the pyrotechnic charges in all explosively actuated valves shall be tested in the valve or a qualified test fixture to confirm the capability of each sampled pyrotechnic charge to provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping. The sampling must select at least one explosively actuated valve from each redundant safety train. Corrective action shall be taken to resolve any deficiencies identified in the operational readiness of the actuation logic or associated electrical circuits, or the capability of a pyrotechnic charge. If a charge fails to fire or its capability is not confirmed, all charges with the same batch number shall be removed, discarded, and replaced with charges from a different batch number that has demonstrated successful 20% sampling of the charges.

(b) Operational Surveillance

Explosively actuated valves shall be subject to the following surveillance activities after commencing plant operation:

(i). At least once every 2 years, each explosively actuated valve shall undergo visual external examination and remote internal examination (including evaluation and removal of fluids or contaminants that may interfere with operation of the valve) to verify the operational readiness of the valve and its actuator. This examination shall also verify the appropriate position of the internal actuating mechanism and proper operation of remote position indicators. Corrective action shall be taken to resolve any deficiencies identified during the examination with post-maintenance testing conducted that satisfies the preservice testing requirements.

(ii). At least once every 10 years, each explosively actuated valve shall be disassembled for internal examination of the valve and actuator to verify the operational readiness of the valve assembly and the integrity of individual components and to remove any foreign material, fluid, or corrosion. The examination schedule shall provide for each valve design used for explosively actuated valves at the facility to be included among the explosively actuated valves to be disassembled and examined every 2 years. Corrective action shall be taken to resolve any deficiencies identified during the examination with post-maintenance testing conducted that satisfies the preservice testing requirements.

(iii). For explosively actuated valves selected for test sampling every 2 years in accordance with the ASME OM Code, the operational readiness of the actuation logic and associated electrical circuits shall be verified for each sampled explosively actuated valve following removal of its charge. This must include confirmation that sufficient electrical parameters (voltage, current, resistance) are available for each valve actuation circuit. Corrective action shall be taken to resolve any deficiencies identified in the actuation logic or associated electrical circuits.

(iv). For explosively actuated valves selected for test sampling every 2 years in accordance with the ASME OM Code, the sampling must select at least one explosively actuated valve from each redundant safety train. Each sampled pyrotechnic charge shall be tested in the valve or a qualified test fixture to confirm the capability of the charge to

provide the necessary motive force to operate the valve to perform its intended function without damage to the valve body or connected piping. Corrective action shall be taken to resolve any deficiencies identified in the capability of a pyrotechnic charge in accordance with the preservice testing requirements.

This license condition shall expire upon (1) incorporation of the above surveillance provisions for explosively actuated valves into the facility's inservice testing program, or (2) incorporation of inservice testing requirements for explosively actuated valves in new reactors (i.e., plants receiving a construction permit, or combined license for construction and operation, after January 1, 2000) specified in the 2012 Edition (or later) of the ASME OM Code as incorporated by reference in 10 CFR 50.55a, including any conditions imposed by the NRC, into the facility's inservice testing program.

5. Inservice Testing Program for Dynamic Restraints

A. The IST program for dynamic restraints is acceptable if it meets the requirements of the ASME BPV Code, Section XI, or the ASME OM Code as incorporated by reference in 10 CFR 50.55a. The IST program for dynamic restraints must comply with these provisions. The COL applicant for a passive new reactor ~~will also need to~~may address IST provisions for RTNSS dynamic restraints as part of its IST program or by other acceptable means.

B. In 10 CFR 50.55a(b)(3)(v), the regulations state that Article IWF-5000, "Inservice Inspection Requirements for Snubbers," of the ASME BPV Code, Section XI, must be used when performing inservice inspection examinations and tests of dynamic restraints at nuclear power plants, except as conditioned in two provisions in 10 CFR 50.55a(b)(3)(v)(A) and (B). The first provision indicates that licensees may use Subsection ISTD of the ASME OM Code, 1995 Edition through the latest edition and addenda incorporated by reference in 10 CFR 50.55a, in place of the requirements for dynamic restraints in the editions and addenda up to the 2005 Addenda of the ASME BPV code, Section XI, IWF-5200(a) and (b) and IWF-5300(a) and (b), by making appropriate changes to their technical specifications or licensee-controlled documents. This provision also indicates that preservice and inservice examinations must be performed using the VT-3 visual examination method described in IWA-2213. The second provision indicates that licensees must comply with the provisions for examining and testing dynamic restraints in Subsection ISTD of the ASME OM Code, and make appropriate changes to their technical specifications or licensee-controlled documents when using the 2006 Addenda and later editions and addenda of Section XI of the ASME BPV Code.

C. The FSAR should identify and tabulate all safety-related components that use dynamic restraints in their support systems. The tabulation should include the following information:

i. Identification of the systems and components in those systems that use dynamic restraints

ii. The number of dynamic restraints used in each system and on components in that system

iii. The type(s) of dynamic restraints (hydraulic or mechanical) and the corresponding supplier

iv. Specification of whether the dynamic restraint was ~~constructed~~constructed in accordance with the ASME BPV Code, Section III, Subsection NF

i. Statement on whether the dynamic restraint is used as a shock, vibration, or dual purpose dynamic restraint

ii. For dynamic restraints identified as either dual purpose or vibration arrestor type, an indication of whether both snubber and component were evaluated for fatigue strength; this evaluation is reviewed under SRP Section 3.9.3, Appendix A.

D. The applicant should provide assurance that all dynamic restraints are properly installed before preoperational piping vibration and plant startup tests. The applicant may use visual observation of piping systems and ~~measure-ment~~measurement of thermal movements during plant startup tests to verify that dynamic restraints are operable (not locked up). The piping preoperational vibration and plant startup test programs should discuss the provisions for such examinations and measurements as described in SRP Section 3.9.2.

E. The applicant should discuss accessibility ~~provisions~~provisions for maintenance, inservice inspection and testing, and possible repair or replacement of dynamic restraints consistent with the provisions of the applicable NRC standard technical specifications.

6. Relief Requests and Proposed Alternatives

A. Where an applicant requests relief from or an alternative to the provisions of the ASME OM Code, the applicant should identify the component identified for which it requests relief or a proposed alternative as follows:

i. Name and number as given in FSAR

ii. Component functions

iii. ASME BPV Code, Section III, Code Class

iv. Valve category as defined in Subsection ISTC-1300 of the OM Code

v. Pump type and group as defined in Subsection ISTB-2000 (or ISTF-2000, as applicable) of the OM Code.

B. The applicant should identify the ASME OM Code requirement(s) from which it is requesting relief or proposing an alternative.

C. For relief from the OM Code requirements, the applicant should specify the basis under which it is requesting relief and then explain why complying with the OM Code is impractical.

D. For alternatives to the OM Code requirements, the applicant should provide sufficient details to demonstrate that (1) the proposed alternative will provide an acceptable level of quality and safety, or (2) compliance with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

E. The applicant should specify a schedule for the implementation of the relief request or alternative.

F. The approval of relief requests or alternatives is discussed in Section I.6 of this SRP section. (see the discussion in Subsection I.6.F for new applicants).

7. ITAAC

For a DC application, the applicant must is required to establish ITAAC for the functional qualification of pumps, valves, and dynamic restraints; preoperational testing of pumps and valves; and installation of dynamic restraints. If NRC-approved standard ITAAC are available, these standard ITAAC should be used. The DC applicant should also prepare ITAAC that are appropriate for reactor-specific design features not addressed in the standard ITAAC.

For a COL application, operational programs (with the exception of EP) are not addressed in ITAAC if the program and its implementation are fully described in the application, as discussed in SECY-05-0197. The NRC staff will conduct inspections to verify that the operational programs have been established in accordance with the provisions in the COL application and any applicable license conditions.

8. COL Action Items

For a DC application, the applicant should specify a COL action item requiring the COL applicant to provide a full description of the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints.

For a COL application referencing a DC, the COL applicant should address the COL action items related to the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints as described in RG 1.206 and this SRP section, as applicable.

9. Operational Programs

For COL reviews, the NRC staff will review the description of the IST and MOV operational programprograms and proposed implementation milestones for the IST program for pumps, valves, and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic restraints), and MOV testing program need to verify that the program description and milestones satisfy 10 CFR 50.55a. The program milestones are typically specified in Table 13.4 of the applicant's FSAR. The implementation requirement and milestone for the specific programs specified below are acceptable:

A. Preservice testing of pumps and valves and preservice examination and testing of dynamic restraints

Milestone: Prior to initial fuel load.

Requirement: License Condition

B. Inservice testing of pumps and valves

Milestone: IST program will be fully implemented after first electrical generation by nuclear heat with appropriate portions of the program implemented as necessary to support the system operability requirements of the technical specifications.

Requirement: 10 CFR 50.55a(f) and ASME OM Code

C. Inservice examination and testing of dynamic restraints

Milestone: Prior to commercial service.

Requirement: 10 CFR 50.55a(g) and ASME BPV Code, Section XI, or ASME OM Code

D. MOV testing

Milestone: Prior to initial fuel load.

Requirement: License condition

Specific license conditions for the milestones for inservice testing of pumps and valves, and inservice examination and testing of dynamic restraints are not necessary because their implementation is mandated by 10 CFR 50.55a(f) and 10 CFR 50.55a(g), respectively.

10. Tier 2* Information

For a DC application, the applicant's FSAR (or DCD) should specify as Tier 2* information that the functional design and qualification of safety-related pumps, valves, and dynamic restraints shall be performed in accordance with ASME QME-1-2007 as accepted in RG 1.100 (Revision 3). The applicant may reference a more recent edition of ASME QME-1 that has been accepted in later revision of RG 1.100.

Technical Rationale

The technical rationale for application of this guidance and/or SRP acceptance criteria to the areas of review addressed by this SRP section is discussed in the following paragraphs:

1. 10 CFR 50.54(jj), 10 CFR 50.55(i) and GDC 1 require, in part, that SSCs (which include pumps, valves, and dynamic restraints) important to safety be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety functions to be performed. The provisions for functional design and IST programs for pumps, valves, and dynamic restraints in this SRP section are based on sound engineering principles as well as operating experience at nuclear power plants. Meeting the requirements of 10 CFR 50.54(jj), 10 CFR 50.55(i), and GDC 1 provides assurance that pumps, valves, and dynamic restraints important to safety are capable of performing their intended safety functions.

2. GDC 2 requires, in part, that components important to safety be designed to withstand the effects of severe natural phenomena, combined with appropriate effects of normal and accident conditions, without a loss of capability to perform their safety functions. Meeting the requirements of GDC 2 provides assurance that pumps, valves, and dynamic restraints important to safety are capable of withstanding the effects of severe natural phenomena while performing their safety functions during and after the occurrence of those phenomena, as applicable.

3. GDC 4 requires, in part, that components important to safety be designed to accommodate the effects of, and be compatible with, the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents. Meeting the requirements of GDC 4 provides assurance that the components are capable of withstanding those effects and continuing to perform their intended safety functions.

4. GDC 14 requires that the RCPB be designed, fabricated, erected, and tested to have an extremely low probability of abnormal leakage, rapidly propagating failure, and gross rupture. Meeting the requirements of GDC 14 provides assurance that RCPB components will have an extremely low probability of leakage or failure.

5. GDC 15 requires that the reactor coolant system and associated auxiliary, control, and protection systems be designed with sufficient margin to ensure that the design conditions of the RCPB are not exceeded during any condition of normal operation, including anticipated operational occurrences.

6. GDC 37 requires, in part, that the emergency core cooling system be designed to permit appropriate periodic pressure and functional testing to ensure the leak tight integrity of its components as well as the operability and performance of the active components of the system. The acceptance criteria in SRP Section 3.9.6 cite ISTs required by the OM Code as well as other preservice and inservice tests for pumps and valves to ensure their leak tight integrity and their operability and performance. This testing specifically applies to pumps and valves in the emergency core cooling system within the scope of the IST program, and is intended to meet the requirements of GDC 37. Meeting the requirements of GDC 37 provides assurance that Emergency Core Cooling System pumps and valves important to safety are capable of performing their intended safety function.

7. GDC 40 requires, in part, that the containment heat removal system be designed to permit appropriate periodic pressure and functional testing to ensure the leak tight integrity of its components as well as the operability and performance of the active components of the system. The acceptance criteria in SRP Section 3.9.6 cite ISTs required by the OM Code as well as other preservice and inservice tests for pumps and valves to ensure their leak tight integrity and their operability and performance. This testing specifically applies to pumps and valves in the containment heat removal system within the scope of the IST program, and is intended to meet the requirements of GDC 40. Meeting the requirements of GDC 40 provides assurance that containment heat removal system pumps and valves important to safety are capable of performing their intended safety function.

8. GDC 43 requires, in part, that the containment atmospheric cleanup system be designed to permit appropriate periodic pressure and functional testing to ensure the leak tight integrity of its components and the operability and performance of the active

components of the system, including pumps and valves. The acceptance criteria in SRP Section 3.9.6 cite ISTs required by the OM Code as well as other preservice and inservice tests for pumps and valves to ensure their leak tight integrity and their operability and performance. This testing specifically applies to pumps and valves in the containment atmospheric cleanup system within the scope of the IST program, and is intended to meet the requirements of GDC 43. Meeting the requirements of GDC 43 provides assurance that containment atmospheric cleanup system pumps and valves important to safety will perform their safety intended function.

9. GDC 46 requires, in part, that the cooling water system be designed to permit appropriate periodic pressure and functional testing to ensure the leak tight integrity of its components and the operability and performance of the active components of the system. The acceptance criteria in SRP Section 3.9.6 cite ISTs required by the OM Code as well as other preservice and inservice tests for pumps and valves to ensure their leak tight integrity and their operability and performance. This testing specifically applies to pumps and valves in the cooling water system within the scope of the IST program, and is intended to meet the requirements of GDC 46. Meeting the requirements of GDC 46 provides assurance that cooling water system pumps and valves important to safety are capable of performing their intended safety function.

10. GDC 54 requires, in part, that piping systems penetrating the primary reactor containment be provided with leak detection and isolation capabilities. Such piping systems should be designed with a capability to test the operability of the isolation valves and associated apparatus periodically to determine if valve leakage is within acceptable limits. The acceptance criteria in SRP Section 3.9.6 cite ISTs required by the OM Code as well as other preservice and inservice tests for valves to ensure their leak tight integrity and their operability and performance. This testing specifically applies to valves within the scope of the IST program in systems that penetrate the primary containment and is intended to meet the requirements of GDC 54. Meeting the requirements of GDC 54 provides assurance that valves in such systems are capable of performing their intended safety function.

11. Appendix B to 10 CFR Part 50 requires, in part, that applicants establish and execute an acceptable quality assurance program, including design, fabrication, construction, testing, and records control. Meeting the requirements of Appendix B to 10 CFR Part 50 provides assurance that designs, tests, IST programs and documentation for pumps, valves, and dynamic restraints will comply with established standards and criteria, thereby ensuring that such equipment will be capable of performing its intended safety functions.

12. 10 CFR 50.55a(f) for pumps and valves, and 10 CFR 50.55a(g) for dynamic restraints, require that such pumps, valves, and dynamic restraints whose function is required for safety be assessed for their operational readiness in accordance with the applicable revision of the OM Code, as described therein. In 10 CFR 50.55a(b)(3), the regulations take exception to, or supplement, the OM Code provisions for these components. Meeting the requirements of 10 CFR 50.55a(f) and 10 CFR 50.55a(g) and 10 CFR 50.55a(b)(3) provides assurance that such pumps, valves, and dynamic restraints are capable of performing their intended safety functions. The following regulations provide the applicable ASME Codes for IST programs for applicants:

a. The NRC regulations in 10 CFR 50.55a(f)(3) and 10 CFR 50.55a(g)(3) specify the design and accessibility requirements for performing inservice testing of pumps and valves, and inservice examination of dynamic restraints, respectively.

b. The NRC regulations in 10 CFR 50.55a(f)(4)(i) and 10 CFR 50.55a(g)(4)(i) specify that programs implemented for inservice testing of pumps and valves and inservice examination of dynamic restraints, respectively, during the initial 120-month interval must comply with the requirements in the latest edition and addenda of the OM Code or BPV Code, Section XI (as applicable) incorporated by reference in 10 CFR 50.55a on the date 12 months before the date of issuance of the operating license under 10 CFR Part 50, or 12 months before the date scheduled for initial loading of fuel for a COL (or the optional ASME Code Cases in RGs 1.147 or 1.192 that are incorporated by reference).

c. The NRC regulations in 10 CFR 50.55a(f)(4)(ii) and 10 CFR 50.55a(g)(4)(ii) specify that programs implemented for inservice testing of pumps and valves and inservice examination of dynamic restraints, respectively, during the successive 120-month intervals must comply with the requirements of the latest edition and addenda of the OM Code or BPV Code, Section XI (as applicable) incorporated by reference in 10 CFR 50.55a 12 months before the start of the 120-month interval (or the optional ASME Code Cases in RGs 1.147 or 1.192 that are incorporated by reference).

13. 10 CFR 52.47(b)(1) and 10 CFR 52.80(a) require that an applicant for a DC and COL, respectively, identify the inspections, tests, and analyses that the licensee shall perform under 10 CFR Part 52, and the acceptance criteria that, if met, are necessary and sufficient to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's rules and regulations.

14. 10 CFR 52.63(c) specifies that the Commission will require, before granting a construction permit, COL, OL, or manufacturing license which references a DC rule, that information normally contained in certain procurement specifications and construction and installation specifications be completed and available for audit if the information is necessary for the Commission to make its safety determinations, including the determination that the application is consistent with the certification information. The regulation indicates that this information may be acquired by appropriate arrangements with the DC applicant.

15. 10 CFR 52.79(a)(11) specifies that the COL applicant provide in its FSAR a description of the program(s), and their implementation, necessary to ensure that the systems and components meet the requirements of the ASME BPV Code and the ASME OM Code in accordance with 10 CFR 50.55a.

16. License conditions for operational program implementation milestones and for scheduling NRC operational program inspections will ensure that such programs, or portions thereof, are implemented ~~before they are needed~~in a timely manner and that the NRC will have an opportunity to inspect the programs before implementation.

III. REVIEW PROCEDURES

The reviewer will select material from the procedures described below, as may be appropriate for a particular case.

These review procedures are based on the identified SRP acceptance criteria. For deviations from these acceptance criteria, the staff should review the applicant's evaluation of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II.

The NRC provides additional guidance regarding the review procedures for IST programs for pumps ~~and~~, valves, and dynamic restraints (snubbers) in NUREG-1482, Revision 2.

1. Functional Design and Qualification of Pumps, Valves, and Dynamic Restraints

   A. The staff will review the functional design and qualification of pumps, valves, and dynamic restraints as described in the SRP Acceptance Criteria in Subsection II.1.

   B. The staff evaluates the program for the design and qualification of plant components for the test and analysis to be applied to confirm the extent to which the equipment meets the SRP provisions. As part of the OL or DC/COL review, the staff will conduct an audit of the applicant's information normally contained in design and procurement specifications to verify that the FSAR and DCD provisions, as applicable, have been incorporated into the specification information for the functional design and qualification of pumps, valves, and dynamic restraints.

   C. The staff will review the test procedures against the criteria set forth in this SRP section.

   D. The staff will review the analytical procedures employed by the applicant to demonstrate functionality, either in conjunction with testing or by themselves, by comparing information submitted in the applicant's program with the acceptance criteria delineated in this SRP section. The references cited in this SRP section provide additional guidance for demonstrating functionality by analysis and supplement the staff's review procedures.

   E. The staff will provide assistance for NRC inspections of the functional design and qualification of pumps, valves, and dynamic restraints as necessary. During those inspections, the staff should review the results of tests and analyses to accomplish the following:

      i. Ensure that the criteria in the certified design were properly implemented

      ii. Ensure that adequate design was demonstrated for pumps, valves, and dynamic restraints important to safety

      iii. Verify that the testing and analyses that were performed properly defined and accounted for all applicable loads.

   F. SRP Sections 3.9.3 and 3.10 provide additional review guidance for safety and relief valves and dynamic restraints.

F. The reviewer should give particular attention to flow-induced loading in functional design and qualification to account for degraded flow conditions such as those that might be encountered because of the presence of debris, impurities, and contaminants in the fluid system (e.g., containment sump pump recirculating water with debris). SRP Section 6.2.2 provides additional review guidance for addressing post-LOCA generated debris.

G. For passive new reactors, the staff will review the COL applicant's description of the functional design and qualification for pumps, valves, and dynamic restraints within the scope of the RTNSS program for conformance with the criteria stated in Subsection II.1.

H. The staff will review the applicant's provisions to address potential adverse effects of flow induced vibration on pumps, valves, and dynamic restraints as described in Subsection II.1.

2. Inservice Testing Program

A. For an OL application, the staff will review the IST program for conformance with the criteria stated in Subsection II.2.

B. For a COL application, the staff will review the full description of the IST program for pumps, valves, and dynamic restraints provided by the applicant through reference to the DC application and the supplemental information specified in the applicant's FSAR for conformance with the criteria stated in Subsection II.2.

C. For a DC application, the staff will verify that the DC application includes provisions to ensure that the design provides accessibility to perform IST activities. The staff will also review the description of the IST program for pumps, valves, and dynamic restraints provided by the applicant in its DCD for conformance with the criteria stated in Subsection II.2 to determine its acceptability for reference in a COL application.

D. For passive new reactors, the staff will review the COL applicant's description of the IST activities for pumps, valves, and dynamic restraints within the scope of the RTNSS program for conformance with the criteria stated in Subsection II.2.

E. The staff will review the applicant's plans to follow the guidance in NUREG-1482, Revision 2, for conformance with the criteria stated in Subsection II.2.

F. The staff will review the provisions for the schedule and implementation of the IST program for pumps, valves and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic restraints) and MOV testing program for conformance with the criteria stated in Subsection II.2.

G. For COL applications, the staff will review the proposed license conditions for (1) the implementation milestones for preservice testing of pumps and valves, preservice examination and testing of dynamic restraints, and MOV testing, and (2) the schedule for implementation of the IST program for pumps, valves, and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic

restraints) and MOV testing program for conformance with the criteria stated in Subsection II.2.

3. Inservice Testing Program for Pumps

A. The staff will review the scope of the applicant's pump IST program for conformance to the criteria stated in Subsection II.3. Initial reference values should be determined from the results of preservice testing or from the results of the first IST. The periodic IST program should be used to verify that any deviations from reference values are within acceptable ranges.

B. The pump test program should conform to the criteria stated in Subsection II.3.

C. The staff will review the pump IST table, including frequencies and test parameters, for conformance to the criteria stated in Subsection II.3.

D. The staff will review the test procedures described in the FSAR for conformance to the criteria stated in Subsection II.3. The staff will determine whether the FSAR ~~need only provide~~provides the necessary information to permit a conclusion that the methods of measurement and the data acquisition system will provide ~~the needed~~sufficient data.

E. The staff will review the accuracy and range of instruments for conformance to the criteria stated in Subsection II.3.

F. The staff will review the test durations for conformance to the criteria stated in Subsection II.3.

G. For passive new reactors, the staff will review the IST activities for RTNSS pumps specified by the COL applicant for conformance to the criteria stated in Subsection II.3.

4. Inservice Testing Program for Valves

A. The staff will review the scope of the applicant's valve IST program for conformance to the criteria stated in Subsection II.4.

B. The staff will review the valve test program for conformance to the criteria stated in Subsection II.4.

C. The staff will review the valve IST table, including parameters and frequencies, for conformance to the criteria stated in Subsection II.4.

D. For passive new reactors, the staff will review the IST activities for RTNSS valves specified by the COL applicant for conformance to the criteria stated in Subsection II.4.

E. The staff will review design and qualification tests, preservice and inservice tests, and acceptance criteria for MOVs, as described in Subsection II.4.E.i.

F. The staff will review design and qualification tests, preservice and inservice tests, and acceptance criteria for POVs, as described in Subsection II.4.E.ii.

G. The staff will review design and qualification tests, preservice and inservice testing, and acceptance criteria for check valves, as described in Subsection II.4.E.iii.

H. The staff will review the applicant's list of PIVs to ensure that it is complete and that the allowable leak rates for each PIV are in accordance with the guidance provided in Subsection II.4.E.iv.

I. The staff will review the applicant's list of CIVs to ensure that it is complete and that the allowable leak rates for each CIV are in accordance with the guidance provided in Subsection II.4.E.v.

J. The staff will review the safety/relief valve test program and corrective actions for conformance to the criteria stated in Subsection II.4.E.vi.

K. The staff will review the testing of manually operated valves for conformance to the criteria stated in Subsection II.4E.vii.

L. The staff will review the testing of explosively actuated (squib) valves and corrective actions for conformance to the criteria stated in Subsection II.4.E.viii.

5. Inservice Testing Program for Dynamic Restraints

A. The staff will review the IST program for dynamic restraints as described in Subsection II.5.

B. The staff will review and evaluate the applicant's provisions to develop and use a snubber operability assurance program containing the elements specified above.

C. A provision to provide the snubber classification and identification is sufficient for the construction permit review stage or DC application.

D. During the OL or COL review, the staff should ensure that the FSAR contains summaries in sufficient detail to confirm the provisions for the IST program for dynamic restraints.

E. For passive new reactors, the staff will review the IST activities for RTNSS dynamic restraints specified by the COL applicant for conformance to the criteria stated in Subsection II.5.

6. Relief and Alternative Requests

The staff will review requests for relief from or alternatives to the requirements of the ASME OM Code to determine whether the applicant has provided sufficient information and that the acceptance criteria of Subsection II.6 have been met. See the discussion in Subsection I.6.F for new applicants.

7. ITAAC, DC Requirements and Restrictions, and COL Applications Referencing Earlier NRC Approvals

For review of a DC application, the reviewer should follow the above procedures to verify that the design, including requirements and restrictions (e.g., interface requirements and site parameters), set forth in the FSAR meets the acceptance criteria. Some DCs have referred to the FSAR as the DCD.

For review of a COL application, the scope of the review is dependent on whether the COL applicant references a DC, an early site permit (ESP) or other NRC approvals (e.g., manufacturing license, site suitability report or topical report).

For review of both DC and COL applications, SRP Section 14.3 should be followed for the review of ITAAC. The staff will review the ITAAC for the functional qualification of pumps, valves, and dynamic restraints; preoperational testing of pumps and valves; and installation of dynamic restraints for conformance to the criteria stated in Subsection II.7.

8. COL Action Items

The staff will review the establishment of COL actions items by the DC applicant for the functional design, qualification and IST programs for pumps, valves, and dynamic restraints as described in Subsection II.8.

The staff will review the response to COL action items by the COL applicant for the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints as described in Subsection II.8.

9. Operational Programs

As described in Subsection II.9, the reviewer verifies that the IST program for pumps, valves, and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination and testing of dynamic restraints) and the MOV testing program are fully described and that implementation milestones have been identified. The reviewer verifies that the program and implementation milestones are included in FSAR Table 13.x and included as license conditions for preservice testing of pumps and valves, preservice examination and testing of dynamic restraints, and MOV testing. Specific license conditions for implementation milestones for inservice testing of pumps and valves and inservice examination and testing of dynamic restraints are not necessary in that their implementation is mandated by 10 CFR 50.55a(f) and 10 CFR 50.55a(g), respectively.

Implementation of this program will be inspected in accordance with NRC Inspection Manual Chapter IMC-2504, “Construction Inspection Program - Non-ITAAC Inspections.” Inspection Procedure 73758, “Part 52, Functional Design and Qualification, and Preservice and Inservice Testing Programs for Pumps, Valves and Dynamic Restraints,” provides guidance for the inspection of nuclear power plants licensed under 10 CFR Part 52.

The staff will review the discussion on the specific operational program and its implementation. The implementation description should contain one or more milestones depending on whether the program will be implemented all at once or in a phased approach. The staff will make a reasonable assurance finding on each program

and its proposed implementation, including the adequacy of the implementation milestones. The evaluation findings section of the staff's safety evaluation report will document these findings. In addition, the staff will identify this program and its implementation milestones within the license condition on operational programs and implementation described in SRP Section 13.4.

10. Tier 2* Information

As described in Subsection II.10 for a DC application, the DC applicant's FSAR (or DCD) should specify as Tier 2* information that the functional design and qualification of safety-related pumps, valves, and dynamic restraints shall be performed in accordance with ASME QME-1-2007 as accepted in RG 1.100 (Revision 3). The applicant may reference a more recent edition of ASME QME-1 that has been accepted in later revision of RG 1.100.

IV. EVALUATION FINDINGS

The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's safety evaluation report. The reviewer also states the bases for those conclusions.

For an OL application:

The NRC staff concludes that the OL applicant's program for functional design and qualification, and IST of pumps, valves, and dynamic restraints is acceptable and meets the requirements of 10 CFR 50.55a; GDC 1, 2, 4, 14, 15, 37, 40, 43, 46, and 54 of Appendix A to 10 CFR Part 50; and Appendix B to 10 CFR Part 50. This conclusion is based on the applicant having specified the design, qualification, and test program to ensure that safety-related pumps, valves, and dynamic restraints will be in a state of operational readiness to perform necessary safety functions throughout the life of the plant. This program includes design and qualification testing and analysis, baseline preservice or inservice testing, and periodic inservice testing. The program provides for functional testing of the components in the operating state. The applicant has also formulated the IST program to include all safety-related pumps, valves, and dynamic restraints.

For a COL application:

The NRC staff concludes that the COL applicant's description of its program for functional design and qualification, and IST programs for pumps, valves, and dynamic restraints is acceptable and meets the requirements of 10 CFR 50.55a; GDC 1, 2, 4, 14, 15, 37, 40, 43, 46, and 54 of Appendix A to 10 CFR Part 50; Appendix B to 10 CFR Part 50; and 10 CFR 52.79(a)(11) and 10 CFR 52.80(a). This conclusion is based on the applicant having provided a description of the design, qualification, and test program to ensure that pumps, valves, and dynamic restraints within the scope of the IST program will be in a state of operational readiness to perform necessary safety functions throughout the life of the plant. This program includes design and qualification testing and analysis, baseline preservice or inservice testing, and periodic inservice testing. The program provides for functional testing of the components in the operating state. The applicant has also formulated the IST program to include all pumps, valves, and dynamic restraints within the scope of the IST program. For a passive plant design, the applicant has provided an acceptable description of the functional design, qualification

and IST activities for pumps, valves, and dynamic restraints within the scope of the RTNSS program. The applicant has adequately addressed the COL Action Items specified in the DC application. The applicant has specified acceptable implementation milestones and requirements for the IST program for pumps, valves, and dynamic restraints (including preservice and inservice testing of pumps and valves, and preservice and inservice examination of dynamic restraints) and MOV testing program that satisfy 10 CFR 50.55a, and applicable license conditions. The NRC staff has established license conditions for the milestone requirements for the preservice testing of pumps and valves, preservice examination of dynamic restraints, and MOV testing, and a license condition for notifying the NRC of the IST program schedule to support NRC inspection activities. The staff has also established a license condition for preservice and inservice surveillance activities for squib valves [if the COL applicant has not specified the application of the 2012 Edition of the ASME OM Code when incorporated by reference in 10 CFR 50.55a]. The NRC staff will conduct an inspection of the IST and MOV operational programs to verify the development and implementation of the functional design and qualification, and IST programs for pumps, valves, and dynamic restraints prior to plant startup.

For a DC application:

The NRC staff concludes that the DC applicant's provisions for the functional design and qualification of pumps, valves, and dynamic restraints in its FSAR or DCD are acceptable in providing reasonable assurance of their design-basis capability. The DC applicant has demonstrated that the design provides accessibility for the performance of IST activities in accordance with 10 CFR 50.55a(f~~).~~) and 10 CFR 50.55a(g). The DC applicant has specified acceptable COL Action Items for the functional design, qualification, and IST programs for pumps, valves, and dynamic restraints. The staff also concludes that the DC applicant's description of its program for functional design and qualification, and IST programs for pumps, valves, and dynamic restraints is acceptable for incorporation by reference in an applicable COL application. The applicant has specified appropriate Tier 2* information for the functional design and qualification of pumps, valves, and dynamic restraints. The applicant has established acceptable ITAAC for the functional qualification of pumps, valves, and dynamic restraints; preoperational testing of pumps and valves; and installation of dynamic restraints in accordance with 10 CFR 52.47(b)(1). The COL applicant will be responsible for supplementing the provisions in the DC application for the functional design and qualification, and IST programs for pumps, valves, and dynamic restraints, as necessary, to satisfy the requirements of 10 CFR 50.55a; GDC 1, 2, 4, 14, 15, 37, 40, 43, 46, and 54 of Appendix A to 10 CFR Part 50; Appendix B to 10 CFR Part 50; and 10 CFR 52.79(a)(11) and 10 CFR 52.80(a).

V. IMPLEMENTATION

The NRC staff will use this SRP section in performing safety evaluations of DC applications and license applications submitted by applicants pursuant to 10 CFR Part 50 or 10 CFR Part 52. Except when the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the staff will use the method described herein to evaluate conformance with Commission regulations.

The provisions of this SRP section apply to reviews of applications submitted six months or more after the date of issuance of this SRP section, unless superseded by a later revision.

VI. REFERENCES

1. American Society of Mechanical Engineers (ASME), ASME *Boiler & Pressure Vessel Code*, as incorporated by reference in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, New York, NY.

2. American Society of Mechanical Engineers, ASME Standard QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," New York, NY.

3. American Society of Mechanical Engineers, Division 1, OM Code: Section IST, "ASME Operation and Maintenance of Nuclear Power Plants," New York, NY.

4. Joint Owners Group, "Joint Owners Group Air-Operated Valve Program (Revision 1, December 13, 2000), forwarded by letter from Nuclear Energy Institute, dated March 27, 2001, Agencywide Documents Access and Management System (ADAMS) Accession No. ML010950310.

5. Joint Owners Group, Tropical Report MPR-2524-A, "Joint Owners' Group Motor Operated Valve Periodic Verification Program Summary," December 11, 2006 (ADAMS Accession No. ML063470526) as accepted in the NRC safety evaluation, dated September 25, 2006 (ADAMS Accession No. ML061280315) and its supplement dated September 18, 2008, (ADAMS Accession No. ML082480638).

6. U.S. *Code of Federal Regulations,* "Domestic Licensing of Production and Utilization," Part 50, Chapter 1, Title 10, "Energy."

7. U.S. *Code of Federal Regulations*, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Part 52, Chapter 1, Title 10, "Energy."

8. U.S. Nuclear Regulatory Commission, "An Approach for Decisions on Plant-Specific Risk-Informed Decisionmaking: Inservice Testing," Regulatory Guide 1.175, August 1998, ADAMS Accession No. ML003740149.

9. U.S. Nuclear Regulatory Commission, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Regulatory Guide 1.174, Revision 2, May 2011, ADAMS Accession No. ML100910006.

10. U.S. Nuclear Regulatory Commission, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Regulatory Guide 1.206, ADAMS Accession No. ML070720184.

11. U.S. Nuclear Regulatory Commission, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Regulatory Guide 1.147, ADAMS Accession No. ML092330064.

12. U.S. Nuclear Regulatory Commission, "Operation and Maintenance Code Case Acceptability, ASME OM Code," Regulatory Guide 1.192, ADAMS Accession No. ML13340A034.

13. U.S. Nuclear Regulatory Commission, “Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems (RTNSS) in Passive Plant Designs (SECY-94-084),” SECY-95-132, ADAMS Accession No. ML003708005.

14. U.S. Nuclear Regulatory Commission, “Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs,” SECY-94-084, ADAMS Accession No. ML003708068.

15. U.S. Nuclear Regulatory Commission, “Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs,” SECY 93-087, July 21, 1993, ADAMS Accession No. ML003708021.

16. U.S. Nuclear Regulatory Commission, “Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria,” SECY-05-0197, ADAMS Accession No. ML052770225.

17. U.S. Nuclear Regulatory Commission, “Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants,” Regulatory Guide 1.100, Revision 3. ADAMS Accession No. ML091320468.

18. U.S. Nuclear Regulatory Commission, “Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident,” Regulatory Guide 1.82, Revision 4, March 2012, ADAMS Accession No. ML111330278.

19. U.S. Nuclear Regulatory Commission, Generic Letter 90-09, “Alternative Requirements for Snubber Visual Inspection Intervals and Corrective Actions,” December 11, 1990.

20. U.S. Nuclear Regulatory Commission, Generic Letter 89-10, “Safety-Related Motor-Operated Valve Testing and Surveillance,” June 1989.

21. U.S. Nuclear Regulatory Commission, Generic Letter 96-05, “Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves,” September 18, 1996.

22. U.S. Nuclear Regulatory Commission, Inspection Manual Chapter IMC-2504, “Construction Inspection Program - Non-ITAAC Inspections,” issued April 25, 2006.

23. U.S. Nuclear Regulatory Commission, Inspection Procedure IP 73758, “Part 52, Functional Design and Qualification, and Preservice and Inservice Testing Programs for Pumps, Valves and Dynamic Restraints.”

24. U.S. Nuclear Regulatory Commission, NUREG-1482, Revision 2, “Guidelines for Inservice Testing at Nuclear Power Plants,” October 2013.

25. U.S. Nuclear Regulatory Commission, Public Memorandum dated July 24, 1995, with a consolidated list of the approved policy and technical positions associated with RTNSS equipment in passive plant designs discussed in SECY-94-084 and SECY-95-132, and their associated Staff Requirements Memoranda (, ADAMS Accession No. ML003708048).

26. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary (RIS) 2000-03, "Resolution of Generic Safety Issue 158: Performance of Safety-Related Power-Operated Valves Under Design Basis Conditions."

27. U.S. Nuclear Regulatory Commission, RIS 2010-06, "Inservice Inspection and Testing Requirements of Dynamic Restraints (Snubbers)."

28. U.S. Nuclear Regulatory Commission, RIS 2012-08, "Developing Inservice Testing and Inservice Inspection Programs Under 10 CFR Part 52."

29. U.S. Nuclear Regulatory Commission, Staff Memorandum, Eugene V. Imbro to David J. Modeen, Nuclear Energy Institute, Comments on JOG AOV Program, October 8, 1999, ADAMS Accession No. ML020360077.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the Standard Review Plan are covered by the requirements of 10 CFR Part 50 and 10 CFR Part 52, and were approved by the Office of Management and Budget, approval ~~number~~numbers 3150-0011 and 3150-0151.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

~~Standard Review Plan~~ SRP Section 3.9.6
Description of Changes

Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints"

In addition to the changes itemized below, editorial changes were made throughout for clarity, consistency, and applicability. Changes incorporated into Revision 4 include:

I. AREAS OF REVIEW

- Changes made to clarify applicability to 10 CFR Part 52 applications
- References provided to Commission policy for new reactors, including Regulatory Treatment of Non-Safety Systems (RTNSS)
- Changes made to address NRC staff review of 10 CFR Part 52 combined license (COL) applications for full description of inservice testing (IST) program
- Reference included to RG 1.206 for COL application guidance
- Changes made to indicate NRC staff audit of design and procurement specifications for design certification and COL applications
- Changes made to indicate technical staff support for inspection activities, particularly for first of a kind equipment (such as new squib valve designs)
- Reference included to NUREG-1482 (Revision 2) for IST programs
- Changes made to reflect updated ASME OM Code IST provisions for new reactors
- Changes made to indicate NRC staff review of Tier 2* information related to functional design and qualification of safety-related pumps, valves, and dynamic restraints in 10 CFR Part 52 design certification applications
- Changes made to indicate license conditions related to IST and motor-operated valve (MOV) operational programs as part of COL application review

II. ACCEPTANCE CRITERIA

- Requirements included from 10 CFR 52.63(c) and 52.79(a)(11) related to design certification procurement specifications and COL application IST program descriptions, respectively
- References included to ASME Standard QME-1-2007 as accepted in RG 1.100 (~~Rev.~~Revision 3) for functional design and qualification of active mechanical equipment
- Criteria updated for review of IST programs for pumps, valves, and dynamic restraints to reflect operating and licensing experience

- COL license condition included for squib valve surveillance for new reactors with passive post-accident heat removal systems based on licensing experience
- Design Certification Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) included for functional qualification and preoperational testing of pumps and valves
- COL operational program schedule milestones included for preservice testing, inservice testing, and MOV testing
- Design Certification Tier 2* information specified for functional design and qualification of safety-related pumps, valves, and dynamic restraints

III. REVIEW PROCEDURES

- Review procedures updated to reflect operating and licensing experience
- Review procedures updated to reference revised acceptance criteria sections

IV. EVALUATION FINDINGS

- Template for evaluation findings updated to address 10 CFR Part 50 operating license applications, 10 CFR Part 52 COL applications, and 10 CFR Part 52 design certification applications

V. IMPLEMENTATION

- No significant changes

VI. REFERENCES

- References updated to include new or revised supporting documents since previous SRP revision