10 CFR 50.55a

102-07855-MDD/MSC
January 17, 2019

Palo Verde
Nuclear Generating Station
5871 S. Wintersburg Rd.
Tonopah, AZ 85354

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station Units 1, 2, and 3**
Renewed Operating License Nos. NPF-41, NPF-51, and NPF-74
Docket Nos. STN 50-528, STN 50-529 and STN 50-530
Fourth 10-Year Interval Pump and Valve Inservice Testing Program

Pursuant to 10 CFR 50.55a(f)(5)(i), the Inservice Testing (IST) Program for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3, was revised for the Fourth 10-Year Interval and submitted to the NRC staff by Arizona Public Service Company letter number 102-07658, dated March 30, 2018 (Agency Documents Access and Management System Accession number ML18093A335). The Fourth 10-Year IST Interval began on January 15, 2018, for each of the three PVNGS units.

This letter transmits the revised Pump and Valve Inservice Testing Program which reflects various Program updates and implementation of License Amendment 206, which removed the IST Program section from the PVNGS Technical Specifications. The pump and valve listings are not included in this submittal because they were not impacted by License Amendment 206.

No commitments are being made to the NRC by this letter. This submittal is for information and does not require NRC staff action.

If you have any questions about this request, please contact Matthew S. Cox, Licensing Section Leader, at (623) 393-5753.

Sincerely,

Michael D. DiLorenzo, Department Leader
Nuclear Regulatory Affairs - Licensing

MDD/MSC/mg

Enclosure: Pump and Valve Inservice Testing Program

cc: S. A. Morris — NRC Region IV Regional Administrator
S. P. Lingam — NRC NRR Project Manager for PVNGS
C. A. Peabody — NRC Senior Resident Inspector for PVNGS

Enclosure

Pump and Valve Inservice Testing Program

Pump and Valve Inservice Testing Program	73DP-9XI01	Revision 39

Procedure Preparer: Jessica Lane

Procedure Owner: Unit 9719 Program Eng

Procedure Usage Requirements		Sections
Information Use:	Refer To 01DP-0AP09, Procedure and Work Instruction Use and Adherence.	ALL

Approved by: Bolf, Boris B(Z99978)

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APPENDICES

1.0 PURPOSE AND SCOPE

1.1 Purpose

1.1.1 This procedure provides the requirements for assessing the operational readiness of pumps and valves with a specific function to bring the reactor from any operating mode to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequence of an accident.

1.1.2 The Pump and Valve Inservice Testing (IST) Program includes the following components which perform a specific function in shutting down the reactor to the safe shutdown condition of cold shutdown, maintaining the cold shutdown condition, or mitigating the consequences of an accident.

- American Society of Mechanical Engineers (ASME) Class 1, 2, and 3 pumps provided with an emergency power source;
- ASME Class 1, 2, and 3 valves;
- ASME Class 1, 2, and 3 pressure relief devices (PSV) protecting systems or portions of systems.

1.1.3 The program also includes components requiring IST by commitment and other components outside the above definitions at the discretion of Component Programs.

1.1.4 This procedure identifies the pump and valve tests performed to meet the requirements of 10CFR 50.55a, Codes and Standards, and the ASME/ANSI OM Code 2012 Edition.

1.1.5 This procedure supports the IST Program within the Component Program Area.

1.1.6 This procedure describes how the responsibilities are divided between the MOV Program and the IST program for ASME OM Code Mandatory Appendix III.

1.2 Scope

1.2.1 This procedure applies to the Fourth 10-Year IST Interval.

1.2.2 This program is applicable to Palo Verde Generating Station (PVGS) Units 1, 2, and 3. The pumps and valves within the scope of the program are identified in EP-Plus Component Tables.

2.0 RESPONSIBILITIES

2.1 Program Engineering Department Leader

2.1.1 Ensures resources are available for compliance with the programmatic aspects of Inservice Testing Program, 10CFR 50.55a(b), and 10CFR 50.55a(f).

2.2 Component Programs Section Leader

2.2.1 Reviews and approves all IST and MOV Program administrative procedures.

2.2.2 Informs the Program Engineering Department Leader about resource needs to ensure compliance with the ASME OM Code.

2.2.3 Ensures individuals competent in the application of the ASME OM Code are assigned the duties of IST Program Owner and MOV Program Owner.

2.2.4 Provides direct oversight of the IST Program as described herein and in 73DP-0AP05, Engineering Programs Management and Health Reporting.

2.3 IST Program Owner

2.3.1 The IST Program Owner is qualified to the Work Assignment (WA) and latest revision of the following standards:

- WA "ENG:IN SERVICE TESTING" including ESP02-XX-008, Inservice Testing
- WA "ENG:IST PUMPS" including ESP02-XX-009, IST Pumps
- WA "ENG:IST VALVES" including ESP02-XX-010, IST Valves

2.3.2 Interprets the ASME OM Code and Code Case requirements.

2.3.3 Maintains the Inservice Test documentation associated with program implementation, which includes timely changes of program information that resides within the EP-Plus database.

2.3.4 Ensures day-to-day functioning of the program and the program results, as described herein and in 73DP-0AP05.

2.3.5 Supports the following program goals:

- Safety
- Code Compliance
- Production
- Corrective Action Program Compliance
- Other Activities

2.3.6 Ensures that IST activities comply with 10CFR 50.55a, ASME OM Code, Technical Specifications, and other regulatory requirements.

2.3.7 Requests relief for exceptions to the ASME OM Code requirements per 10CFR 50.55a.

2.3.8 Places pumps on the increased test frequency described by ASME OM Code ISTB-6200, Corrective Action, when test results fall within the alert range.

2.3.9 Maintains programmatic interface with the respective industry organizations concerning IST program issues and operating experience.

2.3.10 Maintains the current state-of-the-art knowledge of IST engineering practices and issues.

2.3.11 Ensures periodic self-assessments and benchmarks are performed for the PVGS IST Program and participates in IST Program self-assessments at other plants.

2.3.12 Maintains the list of valves that are subject to the Cold Shutdown (CSD) testing and ensures compliance with CSD is maintained.

2.3.13 The primary responsibilities for the IST program owner with respect to ASME OM Code, MOVs and Mandatory Appendix III include:

A. Exercising MOVs per ISTC-3521, III-3610 and III-3620.

B. Leak Testing Category A Valve, that are NOT CIVs is per ISTC-3630 a. The Appendix J program engineer manages CIV testing per ISTC-3620, i.e. 10CFR50, Appendix J. The IST program credits performance of LLRT tests by the Appendix J program.

C. Valve Obturator Movement verification per ISTC-3530.

D. Obturator verification requirements per 10CFR50.55a(b)(3)(xi), except for gate valves and some butterfly valves, as described in Step 4.3.2.H.7.

E. Management of stroke time testing and Reference Values (stroke times) for Category A and B MOVs per ISTC-3300, ISTC-5111, ISTC-5113 and ISTC-5114, where applicable.

F. The remainder of the requirements of ASME OM Code Mandatory Appendix III are implemented by the MOV Program Owner per 73DP-9ZZ12, Motor Operated Valve (MOV) Program.

2.3.14 IST engineering personnel responsible for implementing non-MOV portions of OM Code Mandatory Appendix III and/or OM Code (exclusive of Mandatory Appendix III) are not required to be qualified to any MOV Work Assignment.

2.3.15 Ensures specified MOV post-maintenance testing requirements are completed.

2.3.16 MOV engineering personnel responsible for implementing OM Code Mandatory Appendix III are not required to be qualified to any IST Work Assignments.

2.4 IST Program Owner Qualified Support Personnel

NOTE

Individuals performing any of the following IST related activities are qualified to WA "ENG:IN SERVICE TESTING" including the latest revision of ESP02-XX-008, Inservice Testing.

2.4.1 Identifies, establishes, and provides oversight of IST training (coordinated with training department personnel).

2.4.2 Approves change notices in the EP-Plus database not associated with pump or valve test reference values. Changes initiated by an individual qualified to change the reference values are exempt from the limitation.

2.4.3 Interfaces with other station engineers to ensure appropriate IST design considerations are addressed in the design change processes.

2.4.4 Provides test data information to the system engineer to allow evaluation of component performance and trending.

NOTE

Individuals performing any of the following IST related activities are qualified to WA "ENG:IST PUMPS" including the latest revision of ESP02-XX-009, IST Pumps.

2.4.5 Reviews procedure changes to implementing IST pump procedures to ensure ASME OM Code compliance.

2.4.6 Trends pump performance to detect and monitor degradation.

2.4.7 Establishes or authorizes use of industry-accepted pump test methodologies for the IST program.

2.4.8 Provides oversight of pump testing and inspection activities associated with IST components.

2.4.9 Provides field and technical support for inservice testing, including response to abnormal and unacceptable performance data.

2.4.10 Determines and implements appropriate reference values, reference ranges or acceptance criteria for IST pump performance.

2.4.11 Reviews design change packages for pump program scope and testing impacts.

2.4.12 Establishes and verifies IST program pump scope including the identification of required tests.

2.4.13 Approves change notices in the EP-Plus database associated with pump testing.

2.4.14 Prepares and maintains the IST program documents for pump testing.

2.4.15 Provides technical direction on code compliance for pump testing.

2.4.16 Identifies any programmatic deficiencies for administrative control, maintenance practices, and applications relative to inservice pump testing, with assistance by other plant and corporate organizations.

NOTE

Individuals performing any of the IST related activities are qualified to WA "ENG:IST VALVES" including the latest revision of ESP02-XX-010, IST Valves.

2.4.17 Reviews procedure changes to implementing IST valve test procedures to ensure ASME OM Code compliance.

2.4.18 Trends valve performance to detect and monitor degradation.

2.4.19 Establishes or authorizes use of industry-accepted valve test methodologies for the IST program.

2.4.20 Provides oversight of valve testing and inspection activities.

2.4.21 Provides field and technical support for inservice testing, including response to abnormal or unacceptable performance data.

2.4.22 Determines and implements appropriate reference values, reference ranges or acceptance criteria for IST valve performance.

2.4.23 Reviews design change packages for valve program scope and testing impacts.

2.4.24 Establishes and verifies IST program valve scope including identification of required tests.

2.4.25 Approves change notices in the EP-Plus database associated with valve testing.

2.4.26 Prepares and maintains the IST program documents for valve testing.

2.4.27 Provides technical direction on code compliance for valve testing.

2.4.28 Identifies any programmatic deficiencies for administrative control, maintenance practices, and applications relative to inservice valve testing, with assistance by other plant and corporate organizations.

2.5 Component Programs Engineering Check Valve Program Owner

2.5.1 Determines schedules and outage scopes for check valve inspections and non-intrusive testing.

2.5.2 Ensures inspection and testing of check valves in the IST Program meet the applicable requirements of the ASME OM Code.

2.5.3 Performs certain ISTs (for example, check valve inspections for IST credit and non-intrusive testing).

2.6 Mechanical Component Engineering

2.6.1 Determines if a power operated valve is operating acceptably when stroke times are outside of the reference range.

2.6.2 Performs certain ISTs (for example, on-line Main Steam Safety Valve [MSSV] testing).

2.6.3 Performs certain ISTs by contractors (for example, off-line MSSV and pressurizer safety valve testing).

2.6.4 Troubleshoots components that are degraded or fail to meet acceptance criteria and develops corrective action plans.

2.7 Work Management

2.7.1 Tracks IST procedures to ensure the procedures do not exceed the required frequency.

2.8 Operations

2.8.1 Performs IST procedures (procedures that require manipulation of installed plant equipment).

2.8.2 Performs cold shutdown testing during mid-cycle outages.

2.9 Maintenance

2.9.1 Performs ISTs for pressure relief devices.

2.9.2 Identifies Post Maintenance Test requirements in work packages.

2.10 Predictive Maintenance

2.10.1 Performs certain ISTs (for example, check valve open and closure verification during local leak rate testing).

2.10.2 Measures vibration during pump ISTs.

2.11 Operation Standards

2.11.1 Writes and maintains IST procedures when Operations is the test leader.

2.11.2 Ensures IST procedure revision reviews are performed by an individual qualified to IST Program Standards when implementing changes to acceptance criteria, reference values/ranges, component test scope or test methodology.

2.12 Nuclear Regulatory Affairs

2.12.1 Processes relief requests and submits requests to the NRC for approval.

2.13 MOV Program Owner

2.13.1 The MOV Program Owner implements ASME OM Code Mandatory Appendix III and Code Case requirements with respect to MOVs.

2.13.2 The MOV Program Owner is responsible for Valve position indication for MOVs per ISTC-3700.

2.13.3 The MOV Program Owner is responsible for maintaining the MOV Inservice Test documentation associated with program implementation. This includes timely changes of program information that resides within the EP-Plus database and the Midas database.

2.13.4 The MOV Program Owner shall be qualified to WA "ENG: MOV PROGRAM OWNER" including ESP10-XX-003, MOV Program Owner

2.13.5 The MOV Program Owner is responsible for the day-to-day functioning of the program and the program results, as described in this procedure and 73DP-0AP05, Engineering Programs Management and Health Reporting.

2.13.6 Supports the following program goals, in order of importance:

- Safety
- Code Compliance
- Corrective Action Program Compliance
- Production
- Other Activities

2.13.7 Ensures that MOV activities comply with 10 CFR 50.55a, ASME OM Code, Technical Specifications and other regulatory requirements.

A. Obturator verification requirements for gate valves and some butterfly valves, per 10CFR50.55a(b)(3)(xi), are fulfilled by the MOV Program as described in Step 4.3.2.H.7 of this procedure and section 4.5.8 of 73DP-9ZZ12, Motor Operated Valve (MOV) Program.

2.13.8 Requesting relief for exceptions to the ASME OM Code requirements in accordance with 10 CFR 50.55a.

2.13.9 Maintain programmatic interface with the respective industry organizations concerning MOV program issues and operating experience.

2.13.10 Maintain the current state-of-the-art knowledge of MOV engineering practices and issues.

2.13.11 Ensures periodic self-assessments and benchmarks are performed for the PVGS MOV Program and participates in MOV Program self-assessments at other plants.

2.13.12 MOV engineering personnel responsible for implementing OM Code Mandatory Appendix III are not required to be qualified to any IST Work Assignments.

2.13.13 Reviews MOV test results and is responsible for MOV performance trending, maintenance of the MOV Trending Database and trends MOV performance and MOV failures per procedure 73DP-9ZZ19, Motor Operated Valve-Trending of Test Results (this review, in conjunction with the MOV Team Leader or Designee review of test results, meets the intent of Appendix III Section III-6000).

2.13.14 Maintains MOV databases, documentation and methodology current with industry standards.

2.13.15 Reviews design changes involving MOVs for impact on the MOV Program (including concurring with the evaluation and disposition of any identified deficiencies and proposed MOV modifications.

2.13.16 Maintains contact with interfacing groups, to include System Engineering, Mechanical Design Engineering, PRA Engineering, Component Optimization, Lubrication Engineering, EQ Engineering and Outage Management (includes maintaining cognizant of programmatic changes originated by specified departments which could affect the MOV program), Such as updated calculations and update MOV PRA risk ranking.

2.13.17 Specifies the periodic verification testing requirements of MOVs.

2.13.18 Concurs with the evaluation and disposition of any identified deficiencies and proposed MOV modifications.

2.13.19 Ensures MOV-related problems are properly evaluated and the appropriate corrective actions are implemented.

2.13.20 An engineer performing MOV Calculations for the MOVs identified in Appendix A must be qualified to WA "ENG: MOV PROGRAM OWNER" including ESP10-XX-003, MOV Program Owner, or WA "ENG: MOV CALCULATIONS" including ESP10-XX-004, MOV Calculations except as defined in 73DP-9ZZ13, Motor Operate Valve - Thrust and Torque Calculations.

2.13.21 An individual performing MOV diagnostic trace analysis, MOV Post-Test Evaluations (PTE) or MOV trending for the MOVs identified in Appendix A must be qualified to WA "ENG: MOV PROGRAM OWNER" including ESP10-XX-003 MOV Program Owner or WA "ENG: MOV POST TEST EVAL" including ESP10-XX-005, MOV PTE. Valves Service Maintenance personnel qualified to perform MOV diagnostic testing can import diagnostic test data into MIDAS/APSTEST software.

2.13.22 MOV engineering personnel responsible for implementing OM Code Mandatory Appendix III are not required to be qualified to any IST Work Assignments.

2.13.23 The MOV Engineer is responsible for documenting the results of MOV diagnostic tests.

3.0 DEFINITIONS

3.1 **Acceptance Criteria** — The criteria that must be met in order for a pump or valve to be considered Operable.

3.2 **Alert Range** — The range or value for a given pump parameter outside the normal operating range in which an increased testing frequency is specified. Also known as the Increased Frequency range.

3.3 **Augmented** — Components or tests included within the IST Program at the discretion of IST Engineering. Augmented components are generally tested per the Code to the extent practical; however, deviations from Code requirements do not require relief.

3.4 **Code** — ASME OM Code 2012 Edition, including ISTA (General Requirements), ISTB (Pumps); ISTC (Valves); Appendix I (PSVs); Appendix II (Check Valve Condition Monitoring); Appendix III (MOVs); Appendix V (Pump Periodic Verification Test).

3.5 **Cold Shutdown (CSD) Test** — A component test required to be performed on a cold shutdown frequency, including tests performed in Mode 4 or Mode 3.

3.6 **Essential Information** — The information within EP-Plus that reflects documentation required by the ASME OM Code.

3.7 **Instrument Loop** — Two or more instruments or components working together to provide a single output. (Not a separate suction or discharge pressure instrument.)

3.8 **Reference Range** — The range of stroke timing results which designates acceptable valve operation. Called Acceptance Criteria in the ASME OM Code.

3.9 **Reference Values** — One or more values of test parameters measured or determined when the equipment is known to be operating acceptably.

3.10 **Required Action Range** — The region outside the acceptance criteria defined by the limits of the Alert Range, in which the pump is considered inoperable until further action is taken.

3.11 **TP** — Technical Position

3.12 **Valve Categories** — Defined in ISTC-1300, Valve Categories, and documented in the Program. If the Program indicates that a valve falls under two categories, such as AC, the requirements of both categories apply.

3.13 **Valve Exercising** — The physical stroking of a valve to verify that the moving parts function satisfactorily.

3.14 **Valve Maintenance** — Replacement, repair or preventive maintenance on the valve or the valve's actuating system, which could affect performance parameters of the valve. Examples of valve maintenance include adjustment or replacement of stem packing; removal of the bonnet, stem or actuator; or disconnection of the air or electrical lines to the actuator.

4.0 INSTRUCTIONS

4.1 General

4.1.1 Palo Verde General Information Required per ISTA 9220(b) ⓘ

Table 1: Information for PVGS Unit 1

ISTA-9220(b) Requirement	Parameter
Date of document completion:	73DP-9XI01 Current Revision Effective Date to on EPCR (final page of procedure)
Name and address of Owner:	Arizona Public Service Company P.O. Box 52034 Phoenix, AZ 85072-2034
Name and address of plant:	Palo Verde Nuclear Generating Station 5801 S. Wintersburg Road Tonopah, AZ 85354
Name and number designation of the unit:	Palo Verde Nuclear Generating Station Unit 1
Commercial service date for the unit:	January 28, 1986

Table 2: Information for PVGS Unit 2

ISTA-9220(b) Requirement	Parameter
Date of document completion:	73DP-9XI01 Current Revision Effective Date to on EPCR (final page of procedure)
Name and address of Owner:	Arizona Public Service Company P.O. Box 52034 Phoenix, AZ 85072-2034
Name and address of plant:	Palo Verde Nuclear Generating Station 5801 S. Wintersburg Road Tonopah, AZ 85354
Name and number designation of the unit:	Palo Verde Nuclear Generating Station Unit 2
Commercial service date for the unit:	September 19, 1986

Table 3: Information for PVGS Unit 3

ISTA-9220(b) Requirement	Parameter
Date of document completion:	73DP-9XI01 Current Revision Effective Date to on EPCR (final page of procedure)
Name and address of Owner:	Arizona Public Service Company P.O. Box 52034 Phoenix, AZ 85072-2034
Name and address of plant:	Palo Verde Nuclear Generating Station 5801 S. Wintersburg Road Tonopah, AZ 85354
Name and number designation of the unit:	Palo Verde Nuclear Generating Station Unit 3
Commercial service date for the unit:	January 8, 1988

4.1.2 Applicability Timeline

A. The IST Program is applicable for a 120 month interval. The chronology for PVGS is listed below.

1. In 1995, PVGS changed the 120-month intervals for the Unit 1, 2, and 3 IST programs to establish concurrent intervals. The change revised the end dates of the initial 120-month intervals and the start dates of the second 120-month intervals of all three units to a common date of January 15, 1997. The original schedules were based on the commercial operation dates of the units. The change was made to provide greater consistency between units and to simplify the 120-month updates required by 10CFR 50.55a(f), Inservice testing requirements, (4)(ii). ⓘ

2. In 1997, the NRC granted a one (1)-Year Interval extension (to January 15, 1998) for all three (3) units.

   a) The first 120-month interval for Unit 1 began on 1/28/1986, the commercial operating date, and continued through 01/15/1998.

   b) The first 120-month interval for Unit 2 began on 9/19/1986, the commercial operating date, and continued through 01/15/1998.

   c) The first 120-month interval for Unit 3 began on 1/08/1988, the commercial operating date, and continued through 01/15/1998.

3. The second 120-month interval IST Program for all three units began on 01/15/1998 and continued through 01/14/2008.

4. The third 120-month interval IST Program for all three units began on 01/15/2008 and continued through 01/14/2018.

5. The fourth 120-month interval IST Program for all three units began on 01/15/2018 and ends on 01/14/2028.

4.1.3 Acceptance Criteria

A. For pumps, the Acceptance Criteria are the limits for which the pump is not in the Required Action Range defined by Tables ISTB-5121-1, Centrifugal Pump Test Acceptance Criteria, 5221-1, Vertical Line Shaft and Centrifugal Pumps Test Acceptance Criteria, 5321-1 Positive Displacement Pump (Except Reciprocating) Test Acceptance Criteria, or 5321-2, Reciprocating Positive Displacement Pump Test Acceptance Criteria, of the ASME OM Code.

B. For Power Operated Relief Valves refer to ISTC-5114, Stroke Test Acceptance Criteria.

C. For MOVs, refer to III-6100 Acceptance Criteria.

D. For pneumatic valves refer to ISTC-5132, Stroke Test Acceptance Criteria.

E. For hydraulic valves refer to ISTC-5142, Stroke Test Acceptance Criteria.

F. For solenoid valves refer to ISTC-5152, Stroke Test Acceptance Criteria.

4.1.4 Code Editions

A. During the fourth 120-month IST interval, the IST Program complies with the requirements of the ASME OM Code 2012, including: ⓘ

- ISTB (Pumps)
- ISTC (Valves)
- Appendix I (Pressure Safety Valves (PSVs))
- Appendix II (Check Valve Condition Monitoring)
- Appendix III (MOV)
- Appendix V (Periodic Pump Verification Test)

B. Newer editions or portions thereof may be used per 10CFR50.55a(f)(4)(iv)

C. The IST Program is in the process of implementing obturator verification (OV) testing as required by 10CFR50.55a(b)(3)(xi). Per EVAL 17-12369-001, OV testing must be fully implemented by Jan. 15, 2020. The evaluation describes the process for this work, which is driven by AI 17-12369-002.

4.1.5 Relief Requests and Code Cases

A. Testing shall be conducted per the ASME OM Code of Record. Where test requirements are determined to be impractical, relief may be implemented as allowed per 10CFR50.55a(f)(5)(iv). Alternative Requests and Relief Requests shall utilize the guidance in NUREG 1482 Rev.2 Section 2.5 to determine if the proposed testing for the request requires prior NRC approval prior to implementation of the proposed testing. ⓘ

B. The Program may implement Code Cases with NRC approval whether through Regulatory Guide 1.192, 10CFR50.55a, or where individually submitted by PVGS.

C. Refer to the Pump Relief Requests (PRRs), Cold Shutdown Justifications (CSJs) and Refueling Outage Justifications (ROJs), section for information on where relief has been requested in the PVGS IST Program.

4.1.6 Augmented Tests

A. Components included within the program, at the discretion of the IST Program Owner, are considered Augmented Components and shall be indicated as such in the component tables. The components shall be tested per the Code to the extent practical, however, deviations from Code requirements do not require relief.

4.1.7 Licensing/Design Bases and Code Overlap

A. Performance requirements for Program components may be identified in the Code, Technical Specifications, UFSAR, or other licensing/design bases. The most limiting requirements from the bases shall apply. Any deviation from the philosophy shall be documented on a CR, evaluation, action item, or action with evaluation concurrence by NRA.

B. Calculation documents, while providing bounding numbers, do not always provide numbers that account for instrument uncertainties. Development of surveillance test (ST) acceptance criteria that are limited by Technical Specifications, UFSAR or other licensing/design bases shall account for instrument uncertainties. ⓘ

4.1.8 Beyond Design Basis Events

A. Consistent with industry practice, components required solely to mitigate the consequences of 10CFR50 Appendix R fires and station blackout events are outside the scope of the IST Program since these events are beyond the facility design basis. Beyond design basis events are initiated by multiple (and sometimes complete) failures of safety-related components and systems. The facility design is based on requirement that each safety system be capable of performing its safety-related functions given a failure of the most limiting active component. Although regulations have been imposed that require the capability to cope with, or to mitigate these events, they are outside the scope of the facility accident analyses. Components whose sole safety functions are to mitigate these events are not required by regulations to be classified as safety-related.

4.1.9 Reference Values

A. The reference values (baselines) for pump and valve operating parameters are determined from pre-service testing or Inservice testing performed when the component is known to be operating acceptably. ⓘ

B. Reference values shall be reconfirmed or new reference values shall be established when a value or set of values may have been affected by repair or routine servicing of a pump or valve. At the discretion of Component Programs, minor deviation from existing reference values may be reconfirmed without formal documentation. The number of data points used in calculating reference values is at the discretion of the IST Program Owner. Recalculation of reference values after maintenance typically uses the first ST data. Three (3) ST points are typically used for routine recalculation of reference values. ⓘ

C. For pumps where the Group A and comprehensive tests are performed at the same reference flow point or same reference pressure point the following requirements apply. In certain circumstances, a preservice test per the requirements of ISTB-3100, Preservice Testing may be required when repair, replacement or maintenance on a pump could affect the hydraulic (flow/differential pressure) or mechanical (vibration) performance of the pump. In such cases, flow curve data shall be obtained per ISTB-5110, Preservice Testing (centrifugal pump tests, except vertical line shaft centrifugal pumps). ISTB-5210, Preservice Testing (vertical line shaft centrifugal pumps), or ISTB-5310, Preservice Testing (positive displacement pumps).

1. Results shall be evaluated by the IST Program Engineer with input from the Mechanical Component Engineer with pump expertise and the Predictive Maintenance Engineer with vibration analysis expertise.

2. Examples of work that could affect the hydraulic performance of the pump include but are not limited to:

   - Pump disassembly affecting rotating element
   - Uncoupling/coupling repair of vertical line shaft pump
   - Disassembly of positive displacement pump.

3. For pumps where the Group A / Group B tests are performed at a reference flow point which is unable to be achieved in the Comprehensive test (that is, "miniflow" test), the Group A or Group B test shall also be performed to ensure that test data (differential pressure and/or vibration data, if required) at all reference flow points is collected.

D. More than one set of reference values are permitted to allow a pump or valve to be tested under different plant conditions or equipment operating modes. The additional sets of reference values shall be determined per the Code and documented in the applicable STs. Refer to ISTB-3320, Establishment of Additional Set of Reference Values.

E. When establishing additional sets of reference values, the test shall be run first at the existing conditions, then at the new conditions. The results of both are analyzed to confirm operation is acceptable per ISTB-3320 and ISTC-3320, Establishment of Additional Set of Reference Values.

F. The preferred documentation method for reconfirming or establishing new reference values is with the test record that is completed following maintenance and contains the test results. At a minimum, the determination of pump and valve reference values shall be documented and archived as a Quality Assurance (QA) record or in the application of EP-Plus subject to QA control.

G. All new reference values shall be documented and approved in EP-Plus on the same date or prior to the procedure revision effective date to satisfy the requirements of ASME OM Code 2012 ISTA-9230, Inservice Test and Examination Results, ISTB-3310, Effect of Pump Replacement, Repair and Maintenance on Reference Values and ISTC-3310, Effects of Valve Repair, Replacement, or Maintenance on Reference Values.

1. New reference values implemented by the TAPA process should be documented in EP-Plus prior to TAPA final approval and shall be documented in EP-Plus within the next business week following TAPA issuance.

H. Reference Values, Alert / Reference Ranges, Required Action Ranges, correction factors, etc. may be rounded per standard mathematical practices.

I. Reference Values for pumps and valves, Alert Ranges for pumps, Reference Ranges for valves, and Required Action Ranges for pumps and valves (Acceptance Criteria) are documented in the implementing procedures. New values become effective upon approval of the evaluation, action item, Engineering Evaluation, other document archived as a QA record, or in the application of EP-Plus subject to QA control.

4.1.10 Cold Shutdown (CSD) and Refueling Interval Testing

A. In-Service tests which are impractical to perform during normal plant operation shall be performed on a cold shutdown frequency, and are referred to as CSD Tests. Tests requiring Mode 6 entry shall be performed on a Refueling Interval (outage) frequency and are referred to as Refueling Interval tests.

1. Refer to Appendix A - Determining When a Valve Exercise Test is "Not Practiable" (TP-07)

B. The basis for each test performed on a CSD frequency shall be documented by a Cold Shutdown Justification (CSJ) or Pump Relief Request (PRR). ⓘ

C. CSD Testing is required whenever the plant enters Cold Shutdown (Mode 5). CSD testing should start within 48 hours of reaching Mode 5. Testing need not be started within 48 hours if all CSD Tests will be performed prior to plant startup. All CSD Tests shall be performed during each refueling outage.

D. CSD Testing shall be performed at a rate that will result in every CSD Test being performed every 92 days. No CSD test is required to be performed more frequently than every 92 days.

E. During an extended period in Cold Shutdown, each CSD Test shall be performed every 92 days or the component shall be declared inoperable.

F. Component Programs shall maintain a log of tests performed during Cold Shutdowns. Component Programs shall ensure that CSD testing which is not completed during a cold shutdown will be performed during subsequent cold shutdowns to meet the specified testing requirements.

G. If the results from a Refueling Interval test are in the Alert (Increased Frequency) range, then perform one of the following:

1. Take corrective action and successfully re-perform testing, or

2. Increase the test frequency. Component Programs will not concur with ascension to higher plant Modes for Refueling Interface results in Alert range without Operations and Engineering Management direction.

4.1.11 Test Frequency ⓘ

A. The nominal Code test frequency is quarterly as discussed in Section 4.2 (Pumps) and Section 4.3 (Valves), unless more frequently required by other licensing/design bases. Code Case OMN-20 provides for extension of test intervals up to 25%, depending on test frequency. See step Step 4.10.4.A and Code Case OMN-20 for applicability to individual tests. Periodic ST performance is scheduled by Surveillance Program Control Group (SPCG) and coordinated by Unit Work Control.

B. The Maintenance discipline planners and the Operations Department are responsible for scheduling Conditional STs.

4.1.12 Instrumentation ⓘ

A. The following instrumentation requirements are mandatory for pump testing. Deviations from these requirements for pump testing require relief. The requirements, although not required by the Code, are strongly recommended for valve testing.

1. During quarterly pump testing the accuracy of pressure, differential pressure, flow rate, and speed instruments used for Inservice Testing shall be plus or minus two (2) percent of full scale or better. Accuracy of vibration amplitude instruments shall be plus or minus five (5) percent of full scale or better. During comprehensive pump testing, the accuracy requirement for pressure and differential pressure is one-half (1/2) percent or better. For a combination of instruments, the required accuracy is loop accuracy. ⓘ

2. For the purpose of determining Code compliance, instrument loop accuracies are calculated by taking the square root of the sum of the squares of the reference accuracies of each instrument or component in the loop. All uncertainties such as environmental effects (temperature, radiation, humidity), process effects (power supply, drift, static pressure) vibration effects (inservice, seismic), etc. do not have to be considered. Attributes as orifice plate tolerances, tap locations, or process temperatures need to be taken into account.

3. For the purpose of determining Technical Specification, UFSAR, or licensing/design bases compliance, instrument accuracies shall be taken into consideration as discussed in Step 4.1.9.

4. The full-scale range of each analog instrument shall be three (3) times the reference value or less. Digital instruments calibrated range shall be selected such that the reference value shall not exceed 90 percent of the calibrated range of the instrument. Pump suction and discharge pressures do not have individual reference values. ⓘ

   a) For these measurements when using analog instruments, the full scale range of the instrument shall be three (3) times the expected reading or less.

   b) For these measurements when using digital instruments, the calibrated range should be three (3) times the expected reading or less.

c) When this requirement cannot be met or improving the pressure measurement is desirable, the following requirement shall be imposed.

a. Pump Testing Requiring Two (2) Percent Accuracy Instrumentation

1) The combination of the selected instrument range and accuracy must be less than or equal to the combination of an instrument range equal to 3 times the expected reading with an instrument accuracy of +/-2 percent of the full scale instrument range (analog) or calibrated range (digital).

b. Pump Testing Requiring 0.5 Percent Accuracy Instrumentation

1) The combination of the selected instrument range and accuracy must be less than or equal to the combination of an instrument range equal to 3 times the expected reading with an instrument accuracy of +/-0.5% of the full scale instrument range (analog) or calibrated range (digital).

5. Pump suction and discharge pressures do not have individual reference values. For the measurements, the full scale range of the instrument shall be three (3) times the expected reading or less.

a) When setting the flow or differential pressure to a specific reference value during pump inservice testing, a tolerance band is acceptable. When setting flow +2/-1% is acceptable. When setting pressure or differential pressure +1/-2% is acceptable.

6. The frequency response range of the vibration measuring transducers and the readout system shall be from one-third minimum pump shaft rotational speed to at least 1000 Hz. (ISTB-3510(e), Frequency Response Range). Vibration measurements shall comply with the requirements of ISTB-3540, Vibration. See Relief Request PRR-06 for specific requirements applied to Charging Pumps 13MCHAP01, 13MCHBP01and 13MCHEP01.

7. Some STs specify Measuring & Test Equipment (M&TE) requirements which are more limiting than required by the Code to satisfy other licensing/design bases. If the specified M&TE is not available, then substitutions must be evaluated by a Qualified IST Engineer on a case-by-case basis to identify acceptable alternatives.

8. When pumps are found unacceptable and test deviations are greater than that allowed, then the instruments involved may be recalibrated and the test rerun. When the option is exercised, then the same instrumentation shall be used for both test performances. ⓘ

   a) If circumstances preclude the use of the same instrumentation, then an instrument of the exact same range and accuracy must be used to ensure consistent test results and accurate evaluations.

   b) Test procedures require that pumps be declared inoperable before allowing a post-calibration retest.

B. There are no requirements in the ASME OM Code that mandate specific accuracy requirements for Valve testing. Accuracy of instrumentation should be the identical for pump testing for similar tests.

4.1.13 Before using ERFDADS points for inservice testing, ensure the following: ⓘ

A. OCS has reviewed all procedure changes where the Emergency Response Facilities Data Acquisition and Display System (ERFDADS) use is affected.

B. ERFDADS points used for IST have periodic analog checks. Contact OCS for assistance.

C. Instrument loops that provide input to ERFDADS points used for IST have periodic calibrations performed.

   1. Contact I&C Maintenance Planning for assistance.

D. ERFDADS points used for IST are on the List of Out of Tolerance Equipment (LOOTE).

   1. Contact I&C Design Engineering for assistance.

E. The ERFDADS points used for IST are on the SWMS ST Task Instrument Lists for the applicable tasks.

4.1.14 Program Impacts from Plant Configuration Changes

A. Plant configuration changes that could impact the IST Program shall be reviewed and affected IST documents shall be updated per 81DP-0EE10, Design Change Process.

B. Examples of configuration changes that could impact the IST Program include (but are not limited to) valve replacements, valve operator modifications, pump modifications, and calculation revisions.

C. When a valve modification is identified that could impact a valve stroke time that is measured in the IST Program, then Component Programs shall initiate actions for the following: ⓘ

1. Initiate a restraining action assigned to the work group to add steps to the work order to obtain post-mod stroke time data, and provide the data to Component Programs. Work order steps shall instruct the performer to stroke time the valve using the method in the surveillance test procedure, and provide times to Component Programs Engineering to establish new reference values, or reconfirm old reference values, prior to performing official post-mod surveillance testing.

2. Initiate a restraining action assigned to Component Programs to evaluate post-modification stroke times, and establish new reference values, or reconfirm old reference values prior to performing official post-mod surveillance testing.

D. For changes made to an IST tested component that warrants a change to the Repetitive Task (RT) or Work Scope Library (WSL), the IST Program Owner shall notify Work Management Organization of the needed change via formal method, e-mail, or CR.

4.1.15 Operating Experience

A. IST Program Owner

1. Review industry Operating Experience per 65DP-0QQ01, Industry Operating Experience Review, and ensure that lessons learned from industry events are effectively incorporated into the PVGS IST Program.

2. Sources of Operating Experience relevant to the IST Program include the following:

   - High-tiered and low-tiered OE documents provided by the site OE coordinator per 65DP-0QQ01
   - INPO web site
   - INPO Nuclear Network
   - IST Owner's Group (ISTOG) web site forum and e-mails
   - Participation in benchmarking and self-assessments at other sites
   - ISTOG meetings, NRC/ASME Symposiums, and other industry activities
   - Industry peers
   - INPO Consolidated Events System (ICES)

4.2 Pumps

4.2.1 Pump Testing

A. The establishment of initial test conditions for inservice testing is necessary to ensure that test results are compared to the correct reference values and Alert and Required Action Ranges.

   1. If initial test conditions cannot be established, then the cause for the failure to establish initial test conditions shall be determined and corrected and the test shall be run once initial test conditions are established.

   2. If test is run at conditions other than conditions specified in the test procedure, then the test shall be declared invalid and shall not be used to reset the scheduled test frequency.

B. The Alert and Required Action ranges shall be calculated per Table ISTB-5121-1, Centrifugal Pump Test Acceptance Criteria, Table ISTB-5221-1, Vertical Line Shaft Centrifugal Pumps Test Acceptance Criteria, and Table ISTB-5321-2, Reciprocating Positive Displacement Pump Test Acceptance Criteria, except where the values are limited as discussed in Step 4.1.9.

C. Pumps with results within the Alert range remain operable. Pumps with results outside the Required Action range must be immediately declared inoperable until the cause of the deviation has been determined and the condition is corrected, or an analysis of the pump is performed and new reference values are established per ISTB-6200, Corrective Action (c), New Reference Values.

D. The Code requires doubling the test frequency for certain pump ST results within the Alert range, to allow more frequent observation of pump performance. The test frequency shall be increased from once Quarterly to once per six (6) weeks per ISTB-6200. Operations (typically the Shift Technical Advisor, STA) shall notify Component Programs upon determination of results within the Alert range.

1. Component Programs shall write a CR (if not previously initiated by the performance group) per 01DP-0AP12, Condition Reporting Process whenever a pump is placed on increased frequency testing or exhibits an abnormality or erratic action. The CR (or associated evaluations, action items, or actions) shall determine the corrective actions required (for example, disassembly, inspection, increased test frequency, etc.) or shall contain the analysis required to establish new reference values. ⓘ

2. For components tested only at cold shutdown or refueling outage frequencies, Component Programs shall ensure that the CR (or associated evaluations, action items, or actions) is dispositioned or the required corrective action is completed prior to leaving the applicable mode.

E. Component Programs

1. Maintain a log (such as the Condition Notification Report [CNR]) of all pumps on Increased Frequency testing.

   a) Each component shall be evaluated approximately monthly to determine if the component can be returned to the regular testing frequency or if new reference values are warranted. A minimum of three (3) successful performances should be documented prior to removing the component from increased frequency testing.

2. Formally notify Surveillance Program Control Group (SPCG) in a timely fashion of additions to or removals from the Increased Frequency list.

3. Since plant design will not always permit direct measurement of differential pressures, the differential pressures may be derived using the measured pump discharge pressure and the calculated or measured pump suction pressure. The derived differential pressure will be used as the basis for comparing pump performance from test to test, where applicable. Correction factors are typically added to or subtracted from derived differential pressures to compensate for differences between suction and discharge gauge elevations.

4. Pump suction pressure is not required to be measured if a differential pressure gauge is used for pressure measurements.

5. During inservice testing, after conditions are as stable as the system permits, the pump shall be run at least two (2) minutes before recording data. Some pumps may require longer stabilization as identified in the ST package. ⓘ

   a) During certain pump tests, such as the full flow Auxiliary Feedwater test for the turbine driven pump, throttle valve adjustment may be required to maintain flow at a stable value to compensate for changing system conditions.

6. The test parameters shown in Table ISTB-3000-1, Inservice Test Parameters, except for fixed values, shall be trended by the Code. The parameters will be trended for each component prior to the next test.

4.3 Valves

4.3.1 Valve Categorization ⓘ

A. Category A valves are those valves for which seat leakage is limited to a specific maximum amount in the closed position for fulfillment of their required function(s). The following guidance should be used to determine if a valve is Category A:

1. Valves that have a maximum allowable leakage rate (as opposed to simple closure or flow isolation function) should be assigned to Category A.

2. The categorization of a valve is not dependent solely on the function performed by the valve, such as whether or not it is a containment isolation valve. All applicable aspects should be taken into account. If any of the considerations below indicate that Category B or Category C may not be adequate, the valve should be assigned to Category A:

   - Whether the flow requirements for connected systems can be achieved with the maximum possible leakage through the valve
   - The effect of any reduced system flows resulting from the leakage on the performance of other systems and components
   - The consequences of fluid loss from the system
   - The effect of valve leakage on piping and components
   - The radiological exposure to plant personnel and the public caused by the leak

3. Although a leakage rate that would impact a safety function could be calculated for practically any valve, Category A is reserved for valves where verification of the disk being on the seat is not considered sufficient.

4. Containment Isolation Valves (CIVs) subject to Type C testing per 10 CFR 50 Appendix J are classified as Category A. These valves are listed in UFSAR Table 6.2.4-1.

5. Pressure Isolation Valves (PIVs) are classified as Category A. These valves are listed in CTS 3/4.4.5.2 and UFSAR section 3.9.6.2.

6. The following are generally NOT required to be Category A:

   - Vent, drain, and test valves located between CIVs
   - Valves with a closed safety function to prevent diversion of flow between trains of a system, but the leakage limit is based on total system requirements vs. individual valve requirements provided the potential concerns listed in item 2 have been evaluated.

4.3.2 Valve Testing

A. The establishment of initial test conditions for inservice testing is necessary to ensure that test results are compared to the correct reference values, Reference Ranges and Required Action Ranges.

1. If initial test conditions cannot be established, then the cause for the failure to establish initial test conditions shall be determined and corrected and the test shall be run once initial test conditions are established.

2. If test is run at conditions other than the conditions specified in the test procedure, then the test shall be declared invalid and shall not be used to reset the scheduled test frequency.

NOTE

Step 4.3.2.G provides Motor Operating Valve (MOV) requirements.

B. Valve Position Indication (VP) Testing ⓘ

1. All valves with remote position indicators (other than MOVs) shall be visually observed at least once every two (2) years to verify that remote indicators accurately reflect valve position. The purpose of VP testing is to verify that the remote position indication used during valve exercising accurately indicates valve operation. Per Appendix III, MOV remote position indication is verified as part of the periodic verification/diagnostic testing.

a) If the remote indication does not function properly during operation or testing, then the valve should be declared inoperable until troubleshooting determines whether the problem is due to failure of the valve to reposition or defective position indication.

b) If the position indication is defective, then the valve may be declared operable again based on the previous exercising surveillance until that interval expires. Normal indication should be restored in a timely fashion and VP testing should be completed prior to using or exercising the valve

c) If an exercise or stroke test must be performed and the normal position indication cannot be restored, then alternate means of verifying disk position (Safety Equipment Status System [SESS], ERFDADS, flow or pressure changes, etc.) may be used. A change to the ST procedure is usually required to use alternate position indication.

2. Some manual valves have reach rods with position indication and are considered local indication, and are not subject to VP testing.

NOTE

Step 4.3.2.H provides Motor Operating Valve (MOV) requirements.

C. Valve Exercising, Category A and B Valves ⓘ

1. All active power-operated valves categorized A or B in the IST Program shall be exercised (stroke timed) quarterly except as identified in this procedure.

2. As each valve is exercised, the applicable procedure shall require the following observations to be made and the results recorded.

   a) Valve stem or disk movement shall be established by observing an indicator which signals the change in valve position by either a direct observation of stem movement or indirect evidence, such as changes in system pressure, flow-rate, or temperature, which reflect stem or disk position (ISTC-3530, Valve Obturator Movement).

   b) In the case of power operated valves, the full-stroke time to the positions required to fulfill the safety functions shall be measured.

3. Exercising, stroke timing, and fail-safe testing only need to be performed in the valve's safety function direction.

4. Reference Range values are calculated per ISTC-5000, Specific Testing Requirements, except where the values are limited as discussed in Step 4.1.9.

5. Valves with stroke times outside the Reference Range but still within the Acceptance Criteria shall be immediately (as soon as practical based on plant conditions and Operations resources) retested or declared inoperable. The results of the retest shall be categorized as follows: ⓘ

   a) If the valve is retested and the second set of data falls within the Reference Range, then the valve is Operable. Analyze the cause of the initial deviation and document in the Surveillance Test (ST) Log. Operations shall initiate a CR per 01DP-0AP12 for evaluation by Mechanical Component Engineering.

b) If the valve is retested and the second set of data also falls outside the Reference Range but is within the Acceptance Criteria, then the data must be analyzed within 96 hours to verify that the new stroke time represents acceptable valve operation.

c) Operations shall initiate a CR for evaluation by Mechanical Component Engineering and shall also initiate a 96-hour Technical Specification Component Condition Record (TSCCR).

d) If the CR evaluation is not completed within 96 hours or the evaluation concludes that the new stroke time does not represent acceptable valve operation, then the valve shall be declared inoperable at that time.

6. Limiting Values of Stroke Time (Acceptance Criteria) are specified by the Owner per ISTC-5113, Valve Stroke Testing, ISTC-5131, Valve Stroke Testing (pneumatically operated valves), ISTC-5141, Valve Stroke Testing (hydraulically operated valves), ISTC-5151, Valve Stroke Testing (solenoid operated valves). MOV stroke timing is only required for valves with specific Technical Specification / Design Limits and will be performed at the same interval as the exercise test. The only criterion is the applicable Technical Specification / Design Limit. Valves with stroke times exceeding Acceptance Criteria shall be declared inoperable.

   a) Rapid-Acting Valves Power operated valves which would have reference values less than 2 seconds may be treated as "Rapid-Acting" valves. The Acceptance Criteria for Rapid-Acting valves is 2 seconds per OM Code ISTC-5114(c), ISTC-5132(c), ISTC-5142(c) and ISTC-5152(c). Since Rapid-Acting valve Acceptance Criteria are specified by the Code, values greater than 2.0 seconds cannot be used without regulatory approval. The margin between the normal stroke time and the 2 second Acceptance Criteria and the variability of previous stroke time test results should both be considered when deciding whether a valve should be treated as Rapid-Acting. In general, a valve should use the rapid acting criteria when the average stroke time is less than 1.3 seconds.

b) When power-operated valves new stroke time reference values are established the new reference values may be based on an average of multiple successful test performances on file in IST at the time (or multiple post maintenance stroke tests). Reference Ranges and Acceptance Criteria will be based on the reference values, as shown in Table 1. It may be possible to justify different Acceptance Criteria in certain cases. Acceptance Criteria for Rapid-Acting valves will be 2.0 seconds. New reference values, Reference Ranges, Acceptance Criteria, and determinations of "Rapid-Acting" will be documented in evaluations or other permanent plant documentation.

Operator Type	Reference Value (Vr)	Reference Range	Acceptance Criteria*
Non-MOV (AOV, SOV etc)	> 10sec	± 25% Vr	< 1.5 Vr
	< 10 sec	± 50% Vr	< 2 Vr

*Unless a more limiting criteria exists, or in certain cases where other criteria is justified

c) Refer to Appendix B - Clarifications to Valve Stroke Timing Requirements (TP-04)

D. Fail-Safe Testing ⓘ

1. Valves with fail-safe actuators shall be tested by observing the operation of the actuator upon loss of valve actuating power. PVGS normal operation of most valves has exactly the same effect as removing the power supply; that is, on a fail-shut valve, going to the shut position on the switch removes power from the solenoid valve which, in turn, either allows the spring to close the valve (SOVs) or allows air pressure to vent from the diaphragm thus stroking the valve to the fail-safe position (Air-Operated Valves [AOVs]). Unless identified in Surveillance Test (ST) on an individual basis, the valves need not be additionally fail-safe tested.

E. Valve Exercising, Category C (Check Valves) ⓘ

1. Valves listed in the IST Program as Category C shall be exercised (stroked) quarterly except as identified in this procedure. Each check valve exercise test shall include open and close tests. Open and close tests need only be performed at an interval when practical to perform both tests.

2. The necessary valve obturator (disc) movement shall be demonstrated by exercising the valve and observing that either the disc travels to the seat on cessation or reversal of flow, or opens to the position required to fulfill the function, or both. Observation may involve observing a direct indicator such as a position indicating device or by other indicators such as changes in system pressure, flow rate, level, temperature, seat leakage testing or other positive means.

   a) Full stroking open of check valves is typically satisfied by passing the maximum required licensing/design basis flow through the valve (Generic Letter [GL] 89-04 Position 2). Full stroking may also be satisfied by other means which verify full travel of the disc such as Non-Intrusive Testing (NIT) or disassembly and inspection. ⓘ

   b) Full stroking closed of check valves is typically satisfied by verification of essentially no flow. Closure testing may also be satisfied by Non-Intrusive Testing (NIT) or disassembly and inspection.

3. As an alternative to the traditional exercising requirements of paragraphs 4.3.3.1 and 4.3.3.2, certain check valves are included in 73DP-9XI05, Check Valve Condition Monitoring Program. The valves are identified in this procedure and 73DP-9XI05.

4. Check valves included in the Check Valve (CV) Check Valve Monitoring Program (CMP) shall have degradation monitoring attributes trended by Mandatory Appendix II, II-4000(a)(2), II-4000(b)(2) and II-6000(f).

F. Valve Leak Rate Testing (includes applicable MOVs) ⓘ

1. Containment Isolation Valves

   a) Containment Isolation Valves (CIV) are leakage rate tested under the PVGS Containment Leakage Rate Testing Program (CLRTP). CIVs which are also Reactor Coolant System (RCS) Pressure Isolation Valves (PIV) are additionally tested per the following step. ⓘ

2. Pressure Isolation Valves ⓘ

   a) Pressure Isolation Valves (PIVs) are leak rate tested per SR 3.4.15.1. The testing meets the intent of the Code because the testing includes maximum allowable leakage limits, corrective actions, tests PIVs individually, and adjusts the leakage to the function maximum pressure differential. Therefore, the testing meets IST requirements as stated in NUREG-1482, Guidelines for Inservice Testing at Nuclear Power Plants: Inservice Testing of Pumps and Valves and Inservice Examination and Testing of Dynamic Restraints (Snubbers) at Nuclear Power Plants.

3. Other Category A Valves

   a) Other Category A valves are leakage rate tested at least once every two (2) years per ISTC-3630, Leakage Rate for Other Than Containment Isolation Valves.

G. Category C Safety and Relief Valve Testing (PSVs) ⓘ

1. PSVs shall be tested per OM Code Appendix I except where licensing/design bases require more frequent testing.

2. Safety/relief valve testing is normally performed during refueling outages. Valves may be tested during power operation, but additional valves must be tested per the applicable code if as found set pressure acceptance criteria are not met. The codes do not specify a time interval for the additional tests, but performance within 90 days is expected.

   a) Refer to Appendix C - Periodic Testing and Test Frequency Scheduling for Pressure Relief Devices (TP-09)

3. As-found set pressure testing for IST Program credit is strongly recommended whenever testing or valve maintenance is required. No maintenance, adjustment, disassembly, or other activity which could affect the set pressure or seat tightness is permitted prior to as-found testing. If no as-found test is performed, IST Program credit may still be taken if the as-found test is assumed to have failed. In this case, additional valve testing may be required. ⓘ

4. In addition to testing to satisfy Code requirements, non-Code testing for other purposes is permissible. Non-Code tests do not need to meet code requirements. Non-Code tests are not credited for IST Program scheduling purposes. The potential for preconditioning should be evaluated when considering non-Code tests. ⓘ

H. IST Program MOVs shall be tested per the American Society of Mechanical Engineers (ASME) OM Code Mandatory Appendix III.

1. ASME OM Code Mandatory Appendix III requires the licensee to use a program of maintenance, diagnostic testing, and simplified valve exercising to assure the operational readiness of IST Program MOVs. At PVGS, the MOV program, set up to meet the requirements of NRC GL 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance is known as the GL 89-10 Program.

2. The PVGS GL 89-10 Program preventive maintenance and scheduled diagnostic tests are used to properly set up, maintain and periodically assess proper operation of IST MOVs which satisfies the requirements of ASME OM Code Mandatory Appendix III. MOV PM requirements are delineated in 73DP-9ZZ12, Motor Operated Valve (MOV) Program, Appendix F.

3. The ASME OM Code Mandatory Appendix III requires each MOV to be diagnostically tested at least once per 10 years based on operating history and engineering evaluation. PVGS testing, accomplished per the PVGS GL 89-10 Program, satisfies the requirement. Diagnostic testing intervals are delineated in 73DP-9ZZ12, Motor Operated Valve (MOV) Program, 73DP-9ZZ18, Motor Operated Valve-Post Test Evaluations and 73DP-9ZZ35, Aging Management of Motor-Operated Valves.

4. IST MOVs are to be exercised at least once per refueling cycle per ASME OM Code Mandatory Appendix III. MOV exercising shall involve a full stroke of the MOV from the Control Room. MOVs designed as High Safety Significance Components (HSSCs) are to be exercise tested every quarter whenever possible. The IST program performs MOV exercising per IST surveillance tests. The performance of the exercising is credited by the IST program.

5. Although stroke timed exercising is not an IST Program requirement for MOVs under ASME OM Code Mandatory Appendix III, stroke time exercising will remain in IST STs for MOVs that have specific Technical Specification / design stroke criteria, such as TS 3.3.5.4, which requires "Verify ESF Response Time is within limits." The IST stroke timed exercise test will be performed for these MOVs once per 18 Months to provide information for this TS requirement. Stroke time testing is performed per IST surveillance tests during an exercise test. Test results are reviewed by IST personnel and recorded in EP-Plus software.

6. MOV Program Interface

   a) The MOV Program Owner is responsible for documenting the results of MOV diagnostic tests per ASME Code Mandatory Appendix III.

   b) The IST Program Owner is responsible for ensuring that exercise testing is performed per ASME Code Mandatory Appendix III.

   c) Refer to procedure 73DP-9ZZ12, Motor Operated Valve (MOV) Program, for Appendix III implementation details.

7. For motor-operated gate valves and some motor-operated butterfly valves, the requirement of 10CFR50.55a(b)(3)(xi) to verify valve operation is accurately indicated by supplementing with other indications is fulfilled by MOV Program activities as described in 73DP-9ZZ12, Motor Operated Valve (MOV) Program, section 4.5.8. Butterfly valves for which MOV diagnostics are credited in meeting supplemental indication requirements are shown in Appendix D of procedure 73DP-9ZZ12.

   a) Diagnostic data is obtained and evaluated per procedure 73DP-9ZZ26, Motor Operated Valve (MOV) Testing with Quiklook. Data traces for gate valves, and some butterfly valves, show a characteristic peak indicative of valve unwedging, marked "o9" per the procedure. Steps 6.5.4 and 6.5.7 of 73DP-9ZZ26, Motor Operated Valve (MOV) Testing with Quiklook, direct MOV test technicians to review diagnostic traces for unusual thrust/torque behavior and changes in stroke time that could indicate damage to valve internals or stem/disc separation. The procedure directs initiation of a condition report when the data indicates separation may have occurred.

   b) MOV data trace reviews performed per 73DP-9ZZ26, Motor Operated Valve (MOV) Testing with Quiklook, satisfy the requirement in 10CFR50.55a(b)(3)(xi) by using supplemental information obtained via valve diagnostics to verify the stem-disc connection is intact.

I. Valve tests with trendable parameters should be trended prior to the next test to detect and monitor for degradation.

J. ASME OM Code requirements for rupture disks and the IST program's responsibilities for considering a replacement interval of less than 5 years.

   1. As-Found Equipment Condition codes provide the basis for the replacement interval. The codes should be reviewed after each rupture disk replacement.

2. The codes are captured in SWMS under the "Rel Trending" tab, under the "Closeout" tab for a work order.

3. Codes 5, 6 and 7 demonstrate adequate component condition for a five-year replacement interval. Codes 1, 2, 3 and 4 may suggest a need to shorten the replacement interval if a trend develops. Definitions for the codes are provided in Appendix F of 30DP-9MP01, Conduct of Maintenance.

4.4 Skid-Mounted Components

4.4.1 Skid-mounted components are included in the IST Program if they are classified as ASME Class 1, 2, or 3, and perform a required safety function.

4.4.2 It is permissible to test skid-mounted IST components by testing the major component, if the test of the major component adequately tests the function of the skid-mounted pumps or valves. Components tested in this manner are identified in the PV-Plus database.

4.4.3 Various pumps and valves were purchased as subassemblies of larger components. Examples of these "skid-mounted" components include certain diesel air-start subassemblies, diesel fuel oil pumps and valves, turbine steam admission and trip-throttle valves, and solenoid-operated air supply valves to AOVs. This term also applies to components that are not mounted on the skid, but function much the same as skid-mounted components, e.g. check valves in a cooling water system that provides cooling to a pump.

4.4.4 Refer to Appendix D - Skid Mounted Components (TP-06)

4.5 Surveillance Test Reviews

4.5.1 Acceptance Reviews shall be performed per 73DP-9ZZ14, Surveillance Testing.

4.5.2 MOV diagnostic test results shall be reviewed per the PVGS GL 89-10 Program. Test acceptance is based on the PVGS GL 89-10 Program parameter reviews.

4.6 Records

4.6.1 The completed working copies of the Surveillance Test Procedures and any applicable work orders shall constitute the permanent test record for pump and valve tests. Any additional documents, such as relief valve test reports, should be maintained with the above records, or filed separately in the same file as the Surveillance Test procedures. The documents shall be maintained as lifetime plant records per 84DP-0RM38, Document Management Control.

4.6.2 MOV records are developed per 73DP-9ZZ12, Motor Operated Valve (MOV) Program per ASME OM Code Mandatory Appendix III.

4.7 IST Program Upkeep

4.7.1 The Program shall be maintained by Component Programs. The program and any changes shall be technically reviewed within Component Programs, and approved by the Component Programs Section Leader.

4.7.2 The IST Program must implement a new version of the ASME OM Code every 120 months. Code edition selection is dictated by 10CFR50.55a(f)(4)(ii). The IST program must use the latest edition and addenda, as specified in 10CFR50.55a(a)(1)(iv) 12 months prior to the start of a 120-month interval.

4.7.3 The Pump and Valve Inservice Testing Program shall be reviewed at least every two years to incorporate all changes to the program since the last revision to the program.

4.7.4 Changes to the Pump and Valve Inservice Testing Program shall be implemented in the applicable surveillance test procedures as soon as plant conditions permit.

4.7.5 Substantial/major changes to IST procedures, as determined by the procedure owner per 01DP-0AP01, Procedure Process, shall be reviewed by affected disciplines or organizations.

4.7.6 Addition or deletion of components shall be documented by a CR, evaluation, action item, or action containing the necessary justification.

4.7.7 IST surveillance test procedure changes require a 10CFR 50.59 Applicability Determination to be performed and documented on the Procedure Change Record per 93DP-0LC07, 10CFR 50.59 and 72.48 Screenings and Evaluations Refer to CRDR 2796054 for additional guidance. The Applicability Determination will identify if a 10CFR 50.59 Screening is required. ⓘ

4.7.8 An updated copy of the Component Tables shall be provided to the NRC after substantive changes are made.

4.8 Post Maintenance Testing

4.8.1 An individual qualified to the latest revision of WA "ENG: IST PUMPS" including ESP02-XX-009 for pumps or WA "ENG: MOV IST VALVES" including ESP02-XX-010 for valves should be consulted for assistance in determining post maintenance testing requirements.

4.8.2 Before returning a repaired or replacement pump or valve to service, a test demonstrating satisfactory operation shall be performed.

4.8.3 Use Table 4, Pump Post Maintenance IST Guideline and Table 5, Valve Post Maintenance Inservice Test Guideline as a guideline for determining the minimum and recommended tests to satisfy the ASME OM Code requirements, but is not an all-inclusive list for determining post maintenance activities. Consult procedure 30DP-9WP04, Post Maintenance Testing Development or the appropriate Mechanical Component Engineer to determine additional post-maintenance test requirements.

4.8.4 When a pump or valve reference value, or sets of values, may have been affected by replacement, repair, or routine servicing, a new reference value, or set of values, shall be determined or the previous value reconfirmed by an IST. Consult Table 4, Pump Post Maintenance IST Guideline for pump or Table 5, Valve Post Maintenance Inservice Test Guideline for valve IST guidance following maintenance. ⓘ

A. The Inservice Testing Program maintains awareness of components' post-maintenance test performance via the CAP process. Implementing test procedures include steps directing Operators to write Condition Reports requesting post-maintenance reviews by the IST Program whenever an IST component receives maintenance. ⓘ

B. During refueling outages, IST Program personnel review implementing procedure surveillance test packages to ensure the adequacy of test data and identify any emergent program-implementation issues. These reviews are intended to enhance IST Program performance and are not intended to restrain the outage schedule. ⓘ

4.8.5 The IST procedure required actions for exceeding the reference value ranges are not applicable (NA) when an IST is conducted following maintenance.

A. Consult 01DP-0AP09, Procedure and Work Instruction Use and Adherence to mark steps associated with exceeding a reference range NA.

4.8.6 Pumps and valves that meet the acceptance criteria specified in test procedures are considered operationally ready to perform safety functions.

4.8.7 Pumps and valves that do not meet the acceptance criteria specified in test procedures require evaluation by a qualified IST Engineer in Component Programs. The evaluation will determine if the pump or valve can be considered operationally ready to perform the safety function using the criteria specified by the ASME OM Code. If the pump is not operationally ready, then issue a CR as needed.

4.8.8 If a pump or valve is determined to be operationally ready to perform the safety function and a change to the procedure reference value, range or acceptance criteria is needed, then initiate a CR to revise pump or valve acceptance criteria.

4.8.9 An individual qualified to WA "ENG: IST PUMPS" including ESP02-XX-009 for pumps or WA "ENG: IST VALVES" including ESP02-XX-010 for valves shall review post maintenance test results to establish new reference values OR reconfirm existing reference values. Any new reference values, reference ranges, alert ranges or acceptance criteria shall be entered into the IST Program database (EP-Plus).

4.8.10 Design basis values used to determine the operational limits for components subject to Inservice Testing shall not be exceeded. Test results within design basis limits are reviewed to verify component performance adequacy.

4.8.11 The IST review process for evaluating maintenance impact on Reference Values is:

- Determine maintenance performed on IST component.
- Determine if maintenance performed would have an effect on IST component's measured parameters.
- Compare IST component's performance prior to and post-maintenance to determine if existing reference values/set of values can be reconfirmed or if new reference values/set of values are required to be established.
- Document review of component's performance on a retrievable document (for example, Surveillance Test Work Order [STWO], evaluation, action item, Engineering Work Request [EWR] or in the application of EP-Plus subject to QA control).
- Update the reference value information in the application of EP-Plus subject to QA control.

Table 4: Pump Post Maintenance IST Guideline

Maintenance Activity	Flow Curve**	Comprehensive	Group A*
Centrifugal pump disassembly potentially affecting rotating element	Required	Minimum	
Centrifugal Pump Disassembly not affecting rotating element		Recommended	Minimum
Uncouple/Coupling repair			Minimum
Uncouple/Coupling repair of Vertical Line Shaft Pump	Required	Required	
Positive Displacement Pump Disassembly	Required		Minimum
Bearing Replacement		Minimum	
Packing Adjustment or Replacement			Minimum
Governor Speed Control Repair or Replacement		Recommended	Minimum
Turbine Valve Repair/Replacement			Minimum
Piping or Pipe Support Adjacent to Pump		Recommended	Minimum
Repair to Motor			Minimum
Replacement of Motor		Recommended	Required
*The ASME OM Code rules do not allow Group B tests to be used as a Post Maintenance Test. The test procedure must satisfy the ASME OM Code rules for the Group A or Comprehensive pump test. Comprehensive tests require more accurate instrumentation than Group A tests and are recommended to ensure the most accurate results.			
**Required for pumps where the Group A and Comprehensive tests are performed at the same reference flow point or same reference pressure point. For all other pumps, contact IST Program Owner.			

Table 5: Valve Post Maintenance Inservice Test Guideline

Maintenance Activities	Exercise or Cycle	Stroke Time	Fail Safe	Seat Leakage	VPI or PIT
OVERHAUL VALVE that is, lap seat, change plug, disc, diaphragm or cage (AOV or SOV)	X	X	X	Note 2	X
OVERHAUL VALVE that is, lap seat, change plug, disc, diaphragm or cage (MANUAL)	X			Note 2	X
Cleaning or Lubrication	X	X	X		
Packing Adjustment or Replacement (Manual)	X			Note 2	
Packing Adjustment or Replacement (AOV)	X	X	X	Note 2	
Limit Switch Manipulation	X	X	X		X
Actuator Diaphragm Removal	X	X	X		
Valve Diaphragm Removal	X	X	X	Note 2	X
Actuator Removal	X	X	X	Note 2	X
Bonnet Gasket Replacement	X	X	X	Note 2	X
Uncouple Valve and Actuator	X	X	X	Note 2	X
Adjust Stroke	X	X	X	Note 2	X
Remove or replace coil (SOV)	X	X	X		X
Spring Bench Adjust (AOV)	X	X	X	Note 2	X
Note 2 - Seat Leakage Testing is required only if a seat leakage requirement and test procedure is identified for the component in EP-Plus.					

4.8.12 Refer to Appendix E - Retest Requirements for Solenoid-Operated Valves (TP-01)

Table 6: Post Maintenance Testing for SOVs[1]

Maintenance Performed	Light Check[2]	OM Code Stroke Time Test	OM Code VPI Test[4]
Measure coil electrical characteristics without lifting leads	X		
Lifting and re-landing leads in the position indicating system	X		

Table 6: Post Maintenance Testing for SOVs[1] (Continued)

Maintenance Performed	Light Check[2]	OM Code Stroke Time Test	OM Code VPI Test[4]
Replace position-indicating switch (defective or PM)			X
Adjust position-indicating switch that is obviously mis-positioned			X
Lifting and re-landing lead(s) in the actuation system, such as the coil leads	X	(NOTE 5)	
Coil replacement	(NOTE 3)	X	X
Adjust position-indicating switch to correct faulty indication (if stroke test gauge is used to verify acceptable valve stroke length during maintenance).	X		
Adjust position-indicating switch to correct faulty indication (if stroke test gauge is not used to verify acceptable valve stroke length during maintenance)	(NOTE 3)	X	X
Repair or replacement of wetted parts (valve body, disk, seat, etc.)	(NOTE 3)	X	X

NOTES:

1. Certain valves may require other types of testing, such as leak rate testing of containment isolation valves.

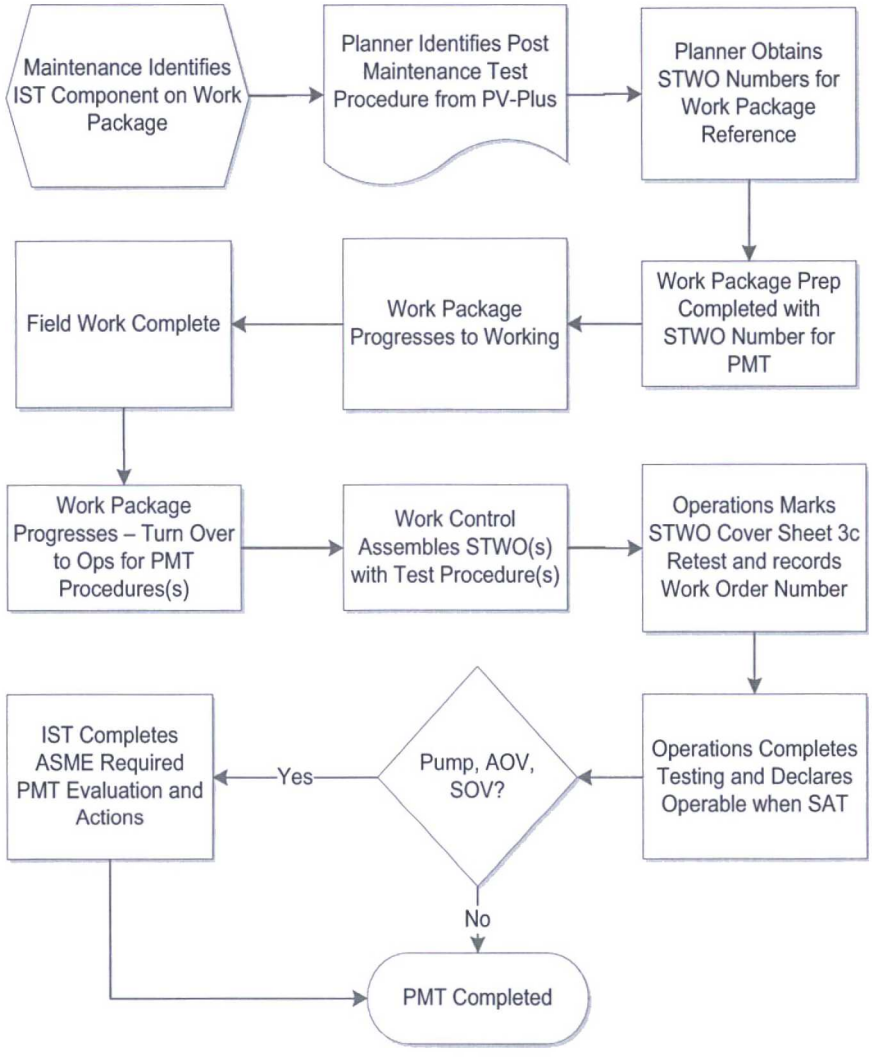
2. Observation that the proper position indicating light(s) are illuminated when the valve is actuated to the open and closed positions.

3. A Light Check is less rigorous than an OM Code VPI Verification. Therefore when an OM Code VPI Verification is performed, a separate Light Check is not required.

4. Verification that valve operation is accurately indicated, by observing that the proper position indicating light(s) are illuminated while the valve is verified to be open and closed. The valve position is verified by monitoring appropriate system parameters, by measuring the valve stroke length, or by other positive means.

5. Stroke time testing in the direction of movement on coil energization (if the valve receives a stroke time test in the 1ST Program).

FIGURE 1 - POST MAINTENANCE TEST DETERMINATION PROCESS



4.8.13 MOV post-maintenance test requirements are delineated in 73DP-9ZZ12, Motor Operated Valve (MOV) Program, Appendix G

4.9 Regulatory Basis

4.9.1 10CFR 50.55a, Codes and Standards, states requirements for IST of certain safety-related pumps and valves. The components are required to be tested according to the requirements of Operation and Maintenance of Nuclear Power Plants, ASME OM Code-2012 Edition. The testing is intended to assess operational readiness of components. The tests conducted during the initial and successive 120-month intervals are to be based on the requirements in the applicable edition and addenda of the Code, to the extent practical, within the limitations of design, geometry, and materials of construction, as described in 10CFR50.55a(f)(4).

4.9.2 10CFR50.55a(f)(4)(ii) requires that IST in each 120-month interval following the initial interval be conducted in compliance with the requirements of the latest edition and addenda of the Code incorporated by reference in 10CFR50.55a(b), in effect 12 months before the start of the interval. Pursuant to 10CFR50.55a(f)(4)(iv), IST may meet the requirements of subsequent editions and addenda incorporated by paragraph (b) or portions of a revised edition. When portions of a revised edition are used, all related requirements of the respective editions or addenda must be met and approval of the NRC obtained as clarified by NRC Regulatory Issue Summary 2004-12: Clarification on use of Later Editions and Addenda to the ASME OM Code and Section XI, dated 7/28/2004.

4.9.3 The NRC may authorize alternatives to Code testing requirements submitted as 10CFR50.55a requests, or submitted in a similar format that includes a description of the requirements, a description of the proposed alternative, and the justification for approval of the alternative. 10CFR50.55a(z)(1) allows the NRC to authorize alternatives if the proposed alternatives would provide an acceptable level of quality and safety. The NRC will normally approve an alternative pursuant to the provision only if the licensee proposes a method of testing that is an equivalent method, or an improvement, to the Code method, or if the testing will comply or is consistent with the later Code editions approved by NRC in 10CFR50.55a(a). Where plant design makes the testing of certain components complicated or impossible, an alternate method of testing is documented in a 10CFR50.55a request.

4.9.4 The PVGS Inservice Testing Program for Pumps and Valves was developed per the requirements of ASME OM Code-2012, (Subsections ISTA, ISTB, ISTC, Mandatory Appendices I, II, III and V).

4.9.5 The components were classified and categorized per the Code of Record with test requirements and intervals assigned accordingly. Technical Specification, UFSAR and other licensing commitments were referenced during the assignment of test intervals. Additional guidance for the development of the PVGS Inservice Testing Program was obtained from NUREG 1482, Guidelines for Inservice Testing at Nuclear Power Plants, Revision 2.

4.9.6 The 10CFR50 Appendix J Program for Primary Containment Testing at PVGS is in compliance with the requirements of Option B of 10CFR50 Appendix J, Regulatory Guide 1.163, September 1995, NEI 94-01 Revision 0, July 1995 and Station Technical Specifications.

4.9.7 The IST Program is submitted to the NRC for overall review and specific approval of associated 10CFR50.55a requests for the successive 120-month IST Program. The program documents submitted to the NRC are used to prepare for IST inspections and to review 10CFR50.55a requests.

4.9.8 Regarding periodic changes, NUREG 1482, Revision 2, Section 2.6, IST Program Documents, specifies that between a licensee's 10-year interval program submittal, the NRC would like to receive up-to-date program documents when the licensee makes significant changes to the IST program to facilitate regulatory activities. As long as the IST program is consistent with the regulations, ASME Code relief is not required. That is, deletions from or additions to the IST program do not necessarily require NRC approval. The burden is on each licensee to verify that the licensee's IST program is complete, includes all components that require IST, and that all such components are tested to the extent practical. If a licensee deletes a particular component from the licensee's IST program, then the staff recommends that the licensee should document the reason in an appropriate place.

4.9.9 The staff expects each licensee to maintain the IST program up-to-date and ensure that the IST remains consistent with changes in plant configuration. If a particular relief request is no longer required because of changes in hardware, system design, or new technology, the licensee is expected to revise the program to withdraw the relief request. Conversely, if a system modification results in the addition of a component to the IST program, the licensee should ensure that the modification meets the Code requirements or that a relief request is submitted for NRC review and approval.

4.9.10 The program plan document establishes the requirements which have been translated into implementing (surveillance) procedures for inservice testing and evaluation of Class 1, 2, and 3 pumps and valves. Additionally, using the guidance in NUREG 1482 certain other pumps and valves not required to be classified as Class 1, 2, and 3, but which perform a specific function required to bring the reactor from any operating mode to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident, are also included.

4.9.11 PVGS is licensed with a safe shutdown condition of Cold Shutdown.

4.9.12 The regulatory basis for MOVs is delineated in the PVGS Basis Document for 73DP-9ZZ12, Motor Operated Valve (MOV) Program.

4.10 OM Code Case Acceptability

4.10.1 ISTA-3130 Application of Code Cases

A. Code Cases to be used during a preservice or inservice test or examination shall be identified in the test plan.

B. Code Cases shall be applicable to the edition and addenda specified in the test plan.

C. Code Cases issued subsequent to filing the test plan may be proposed for use in amendments to the test plan.

D. Code Cases shall be in effect at the time the test plan is filed, except as provided in ISTA-3130(d).

4.10.2 NUREG 1482, Revision 2, Section 2.1.1, ASME Code Case Applicability

A. If a licensee would like to use an ASME Code Case with an Edition or Addendum of the ASME Code to which the ASME Code is not applicable, then the licensee has the following options:

1. Have the alternative to use the Code Case, beyond the stated applicability, authorized by the NRC pursuant to 10CFR50.55a(z), or

2. If the Code Case is applicable to an Edition or Addendum of the ASME Code later than the version of the Code being used by the licensee, then the licensee could update to the later version of the Code pursuant to 10CFR50.55a(f)(4)(iv) and then use the Code Case, provided the Code Case has been approved for use in the appropriate Regulatory Guide and incorporated by reference into 10CFR50.55a.

   a) Note that the later version of the ASME Code must also have been incorporated by reference into 10CFR50.55a the licensee must update all related requirements of the respective Edition or Addenda and the update must be specifically approved by the Commission.

B. The NRC may authorize the use of a Code Case that it has not yet been approved for use in RG 1.192 if a licensee requests the use of the code case under 10 CFR 50.55a(z). The NRC may authorize the use of such a Code Case until a future revision to RG 1.192 accepts the use of the ASME Code Case. At that time, if the licensee intends to continue implementing the Code Case, they must follow all the provisions of the Code Case with the conditions specified in RG 1.192, if any. The authorization for a specific licensee to use a Code Case that is not listed in RG 1.192 does not authorize any other licensee to use the Code Case without submittal by the subsequent licensee of a request to implement an alternative to the ASME OM Code requirements under 10 CFR 50.55a(z).

4.10.3 Regulatory Guide 1.192, Revision 1, Introduction and Discussion

A. Regulatory Guide 1.192 identifies the Code Cases that have been determined by the NRC to be acceptable alternatives to applicable parts of the OM Code.

B. The Code Cases may be used by licensees, without request to the NRC, provided the code cases are used with any identified limitations or modifications.

C. OM Code Cases not yet endorsed by the NRC may be used by a licensee or applicant through 10 CFR 50.55a(z)(1). That section permits the use of alternatives to the Code requirements referenced in 10 CFR 50.55a provided that the proposed alternatives result in an acceptable level of quality and safety and that their use is authorized by the Director of the Office of Nuclear Reactor Regulation.

D. Regulatory Guide 1.192, Appendix A lists the OM Code edition or addenda for each Code Case, with the date of approval by the ASME Board on Nuclear Codes and Standards. Appendix A is a numerical listing of the OM Code Cases.

E. Table 1, Acceptable OM Code Cases, in Regulatory Guide 1.192 lists the Code Cases that are acceptable to the NRC for implementation in the IST of light water cooled nuclear power plants.

F. Table 2, Conditionally Acceptable OM Code Cases, in Regulatory Guide 1.192 lists the Code Cases that are acceptable provided the Code Cases are used with the identified limitations or modifications, that is, the Code Case is generally acceptable but the NRC has determined that the alternative requirements must be supplemented in order to provide an acceptable level of quality and safety.

G. Table 2, Conditionally Acceptable OM Code Cases, in Regulatory Guide 1.192 lists the Code Cases that are acceptable provided the Code Cases are used with the identified limitations or modifications. These Code Cases are generally acceptable but the NRC has determined that the alternative requirements must be supplemented in order to provide an acceptable level of quality and safety.

H. With regard to the use of any Code Case, the user is responsible to make certain that the provisions of the Code Case do not conflict with regulatory requirements or licensee commitments.

4.10.4 Code Cases Selected for use at PVGS

A. PVGS adopts the rules specified in Code Case OMN-20 as it appears in ASME OM Code 2012 Edition. This code is permitted for use as described in 10 CFR 50.55a.

4.11 Program Development

4.11.1 The IST Program covers components in ASME Code Class systems and a limited number of Non-ASME Code Class systems. Components included in the IST Program are components with specific functions required to bring the reactor from any operating mode to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident. ⓘ

4.11.2 ASME Class 1, 2 and 3 piping and components are identified on the PVGS Piping and Instrument Diagrams (P&IDs). The P&IDs were reviewed to identify systems or portions of systems that are Code Class 1, 2, or 3. P&IDs containing Class 1, 2, or 3 plant pumps and valves or other pumps and valves with safety functions that require testing are identified in the Component Tables. Each Class 1, 2, and 3 component was reviewed to determine which require testing to satisfy the scope requirements of ASME OM Code-2012 Edition, Subsection ISTA, General Requirements, Article ISTA-1000, Introduction, Subarticle ISTA-1100, Scope.

4.11.3 After all systems or portions of systems containing pumps and valves within the scope of the IST Program were identified, the safety functions for each component were determined. The safety function of each component is identified and documented in a computerized database. The references used in the determinations are also recorded and include in the UFSAR, Technical Specifications, and other design basis documents. IST categories per ASME OM Code-2012 Edition. In cases where an interpretation of the ASME OM Code or applicable regulations was necessary, the interpretation was documented in a plant-specific Technical Position.

4.11.4 Where the testing of certain plant components is not possible during normal plant operation, an alternate testing schedule is documented in a Cold Shutdown Justification. Where the testing of certain plant components is not possible during a cold shutdown, an alternate testing schedule is documented in a Refueling Outage Justification. Where plant design makes the testing of certain components complicated or impossible, an alternate method of testing is documented in a 10CFR50.55a request.

4.11.5 Components failing to meet test requirements will be dispositioned by the Plant's Corrective Action Program. Specific responsibilities are defined in the Plant procedures.

4.12 Component Table Guidance

4.12.1 The IST Program is reflected by component tables for pumps and valves, including associated code deviations referred to as Cold Shutdown Justifications, Refueling Outage Justifications and 10CFR50.55a Requests.

4.12.2 For ease of table and program interpretation, this document contains the table notes, pump table legend, valve table legend, accompanying definitions, and associated abbreviations.

4.12.3 IST Program details and component tables describing test requirements and basis information are contained in the EP-Plus database. The database is accessible by typing “epplus” in web browser address bar.

4.13 EP-Plus Essential Information

4.13.1 Much of the information in EP-Plus can be credited towards meeting the documentation requirements described by the ASME OM Code. Keeping the information as up to date as possible is an important aspect of program implementation. Table 7, Control of Essential Information in EP-Plus is to be used as a guideline in keeping EP-Plus up to date.

4.13.2 Essential information in EP-Plus describes documentation required by the ASME OM Code. The items that reflect essential information in Table 7, Control of Essential Information in EP-Plus are designated with an exclamation point in the first column.

4.13.3 Failure to update essential information within the timeliness requirements shown in Table 7, Control of Essential Information in EP-Plus shall be considered a nonconformance in meeting ASME Records requirements. The time allowed starts when new or updated information becomes available in V:/Surveillance_Tests folder and Component Programs (Unit 9725) is notified of the new or updated information.

Table 7: Control of Essential Information in EP-Plus

Main Category	PV-Plus Field	Information Required	Required Timeliness of Updates to Information
!Plan Info!	Title/Revision	Interval and Revision (ISTA-9220)	Within 30 days
!Plan Info!	General Info	Program Purpose (ISTA-9220)	Within 30 days
Plan Info	General Info	Program Development	Within 30 days
Plan Info	General Info	Component Table Reference	Within 30 days
Plan Info	General Info	Program References	Within 30 days
Plan Info	Valve Information	No specific information	No Time Requirement
Plan Info	Pump Information	No specific information	No Time Requirement
!Plan Info!	Code Edition	Code of Record for Interval (ISTA-3110, Test and Examination Plans)	Within 30 days
Plan Info	Code Edition	Regulatory Basis	Within 30 days
Plan Info	Code Edition	ASME OM Code Acceptability	Within 30 days
System Info	System Code	Two Letter System Designator	Document reference only within 60 days
System Info	System Name	System Name	Document reference only within 60 days
System Info	Summary	System Purpose Summary	Document reference only within 60 days
!Valve Info!	Valve	Tag Number of Valve (ISTA-9230, Inservice Test and Examination Results)	Document reference only within 60 days
Valve Info	IST Tested	Checked if valve is in IST Program	Within 7 days
!Valve Info!	P&ID	Drawing # Valve Located On (ISTA-1500, Owner's Responsibilities)	Document reference only within 60 days
Valve Info	Coord	Coordinates where valve is on P&ID	Document reference only within 60 days

Table 7: Control of Essential Information in EP-Plus (Continued)

Main Category	PV-Plus Field	Information Required	Required Timeliness of Updates to Information
!Valve Info!	System	Valve located in which system (ISTA-1500)	Document reference only within 60 days
!Valve Info!	Manufacturer	Manufacturer of currently installed valve (ISTC-9100, Records)	Not used at PVGS - see SWMS Database
!Valve Info!	Model	Model of currently installed valve (ISTC-9100, Records)	Not used at PVGS - see SWMS Database
Valve Info	Description	Description of valve (from SWMS)	Document reference only within 60 days
Valve Info	Function	Whether valve is Active or Passive	Within 7 days
!Valve Info!	Code Class	ASME Code Class 1, 2 or 3 (ISTA-1500)	Within 7 days
!Valve Info!	Code Category	ASME Category A, B, or C (ISTC-9200, Test Plans)	Within 7 days
Valve Info	Actuator Type	Type of actuator for valve	Within 7 days
Valve Info	Normal Position	Open or Closed	Within 7 days
Valve Info	Safety Position	Position required of valve to fulfill the safety function	Within 7 days
Valve Info	Valve Group	Group valve is in	Within 7 days
Valve Info	Failure Mode	Code for typical failure mode	Within 7 days
Valve Info	Valve Type	Type of valve (that is gate, globe, etc.)	Document reference only within 60 days
Valve Info	Valve Size	Size of valve denoted in inches	Document reference only within 60 days
Valve Info	Augmented	Checked if valve is in IST program as an augmented component	Within 7 days
Valve Info	Exempt	Checked if valve is exempt	Within 7 days
Valve Info	CIV	Checked if valve is a Containment Isolation Valve	Within 7 days
Valve Info	PIV	Checked if valve is a Pressure Isolation Valve	Within 7 days
Valve Info	Schedule	Not used currently at PVGS	No Time Requirement
Valve Info	CS	Not used currently at PVGS	No Time Requirement

Table 7: Control of Essential Information in EP-Plus (Continued)

Main Category	PV-Plus Field	Information Required	Required Timeliness of Updates to Information
Valve Info	Code Dev	Lists code deviations for the valve based on Test Type, Frequency, Document Type, Document #, Approved, Approval Reference. Information for Function, Test Requirement, Basis, Alternate Testing, Acceptance Criteria are all currently found in 73DP-9XI01. The information should be stored in EP-Plus. References are populated with references for the current code deviation.	Within 7 days
Valve Info	Basis	Safety Function of the valve	Within 7 days
Valve Info	Basis	Description of valve not currently used at PVGS	No Time Requirement
Valve Info	Basis	References for basis for valve being in IST Program are maintained here	Within 7 days
Valve Info	IST Notes	Specific note regarding the valve (change notice controlled field)	Within 7 days
Valve Info	Notes	Non-controlled field	No Time Requirement
!Valve Info!	Test Type	Type of test valve receives (ISTA-3110, Test and Examination Plans)	Within 7 days
!Valve Info!	Freq	Frequency of associated test type for valve (ISTA-1500, Owner's Responsibilities)	Within 7 days
!Valve Info!	Procedure	Procedure in which valve is tested (ISTA-1500, Owner's Responsibilities)	Within 7 days
Valve Info	Comments	Comments related to the test type, frequency and procedure in which valve is tested	Within 7 days
!Valve Data!	Acceptance	Acceptance Criteria for valve test - includes Reference Ranges and Acceptance Criteria (ISTA-9230, Inservice Test and Examination Results)	Within 7 days
!Valve Data!	Test Data	Depending on test type various fields of data are required to be populated with information such as test date, work order number, test data and comments (ISTA-1500)	Within 7 days

Table 7: Control of Essential Information in EP-Plus (Continued)

Main Category	PV-Plus Field	Information Required	Required Timeliness of Updates to Information
!Pump Info!	Pump ID	Tag number of pump (ISTA-9230, Inservice Test and Examination Results)	Document reference only within 60 days
Pump Info	Tested Pumps	Checked if pump is in IST Program	Within 7 days
!Pump Info!	System Code	Pump located in which system (ISTA-1500, Owner's Responsibilities)	Document reference only within 60 days
!Pump Info!	P&ID	Drawing # pump located on (ISTA-1500, Owner's Responsibilities)	Document reference only within 60 days
Pump Info	Coord	Coordinates where pump is on P&ID	Document reference only within 60 days
!Pump Info!	Code Class	ASME Code Class 1, 2 or 3 (ISTA-1500, Owner's Responsibilities)	Within 7 days
Pump Info	Description	Description of pump (from SWMS)	Document reference only within 60 days
Pump Info	Pump Type	Type of pump	Document reference only within 60 days
!Pump Info!	Manufacturer	Manufacturer of currently installed pump (ISTB-9100, Pump Records)	Document reference only within 60 days
!Pump Info!	Model	Model of currently installed pump (ISTB-9100, Pump Records)	Document reference only within 60 days
!Pump Info!	Group	Group that pump is considered to be in (A or B) (ISTB-9200, Test Plans)	Within 7 days
Pump Info	Augmented	Checked if pump is in IST program as an augmented component	Within 7 days
Pump Info	Exempt	Checked if pump is exempt	Within 7 days
!Pump Info!	Test	Type of test pump receives (ISTA-3110, Test and Examination Plans)	Within 7 days
!Pump Info!	Freq	Frequency of associated test type for pump (ISTA-1500, Owner's Responsibilities)	Within 7 days
!Pump Info!	Procedure	Procedure in which pump is tested (ISTA-1500, Owner's Responsibilities)	Within 7 days
Pump Info	DP	Checked if Differential Pressure is a measured parameter for IST	Within 7 days
Pump Info	Fixed	Checked if Fixed resistance is a measured parameter for IST	Within 7 days

Table 7: Control of Essential Information in EP-Plus (Continued)

Main Category	PV-Plus Field	Information Required	Required Timeliness of Updates to Information
Pump Info	Flow	Checked if Flow is a measured parameter for IST	Within 7 days
Pump Info	Flow Min	Checked if Minimum Flow is a measured parameter for IST	Within 7 days
Pump Info	Flow Full	Checked if Full Flow is a measured parameter for IST	Within 7 days
Pump Info	Dsch	Checked if Discharge Pressure is a measured parameter for IST	Within 7 days
Pump Info	RPM	Checked if RPM (speed) is a measured parameter for IST	Within 7 days
Pump Info	VIB	Checked if Vibration is a measured parameter for IST	Within 7 days
Pump Info	Comment	Comments related to the test type, frequency and procedure in which pump is tested	Within 7 days
Pump Info	Notes	Specific note regarding the pump (not change notice controlled field)	Within 7 days
Pump Info	Basis	Safety Function of the pump	Within 7 days
Pump Info	Basis	Description of pump not currently used at PVGS	No time requirement
Pump Info	Basis	References not currently used at PVGS	No time requirement
Pump Info	Code Dev	Lists code deviations for the pump based on Test Type, Frequency, Document Type, Document #, Approved, Approval Reference. Information for Function of pump is populated for some of the pumps. Information for Test Requirement, Basis, Alternate Testing, Acceptance Criteria are all currently found in 73DP-9XI01. The information should be stored in EP-Plus. References are populated with references for the current code deviation.	Within 7 days
!Pump Data!	Acceptance	Acceptance Criteria for pump test (includes Alert ranges and Acceptance Criteria) (ISTA-9230, Inservice Test and Examination Results)	Within 7 days

Table 7: Control of Essential Information in EP-Plus (Continued)

Main Category	PV-Plus Field	Information Required	Required Timeliness of Updates to Information
!Pump Data!	Test Data	Depending on test type various fields of data are required to be populated with information such as test date, work order number, test data and comments (ISTA-1500, Owner's Responsibilities)	Within 7 days
!Check Valve!	Valve Groups	List of valves in each group. Analysis information forming the basis for the program (II-6000)	Within 60 days
!Check Valve!	Performance Analysis	Analysis information from Operating Experience forming the basis for the program, like failure or maintenance history patterns (II-6000, Documentation)	Within 60 days
!Check Valve!	Cause Analysis	Analysis information from failure mechanisms used to form the basis for program activities (II-6000, Documentation)	Within 60 days
!Check Valve!	Test Assessment	Analysis information determined using performance and cause analysis to formulate failure mechanism strategies (II-6000, Documentation)	Within 60 days
Check Valve	Maintenance	Used to update information under certain Check Valve fields.	No time requirement
!Check Valve!	Recommended Activities	Condition Monitoring activities with interval info and the identification of trendable attributes that may exist (II-6000, Documentation)	Within 60 days
Check Valve	Panel Review	Not used at PVGS	No time requirement
Check Valve	Print Group	No specific information	No time requirement
Check Valve	History	Results of Condition Monitoring Activities.	Within 6 months

Note: This table describes data fields within the EP-Plus database. The items that contain essential information have been marked with an exclamation point (!) in the first column. Refer to Step 4.13.2.

4.14 Pump Relief Requests (PRRs), Cold Shutdown Justifications (CSJs), Refueling Outage Justifications (ROJs)

4.14.1 Table 8 lists the 10CFR50.55a Pump Relief Requests (PRRs), Cold Shutdown Justifications (CSJs), and Refueling Outage Justifications (ROJs) used in the PVGS Pump and Valve Inservice Testing Program.

Table 8: PRRs, CSJs, and ROJs

Label	Subject (and Notes)
PRR-01	Essential Auxiliary Feedwater Pump Flow Rate Measurement
PRR-02	Diesel Fuel Oil Transfer Pump Suction Pressure Measurement
PRR-03	Low Pressure Safety Injection (LPSI) Pump Flow Rate Measurement
PRR-04	High Pressure Safety Injection (HPSI) Pump Flow Rate Measurement
PRR-05	Containment Spray Pump Flow Rate Measurement
PRR-06	Charging Pump Vibration Instrumentation
CSJ-01	Auxiliary Feedwater (AFW) Discharge Header Check Valve Open Exercising
CSJ-02	AFW Header Check Valve Open Exercising
CSJ-03	Auxiliary Pressurizer Spray Valve Exercising
CSJ-04	Letdown Isolation Valve Closed Exercising
CSJ-05	Shutdown Cooling Suction Isolation Valve Exercising
CSJ-06	Instrument Air Containment Isolation Valve Closed Exercising
CSJ-07	Reactor Head Vent and Pressurizer Vent Valve Exercising
CSJ-08	Feedwater Isolation Valve (FWIV) Closed Exercising
CSJ-09	Main Steam Isolation Valve (MWIV) Closed Exercising
CSJ-10	SIT Vent Valve Exercising
ROJ-01	Containment Refueling Purge Valve Closed Exercising
ROJ-02	Reactor Coolant Pump (RCP) Seal Bleed-Off Isolation Valve Closed Exercising
ROJ-03	HPSI, LPSI, Containment Spray (CS) Recirc Line Check Valve Bi-Directional Closed Testing

4.14.2 The following tables are verbatim from the interval submittals to the NRC. The citations are noted in the tables.

A. PUMP 10CFR50.55a REQUEST PRR-01

PUMP 10CFR50.55a REQUEST PRR-01

Relief Request In Accordance with 10CFR50.55a(z)(2)

-- Inservice Testing Impracticality --

Essential Auxiliary Feedwater Pump Flow Rate Measurement During Group B Test	
Components Affected:	Pump: AFA-P01 Pump Description: Essential Auxiliary Feedwater Pump (Turbine-Driven) Pump: AFB-P01 Pump Description: Essential Auxiliary Feedwater Pump (Motor-Driven) Code Class: 3 Pump Category: B
Component/System Function:	The essential auxiliary feedwater (AF) pumps supply water to the steam generators during an accident. They also can be used to supply feedwater to the steam generators during plant startup and shutdown, although the non-class AF pump normally fulfills this function.
Applicable Code Edition and Addenda:	ASME OM Code 2012 Edition
Applicable Code Requirements:	ISTB-3300, Reference Values, paragraph (e)(2), states, "Reference values shall be established at the comprehensive pump test flow rate for the Group A and Group B tests, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate." ISTB-5122, Group B Test Procedure, states, in part, that "Group B tests shall be conducted with the pump operating as close as practical to a specified reference point and within the variances from the reference point as described in this paragraph. The test parameter value identified in Table ISTB- 3000-1 shall be determined and recorded as required by this paragraph." ISTB-5122(b), states, "The differential pressure or flow rate shall be determined and compared to its reference value."

Essential Auxiliary Feedwater Pump Flow Rate Measurement During Group B Test	
Reason for Request:	Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(2), an alternative is being requested from the requirement of the ASME OM Code for measurement of the flow rate for Group B testing of the six Essential Auxiliary Feedwater (AF) Pumps. The basis of this request is that the ASME OM Code requirements present an undue hardship without a compensating increase in the level of quality and safety. This relief request is a resubmittal of NRC approved third 10-year interval PRR-01, which was based on the ASME OM Code-2001 Edition through the OMB 2003 addenda. This fourth 10-year interval request is based on the ASME OM Code 2012 Edition. There have been no substantive changes to this alternative, to the OM Code requirements or to the basis for use, which would alter the previous NRC Safety Evaluation conclusions. The ASME OM Code requires the establishment of Group B reference point flow rate at the comprehensive test flow rate or at the highest practical flow rate and to operate the pump at a specified reference point (i.e., fix the flow to a specified value). Measurement of flow is considered a hardship since this is a fixed resistance recirculation path with no flow instrumentation provided. When the pump operates on minimum flow recirculation (approximately 260 gallons per minute (gpm)), the specified reference point is essentially achieved by the recirculation line's fixed resistance. To establish the fixed resistance, the minimum flow recirculation line contains an administratively controlled locked-throttled drag valve and a locked open manual isolation valve. The drag valve is entirely passive and treated as an orifice. The hand wheels are removed and the valves are locked in position. There are no operations procedures that manipulate the valve. There are no maintenance tasks associated with the valve. The use of an ultrasonic flowmeter was evaluated and determined nonviable due to the difficulty in establishing an application-specific 2% calibration on the AF mini-flow piping. Allowing the flow to remain fixed by the locked-in resistance increases the potential for repeatable test results and degradation monitoring rather than changing the resistance based on the ultrasonic flow meter readout fluctuations. With this understanding, there is little value added by installing ISTB-3510 compliant flow instrumentation in the minimum flow recirculation line to measure flow.

Essential Auxiliary Feedwater Pump Flow Rate Measurement During Group B Test	
Reason for Request (continued):	This fixed resistance methodology is repeatable from test to test and accomplishes the same result as if flow were being measured and recorded. To comply with the ASME OM Code there are only two practical flow paths available for testing each essential AF pump. The primary flow path is into the main feedwater lines to the steam generators. The other flow path is the minimum flow recirculation line that recirculates back to the condensate storage tank. The flow path to the steam generators is equipped with flow instrumentation, but the recirculation line is a fixed resistance circuit with no provisions for flow indication. Use of the primary flow path at power would inject cold AF into the main feedwater lines. The resulting temperature perturbations could lead to thermal shock/fatigue damage to the feedwater piping and steam generators, and the cooldown of the reactor coolant system could cause undesirable reactivity variations and power fluctuations. Modifying the minimum flow recirculation line to provide flow indication that meets the ± 2% accuracy requirement (as specified in Table ISTB-3510-1, Required Instrument Accuracy) adds little value since the flow is fixed at approximately 260 gpm and differential pressure is used to monitor degradation. Use of an ultrasonic flow meter and possible adjustment of the fixed resistance introduces the potential for less accurate degradation monitoring than currently employed.

Essential Auxiliary Feedwater Pump Flow Rate Measurement During Group B Test	
Proposed Alternative and Basis for Use:	The essential AF pumps are standby pumps that are normally idle during plant operation, except for testing. During plant operation, quarterly Group B pump testing for each pump shall be conducted at mini-flow conditions using the minimum flow recirculation line fixed resistance to establish the specified reference point. ISTB-5100(b)(2) allows the use of bypass test loops to be used for Group B tests. The PVGS minimum flow recirculation line is designed to meet the pump manufacturer's operating specifications of approximately 260 gpm. Flow rate will not be measured or recorded. To monitor for degradation, pump differential pressure shall be determined and compared to its reference value and the associated Acceptance, Alert and Required Action Ranges as specified in Table ISTB-5121-1, Centrifugal Pump Test Acceptance Criteria. Each essential AF pump will be comprehensively tested in accordance with ISTB-5123, Comprehensive Test Procedure, on a biennial (2-year) frequency as specified in Table ISTB-3400-1, Inservice Test Frequency, and meet the requirements of Mandatory Appendix V, Pump Periodic Verification Test Program, as specified in ISTB-1400(d). Since these are standby pumps, little degradation is expected during plant operation when the pumps are idle except for testing. Testing the pumps at the comprehensive pump test flow rate on a 2-year frequency, while satisfying Mandatory Appendix V, provides additional information regarding the condition of the pumps.
Duration of Proposed Alternative:	The proposed alternative identified in this 10 CFR 50.55a request shall be utilized for the duration of the fourth 10-year IST interval beginning January 15, 2018, and ending January 14, 2028.

Essential Auxiliary Feedwater Pump Flow Rate Measurement During Group B Test	
Precedents:	The NRC previously authorized pump relief request PRR-01 for the third 10-year IST Program interval at PVGS Units 1, 2 and 3 in the following safety evaluation: - Letter from the NRC (T. G. Hiltz) to Arizona Public Service Company (R. K. Edington), Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Relief Request for the Third 10-Year Interval Pump and Valve Inservice Testing, dated April 24, 2008 (ADAMS Accession No. ML081050003) In addition, this proposed alternative complies with NRC Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs, Position 9, dated April 3, 1989.
References:	1) 10 CFR 50.55a, Codes and Standards 2) ASME OM Code 2012 Edition 3) Interval 4 SER, dated Dec. 28, 2017

B. PUMP 10CFR50.55a REQUEST PRR-02

PUMP 10CFR50.55a REQUEST PRR-02

Relief Request In Accordance with 10CFR50.55a(f)(5)(iii)

-- On the basis that the proposed alternative provides an acceptable level of quality and safety --

Diesel Fuel Oil Transfer Pump Suction Pressure Measurement	
Components Affected:	Pump ID: DFA-P01 Pump Description: Diesel Generator Fuel Oil Transfer Pump A Pump ID: DFB-P01 Pump Description: Diesel Generator Fuel Oil Transfer Pump B Code Class: 3 Pump Category: B
Component/System Function:	The DGFO transfer pumps transfer diesel fuel from the fuel oil storage tank to the Emergency Diesel Generator (EDG) day tank.
Applicable Code Edition and Addenda:	ASME OM Code 2012 Edition
Applicable Code Requirements:	ISTB-3510, General, paragraph ISTB-3510(a), Accuracy, states, in part, that "Instrument accuracy shall be within the limits of Table ISTB-3510-1. Table ISTB-3510-1, Required Instrument Accuracy, provides the accuracy limits for Comprehensive and Preservice Tests, percent for pressure is ± 1/2% [±0.5%].

Diesel Fuel Oil Transfer Pump Suction Pressure Measurement	
Reason for Request:	Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (f)(5)(iii), an alternative is being requested from the requirement of the ASME OM Code relative to the DGFO transfer pumps suction pressure instruments accuracy.The basis of this request is that compliance with the ASME OM Code requirements is impractical for pump testing and would present a burden if those requirements were imposed, without providing significantly more accurate suction pressure data for the evaluation of pump degradation. This relief request is a resubmittal of NRC-approved third 10-year interval PRR-02, which was based on the ASME OM Code-2001 Edition through the OMB 2003 addenda. This fourth 10-year interval request is based on the ASME OM Code 2012 Edition. There have been no substantive changes to this proposed alternative, to the OM Code requirements or to the basis for use, which would alter the previous NRC safety evaluation conclusions.
Impracticality of Compliance:	There are no inlet pressure gauges installed for this pump configuration. Specifically, the pumps are horizontal, centrifugal type with an integral motor. They operate submerged in the diesel fuel oil storage tank. The pump and drive motor are completely housed in an enclosed steel casing with no shaft penetrations requiring seals or packing. The casing has a hermetically sealed compartment for the stator windings of the motor to prevent entrance of pumped liquid or vapor. Pump bearings are cooled by recirculation of pumped fluid. The entire assembly is suspended from a cover plate, which is bolted to a nozzle on the tank. The DGFO storage tank is equipped with level instrumentation (DFN-LI-33 and DFN-LI-34) having a calculated loop accuracy of ± 1.5%. The instrument reads out in percent of tank level, which is converted to suction pressure during pump Inservice tests. The calibrated instrument range results in a suction pressure span of 0.2 pounds per square inch gauge (psig) to 4.4 psig. This instrument accuracy is acceptable for use during Group B pump testing but does not meet the ± 0.5% accuracy as required by Table ISTB-3510-1 for comprehensive pump testing performed every 2 years, or preservice pump testing performed as required.

Diesel Fuel Oil Transfer Pump Suction Pressure Measurement

Burden of Compliance:

Compliance with ISTB-3510 accuracy requirements during comprehensive and preservice pump testing measurement of suction pressure would require re-design and installation of more accurate instrumentation with minimal benefit.

The installed instrumentation converts to a full-scale range of 4.4 psig, which only slightly exceeds the pump suction reference (Pr) value of 3.8 psig (full scale equals 1.15 times reference).

Considering the existing 1.5% accuracy of the level instrument, the reading could be as high as 3.85 psig or as low as 3.74 psig. This results in less than a 0.11 psig difference in the readings and is considered insignificant when monitoring for degradation. Also, there is an essentially equivalent variance for the ISTB-3510 allowed combination of range and accuracy for comprehensive and preservice pump testing, as compared to the installed instrumentation. The table below illustrates.

Instrument	Range (R)	Accuracy (A)	Range x Accuracy (R x A)	Maximum Variance R x A x Pr
ISTB-3510 allowed	3 x Pr	+/- 0.5%	1.5%Pr	1.5% (3.8) = .057 psig
Installed instruments	1.15 x Pr	+/-1.5%	1.7%Pr	1.7% (3.8) = .065 psig

The current DGFO pump differential pressure reference value (DPr) varies from 27.7 to 29.1 pounds per square inch differential (psid), with an average of 28.4 psid. The difference between the ISTB-3510 allowed variance in pressure measurement, compared with the variance in the installed instruments, is insignificant when monitoring for pump degradation. The difference is 0.008 psig, where 0.008 psig = 0.065 psig – 0.057 psig.

Another consideration is that the existing DGFO storage tank level is essentially constant, thus assuring a constant suction pressure for the DGFO transfer pumps. Technical Specification (TS) 3.8.3.1 requires that the DGFO storage tank be maintained at 80%, which is verified every 31 days to assure sufficient supply for 7 days of full-load Diesel Generator operation. The difference between minimum allowable tank level and the top of the tank is only 26.4 inches.

Diesel Fuel Oil Transfer Pump Suction Pressure Measurement	
Burden of Compliance (continued):	The suction pressure is essentially fixed by the TS level requirements, allowing for minimal variation in suction pressure. Due to strict controls placed on fuel oil level, the suction pressure does not vary by more than 0.7 psig. APS reviewed the previous two years of test history. The data shows essentially constant suction pressure for each of the pumps with a maximum recorded variance of 0.5 psig.
Proposed Alternatives and Basis for Use:	Comprehensive and preservice tests for each DGFO transfer pump will measure and record pump suction pressure using the installed plant instruments (DFN-LI-33 and DFN-LI-34). Use of these instruments provides reasonable assurance that DGFO transfer pumps are operationally ready since 1) the instruments yield a reading that is essentially equivalent to that achieved using an instrument meeting the ASME OM Code range and accuracy requirements and 2) the TS requirements limit DGFO tank level variations, thus suction pressure is essentially constant. Based on the determination that compliance with the ASME OM Code requirements is impractical for pump testing, Code compliant instrumentation would provide insignificantly more accurate data for evaluation of pump degradation, and the burden caused if the Code requirement was imposed, the proposed alternative is requested pursuant to 10 CFR 50.55a(f)(5)(iii).
Duration of Proposed Alternatives:	The proposed alternative identified in this 10 CFR 50.55a request shall be utilized during the fourth 10-year IST Interval beginning January 15, 2018, and ending January 14, 2028.
Precedents:	The NRC previously authorized pump relief request PRR-02 for the third 10-year IST program interval at PVGS Units 1, 2 and 3 in the following safety evaluation: - Letter from the NRC (T. G. Hiltz) to Arizona Public Service Company (R. K. Edington), Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Relief Request for the Third 10-Year Interval Pump and Valve Inservice Testing Program, dated April 24, 2008 (ADAMS Accession No. ML081050003)

Diesel Fuel Oil Transfer Pump Suction Pressure Measurement	
References:	1) NUREG 1482, Revision 2, Guidelines for Inservice Testing at Nuclear Power Plants: Inservice Testing of Pumps and Valves and Inservice Examination and Testing of Dynamic Restraints (Snubbers) at Nuclear Power Plants, Section, 5.5.3, Use of Tank or Bay Level to Calculate Differential Pressure, dated October 2013 (ADAMS Accession No. ML13295A020) 2) Interval 4 SER, dated Dec. 28, 2017

C. PUMP 10CFR50.55a REQUEST PRR-03

PUMP 10CFR50.55a REQUEST PRR-03

Relief Request In Accordance with 10CFR50.55a(z)(2)

-- Inservice Testing Impracticality --

LPSI Pump Flow Rate Measurement	
Components Affected:	Pump ID: SIA-P01 Pump Description: Low Pressure Safety Injection (LPSI) Pump A Pump ID: SIB-P01 Pump Description: Low Pressure Safety Injection (LPSI) Pump B Code Class: 2 Pump Category: A
Component/System Function:	The LPSI pumps provide low-pressure coolant injection of borated water into the reactor coolant system (RCS) under accident conditions. They also provide shutdown cooling flow post-accident and during normal reactor startup and shutdown.
Applicable Code Edition and Addenda:	ASME OM Code 2012 Edition

LPSI Pump Flow Rate Measurement	
Applicable Code Requirements:	ISTB-3300, Reference Values, paragraph ISTB-3300(e)(2), states, "Reference values shall be established at the comprehensive pump test flow rate for the Group A and Group B tests, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate." ISTB-5121, Group A Test Procedure, states, in part, "Group A tests shall be conducted with the pump operating as close as practical to a specified reference point and within the variances from the reference point as described in this paragraph. The test parameters shown in Table ISTB-3000-1 shall be determined and recorded as required by this paragraph." ISTB-5121(b), states, "The resistance of the system shall be varied until the flow rate is as close as practical to the reference point with the variance not to exceed +2% or -1% of the reference point. The differential pressure shall then be determined and compared to its reference value.Alternatively, the flow rate shall be varied until the differential pressure is as close as practical to the reference point with the variance not to exceed +1% or -2% of the reference point and the flow rate determined and compared with the reference flow rate." ISTB-5121(c), states, "Where it is not practical to vary system resistance, flow rate and pressure shall be determined and compared to their respective reference values."
Reason for Request:	Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(2), an alternative is being requested from the ASME OM Code requirement for the flow rate measurement during Group A testing of the LPSI Pumps. The basis of this request is that the ASME OM Code requirements present an undue hardship without a compensating increase in the level of quality and safety.

LPSI Pump Flow Rate Measurement	
Reason for Request (continued):	This relief request is a resubmittal of NRC approved third 10-year interval PRR-03, which was based on the ASME OM Code-2001 Edition through the OMB 2003 addenda. This fourth 10-year interval request is based on the ASME OM Code 2012 Edition. There have been no substantive changes to this alternative, to the OM Code requirements or to the basis for use, which would alter the previous NRC safety evaluation conclusions. The ASME OM Code requires the establishment of the Group A reference point flow rate at the comprehensive test flow rate or at the highest practical flow rate, and to operate the pump at a specified reference point (i.e., fix the flow to a specified value). It is considered a hardship to meet this requirement since this is a fixed resistance recirculation path of approximately 180 gallons per minute (gpm) with limited capability permanent plant flow instrumentation. The installed flowmeter is on a common recirculation line to the refueling water tank. The instrumentation is a 0-5000 gpm ultrasonic flowmeter with ± 5% accuracy that does not meet the ± 2% instrument accuracy requirements of Table ISTB-3510-1, Required Instrument Accuracy, for pump testing. The use of an ultrasonic flowmeter with 2% accuracy was evaluated and determined nonviable due to the difficulty in establishing an application specific 2% calibration on the safety injection mini-flow piping. To establish the fixed resistance, the minimum flow recirculation line contains a flow orifice and a normally open motor-operated valve and solenoid isolation valve. Allowing the flow to remain fixed by the orifice resistance increases the potential for repeatable test results and degradation monitoring rather than attempting to change the resistance based on ultrasonic flowmeter readout fluctuations. When the pump operates on minimum flow recirculation, the specified reference point is essentially achieved by the fixed resistance.

LPSI Pump Flow Rate Measurement	
Reason for Request (continued):	With this understanding, there is little value added in replacing the existing 0-5000 gpm, ± 5% ultrasonic flowmeter, or adding instrumentation that meets ISTB-3510 requirements. The fixed resistance methodology is repeatable from test to test and accomplishes the same result as if flow were being measured and recorded. During normal plant operation, the LPSI pumps cannot develop sufficient discharge pressure to overcome RCS pressure and allow flow through the safety injection headers. Thus, during quarterly testing, LPSI flow is routed through a minimum flow recirculation line to the refueling water tanks. The minimum-flow recirculation flow path is a fixed resistance circuit containing a flow-limiting orifice capable of passing only a small fraction (approx. 180 gpm) of the design flow (4200 gpm). The permanent plant 0-5000 gpm, ± 5% accuracy, flow instrumentation (permanently mounted ultrasonic flowmeter) has only limited capability, and its accuracy does not meet Table ISTB-3510-1, Required Instrument Accuracy, flow rate ± 2% accuracy requirements. The LPSI pumps are categorized as Group A since they are normally used to provide shutdown cooling flow during shutdown operations, and occasionally for recirculating the refueling water tank when the unit is at power. This infrequent use is expected to result in minimal degradation during plant operation. Thus, the alternate testing will adequately monitor these pumps to ensure continued operability and availability for accident mitigation. Modifying the minimum flow recirculation line to provide flow indication to meet the ± 2% accuracy requirement as specified in Table ISTB-3510-1 adds little value since the flow is fixed and differential pressure is used to monitor degradation.

LPSI Pump Flow Rate Measurement	
Proposed Alternative and Basis for Use:	During plant operation, quarterly Group A pump testing for the LPSI pumps shall be conducted at mini-flow conditions using the minimum flow recirculation line fixed resistance of approximately 180 gpm to establish the specified reference point. Subsection ISTB, paragraph ISTB-5100(b), Bypass Loops, subparagraph (1) allows the use of bypass test loops for Group A tests. The flow rate through the loop is established at the highest practical flow rate of approximately 180 gpm in accordance with ISTB-3300(e)(2). Flow rate will not be measured or recorded. To monitor for degradation, pump differential pressure shall be determined and compared to its reference value and the associated Acceptable and Required Action Ranges as specified in Table ISTB-5121-1, Centrifugal Pump Test Acceptance Criteria. Vibration measurement will be conducted quarterly in accordance with ISTB-3540, Vibration. The LPSI pumps will be comprehensively tested in accordance with ISTB-5123, Comprehensive Test Procedure, on a biennial (2-year) frequency as specified in Table ISTB-3400-1, Inservice Test Frequency, and meet the requirements of Mandatory Appendix V, Pump Periodic Verification Test Program, as specified in ISTB-1400(d). The LPSI pumps are used infrequently. Little degradation is expected during plant power operation when the pumps are idle except for limited operations and testing. Testing the pumps at the comprehensive pump flow rate on a 2-year frequency while satisfying Mandatory Appendix V provides additional information regarding the condition of the pumps. Based on the determination that compliance with the ASME OM Code requirement results in a hardship without a compensating increase in the level of quality and safety, this proposed alternative is requested pursuant to 10 CFR 50.55a(z)(2).

LPSI Pump Flow Rate Measurement	
Duration of Proposed Alternative:	The proposed alternative identified in this 10 CFR 50.55a request shall be utilized during the fourth 10-year inservice test interval beginning January 15, 2018, and ending January 14, 2028.
Precedents:	The NRC previously authorized pump relief request PRR-03 for the third 10-year IST program interval at PVGS Units 1, 2 and 3 in the following safety evaluation: - Letter from the NRC (T. G. Hiltz) to Arizona Public Service Company (R. K. Edington), Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Relief Request for the Third 10-Year Interval Pump and Valve Inservice Testing Program, dated April 24, 2008 (ADAMS Accession No. ML081050003) In addition, this proposed alternative complies with NRC Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs, Position 9, dated April 3, 1989.
References:	1) 10 CFR 50.55a, Codes and standards 2) ASME OM Code 2012 Edition 3) Interval 4 SER, dated Dec. 28, 2017

D. PUMP 10CFR50.55a REQUEST PRR-04

PUMP 10CFR50.55a REQUEST PRR-04

Relief Request In Accordance with 10CFR50.55a(z)(2)

-- Inservice Testing Impracticality --

HPSI Pump Flow Rate Measurement During Group B Test	
Components Affected:	Pump ID: SIA-P02 Pump Description: High Pressure Safety Injection (HPSI) Pump A Pump ID: SIB-P02 Pump Description: High Pressure Safety Injection (HPSI) Pump B Code Class: 2 Pump Category: B
Component/System Function:	The HPSI pumps provide high-pressure coolant injection of borated water into the reactor coolant system (RCS) under accident conditions. They also provide flow for long-term cooling and flushing to prevent boron precipitation.
Applicable Code Edition and Addenda:	ASME OM Code 2012 Edition

HPSI Pump Flow Rate Measurement During Group B Test	
Applicable Code Requirements:	ISTB-3300, Reference Values, paragraph ISTB-3300(e)(2), states, "Reference values shall be established at the comprehensive pump test flow rate for Group A and Group B tests, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate." ISTB-5122, Group B Test Procedure, states, in part, that "Group B tests shall be conducted with the pump operating as close as practical to a specified reference point and within the variances from the reference point as described in this paragraph. The test parameter value identified in Table ISTB-3000-1 shall be determined and recorded as required by this paragraph." ISTB-5122(c), states, "System resistance may be varied as necessary to achieve a point as close as practical to the reference point. If the reference point is flow rate, the variance from the reference point shall not exceed +2% or -1%."
Reason for Request:	Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(2), an alternative is being requested from the requirement of the ASME OM Code for measurement of the flow rate for Group B testing of the HPSI Pumps. The basis of this request is that the ASME OM Code requirements present an undue hardship without a compensating increase in the level of quality and safety. This relief request is a resubmittal of NRC approved third 10-year interval PRR-04, which was based on the ASME OM Code-2001 Edition through the OMB 2003 addenda. This fourth 10-year interval request is based on the ASME OM Code 2012 Edition. There have been no substantive changes to this alternative, to the OM Code requirements or to the basis for use, which would alter the previous NRC safety evaluation conclusions.

HPSI Pump Flow Rate Measurement During Group B Test	
Reason for Request (continued):	The ASME OM Code requirements to establish the Group B reference point flow rate at the highest practical flow rate and operate the pump at a specified reference point (i.e., fix the flow to a specified value) is considered a hardship since this is a fixed resistance recirculation path of approximately 170 gallons per minute (gpm), which is measured by limited capability permanent plant flow instrumentation. The installed flowmeter is on a common recirculation line to the Refueling Water Tank. This instrumentation is a 0-5000 gpm ultrasonic flowmeter with ± 5% accuracy and does not meet the ± 2% instrument requirements of Table ISTB-3510-1, Required Instrument Accuracy, for pump testing. The use of an ultrasonic flowmeter with 2% accuracy was evaluated and determined to be nonviable due to the difficulty in establishing an application specific 2% calibration on the SI mini-flow piping. To establish the fixed resistance, the minimum flow recirculation line contains a flow orifice and a normally open motor-operated valve and solenoid isolation valve. Allowing the flow to remain fixed by the orifice resistance increases the potential for repeatable test results and degradation monitoring rather than attempting to change the resistance based on ultrasonic flowmeter readout fluctuations. When the pump operates on minimum flow recirculation, the specified reference point is essentially achieved by the fixed resistance. With this understanding, there is little value added in replacing the existing 0-5000 gpm, ± 5% ultrasonic flowmeter, or adding instrumentation that meets ISTB-3510(a), Accuracy, requirements. The fixed resistance methodology is repeatable from test to test and accomplishes the same result as if flow were being measured and recorded.

HPSI Pump Flow Rate Measurement During Group B Test	
Reason for Request (continued):	During normal plant operation, the HPSI pumps cannot develop sufficient discharge pressure to overcome RCS pressure and allow flow through the SI headers. Thus, during quarterly testing, HPSI flow is routed through a minimum flow recirculation line to the refueling water tanks. The minimum-flow recirculation flow path is a fixed resistance circuit containing a flow-limiting orifice capable of passing only a small fraction (approximately 170 gpm) of the design flow (815 gpm). The permanent plant 0-5000 gpm, ± 5% accuracy, flow instrumentation (permanently mounted ultrasonic flowmeter) has only limited capability, and its accuracy does not meet Table ISTB-3510-1, Required Instrument Accuracy, flow rate 2% accuracy requirements. The HPSI pumps are categorized as Group B. During normal operation, the HPSI pumps are generally in standby except for pump testing. Pumps 1MSIBP02, 2MSIBP02 and 3MSIBP02 are used occasionally to recharge the SI tanks. Minimal degradation is expected during plant operation with this limited use. Thus, the alternate testing will adequately monitor these pumps to ensure continued operability and availability for accident mitigation. Modifying the minimum flow recirculation line to provide flow indication to meet the ± 2% accuracy requirement as specified in Table ISTB-3510-1 adds little value since the flow is fixed and differential pressure is used to monitor degradation.

HPSI Pump Flow Rate Measurement During Group B Test	
Proposed Alternative and Basis for Use:	During plant operation, quarterly Group B pump testing for each HPSI pump shall be conducted at mini-flow conditions using the minimum flow recirculation line fixed resistance of approximately 170 gpm to establish the specified reference point. ISTB-5100(b)(2) allows the use of bypass test loops to be used for Group B tests. The minimum flow recirculation line is designed to meet the pump manufacturer's operating specifications. The flow rate through the loop is established at the highest practical flow rate of approximately 170 gpm in accordance with ISTB-3300(e)(2). Flow rate will not be measured or recorded. To monitor for degradation, pump differential pressure shall be determined and compared to its reference value and the associated Acceptable and Required Action Ranges as specified in Table ISTB-5121-1, Centrifugal Pump Test Acceptance Criteria. The HPSI pumps will be comprehensively tested in accordance with ISTB-5123, Comprehensive Test Procedure, on a biennial (2-year) frequency as specified in Table ISTB-3400-1, Inservice Test Frequency, and meet the requirements of Mandatory Appendix V, Pump Periodic Verification Test Program, as specified in ISTB-1400(d). The HPSI pumps are used infrequently. Minimal degradation is expected during plant power operation when the pumps are idle, except for limited operations and testing. Testing the pumps at the comprehensive pump test flow rate on a 2-year frequency, while satisfying Mandatory Appendix V, provides additional information regarding the condition of the pumps. Based on the determination that compliance with the ASME OM Code requirement results in a hardship without a compensating increase in the level of quality and safety, this proposed alternative is requested pursuant to 10 CFR 50.55a(z)(2).

HPSI Pump Flow Rate Measurement During Group B Test	
Duration of Proposed Alternative:	The proposed alternative identified in this 10 CFR 50.55a request shall be utilized during the Fourth 10-year IST interval beginning January 15, 2018, and ending January 14, 2028.
Precedents:	The NRC previously authorized pump relief request PRR-04 for the third 10-year IST Program interval at PVGS Units 1, 2 and 3 in the following safety evaluation: - Letter from the NRC (T. G. Hiltz) to Arizona Public Service Company (R. K. Edington), Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Relief Request for the Third 10-Year Interval Pump and Valve Inservice Testing Program, dated April 24, 2008 (ADAMS Accession No. ML0801050003) In addition, this proposed alternative complies with NRC Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs, Position 9, dated April 3, 1989.
References:	1) 10 CFR 50.55a, Codes and standards 2) ASME OM Code 2012 Edition 3) Interval 4 SER, dated Dec. 28, 2017

E. PUMP 10CFR50.55a REQUEST PRR-05

PUMP 10CFR50.55a REQUEST PRR-05

Relief Request In Accordance with 10CFR50.55a(z)(2)

-- Inservice Testing Impracticality --

Containment Spray Pump Flow Rate Measurement	
Components Affected:	Pump ID: SIA-P03 Pump Description: Containment Spray (CS) Pump A Pump ID: SIB-P03 Pump Description: Containment Spray (CS) Pump B Code Class: 2 Pump Category: A
Component/System Function:	The CS pumps deliver borated water to the containment spray headers, providing containment cooling and pressure control during accident conditions. The CS pumps can also be lined up to provide flow for shutdown cooling.
Applicable Code Edition and Addenda:	ASME OM Code 2012 Edition

Containment Spray Pump Flow Rate Measurement	
Applicable Code Requirements:	ISTB-3300, Reference Values, paragraph ISTB-3300(e)(2), states, "Reference values shall be established at the comprehensive pump flow rate for Group A and Group B tests, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate." ISTB-5121, Group A Test Procedure, states, in part, "Group A tests shall be conducted with the pump operating as close as practical to a specified reference point and within the variances from the reference point as described in this paragraph. The test parameters shown in Table ISTB-3000-1 shall be determined and recorded as required by this paragraph." ISTB-5121(b), states in part, "The resistance of the system shall be varied until the flow rate is as close as practical to the reference point with the variance not to exceed +2% or -1% of the reference point. The differential pressure shall then be determined and compared to its reference value." ISTB-5121(c), states, "Where it is not practical to vary system resistance, flow rate and pressure shall be determined and compared to their respective reference values."

Containment Spray Pump Flow Rate Measurement	
Reason for Request:	requested from the requirement of the ASME OM Code for flow rate measurement for Group A testing of the CS Pumps. The basis of this request is that the ASME OM Code requirements present an undue hardship without a compensating increase in the level of quality and safety. This relief request is a resubmittal of NRC approved third 10-year interval PRR-05, which was based on the ASME OM Code 2001 Edition through the OMB 2003 addenda. This fourth 10-year interval request is based on the ASME OM Code 2012 Edition. There have been no substantive changes to this alternative, to the OM Code requirements or to the basis for use, which would alter the previous NRC safety evaluation conclusions. The ASME OM Code requires the Group A reference point flow rate to be established at the comprehensive pump test flow rate if practicable or at the highest practical flow rate, and to operate the pump at a specified reference point (i.e., fix the flow to a specified value). It is considered a hardship to meet this requirement since this is a fixed resistance recirculation path of approximately 190 gallons per minute (gpm) with limited capability permanent plant flow instrumentation. The installed instrumentation is a 0-5000 gpm ultrasonic flowmeter with ± 5% accuracy and does not meet the 2% instrument requirements of Table ISTB-3510-1, Required Instrument Accuracy, for pump testing. The use of an ultrasonic flowmeter with 2% accuracy was evaluated and determined nonviable due to the difficulty in establishing an application specific 2% calibration on the SI mini-flow piping. To establish the fixed resistance the minimum flow recirculation line contains a flow orifice and a normally open motor-operated valve and solenoid isolation valve. Allowing the flow to remain fixed by the orifice resistance increases the potential for repeatable test results and degradation monitoring rather than attempting to change the resistance based on ultrasonic flowmeter readout fluctuations.

Containment Spray Pump Flow Rate Measurement	
Reason for Request (continued):	When the pump operates on minimum flow recirculation, the specified reference point is essentially achieved by the fixed resistance. With this understanding, there is little value added in replacing the existing 0-5000 gpm, ± 5% ultrasonic flowmeter, or adding instrumentation that meets ISTB-3510(a), Accuracy, requirements. The fixed resistance methodology is repeatable from test to test and accomplishes the same result as if flow were being measured and recorded. The normal CS flow path cannot be used for testing the CS pumps without spraying down the inside of the containment building and risking damage to important equipment. The reactor coolant system (RCS) injection portion of the shutdown cooling flow path cannot be used for testing during plant operation because the CS pumps are unable to develop sufficient discharge pressure to overcome RCS pressure. The minimum-flow recirculation flow path is a fixed resistance circuit containing a flow-limiting orifice capable of passing only a small fraction (approx. 190 gpm) of the design flow (3890 gpm). The permanent plant 0-5000 gpm, ± 5% accuracy, flow instrumentation (permanently mounted ultrasonic flowmeter) has only limited capability, and does not meet the Table ISTB-3510-1 flow rate accuracy requirement for ±2%. This instrumentation is on a common recirculation line to the Refueling Water Tank. A larger recirculation flow path is available; however, this requires an alternate line up and the same limited capability flow instrument exists in this portion of the recirculation line. The larger recirculation flow path is capable of carrying higher flow, but routine surveillance testing at less than the full flow reference value is not practical because of the pump rumble range (1800-2800 gpm). Testing in or near the rumble range is not practical because of the potential for equipment damage. Testing at flow rates above the rumble range (> 2800 gpm) is not practical because flow velocities in the recirculation piping would exceed the design criteria.

Containment Spray Pump Flow Rate Measurement	
Reason for Request (continued):	The CS pumps are categorized as Group A since they are normally used to provide shutdown cooling flow during shutdown operations. This infrequent use is expected to result in minimal degradation during plant operation. Thus, the alternate testing will adequately monitor these pumps to ensure continued operability and availability for accident mitigation. Modifying the minimum flow recirculation line to provide flow indication to meet the ± 2% accuracy requirement as specified in Table ISTB-3510-1 adds little value since the flow is fixed and differential pressure is used to monitor degradation.

Containment Spray Pump Flow Rate Measurement	
Proposed Alternative and Basis for Use:	During plant operation, quarterly Group A pump testing for the CS pumps shall be conducted at mini-flow conditions using the minimum flow recirculation line fixed resistance of approximately 190 gpm to establish the specified reference point. ISTB-5100(b), Bypass Loops, subparagraph (1) allows the use of bypass test loops for Group A tests. The flow rate through the loop is established at the highest practical flow rate of approximately 190 gpm in accordance with ISTB-3300(e)(2). Flow rate will not be measured or recorded. To monitor for degradation, pump differential pressure shall be determined and compared to its reference value and the associated Acceptable and Required Action Ranges as specified in Table ISTB-5121-1, Centrifugal Pump Test Acceptance Criteria. Vibration measurement will be conducted quarterly in accordance with ISTB-3540, Vibration. The CS pumps will be comprehensively tested in accordance with ISTB-5123, Comprehensive Test Procedure, on a biennial (2-year) frequency as specified in Table ISTB-3400-1, Inservice Test Frequency, and meet the requirements of Mandatory Appendix V, Pump Periodic Verification Test Program, as specified in ISTB-1400(d). The CS pumps are infrequently used pumps. Little degradation is expected during plant power operation when the pumps are idle, except for limited operations and testing. Testing the pumps at the comprehensive pump test flow rate on a 2-year frequency, while satisfying Mandatory Appendix V, provides additional information regarding the condition of the pumps. Based on the determination that compliance with the ASME OM Code requirement results in a hardship without a compensating increase in the level of quality and safety, this proposed alternative is requested pursuant to 10 CFR 50.55a(z)(2).
Duration of Proposed Alternative:	The proposed alternative identified in this 10 CFR 50.55a request shall be utilized during the Fourth 10-year IST interval beginning January 15, 2018, and ending January 14, 2028.

Containment Spray Pump Flow Rate Measurement	
Precedents:	The NRC previously authorized pump relief request PRR-05 for the third 10-year IST Program interval at PVGS Units 1, 2 and 3 in the following safety evaluation: - Letter from the NRC (T. G. Hiltz) to Arizona Public Service Company (R. K. Edington), Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Relief Request for the Third 10-Year Interval Pump and Valve Inservice Testing Program, dated April 24, 2008 (ADAMS Accession No. ML0801050003) In addition, this proposed alternative complies with NRC Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs, Position 9, dated April 3, 1989.
References:	1) 10 CFR 50.55a, Codes and standards 2) ASME OM Code 2012 Edition 3) Interval 4 SER, dated Dec. 28, 2017

F. PUMP 10CFR50.55a REQUEST PRR-06

PUMP 10CFR50.55a REQUEST PRR-06

Relief Request In Accordance with 10CFR50.55a(z)(1)

-- Inservice Testing Impracticality --

Charging Pump Vibration Instrumentation	
Components Affected:	Pump ID: CHA-P01 Pump Description: Charging (CH) Pump A Pump ID: CHB-P01 Pump Description: Charging (CH) Pump B Pump ID: CHE-P01 Pump Description: Charging (CH) Pump E Code Class: 2 Pump Category: A
Component/System Function:	The positive displacement CH pumps perform a safety function to provide charging flow from the volume control tank, refueling water tank, or spent fuel pool to the reactor coolant system (RCS) for emergency boration and RCS pressure control (with auxiliary pressurizer spray). These pumps also provide flow for RCS makeup, RCS boron and chemical control, and reactor coolant pump seal injection (non-safety functions).
Applicable Code Edition and Addenda:	ASME OM Code 2012 Edition
Applicable Code Requirements:	ISTB-3510(e), Frequency Response Range, states, "The frequency response range of the vibration-measuring transducers and their readout system shall be from one-third minimum pump shaft rotational speed to at least 1,000 Hz."

Charging Pump Vibration Instrumentation	
Reason for Request:	Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(1), an alternative is being requested from the requirement of the ASME OM Code for use of vibration-measuring transducers with frequency response from one-third minimum pump shaft rotational speeds to at least 1,000 hertz (Hz) during Group A and Comprehensive pump inservice testing (IST). The basis for this request is that use of instrumentation with a frequency response range lower limit of 3 Hz versus the Code-required one-third shaft speed (or 1.1 Hz) will provide an acceptable level of quality and safety. The CH pumps are of a single-acting reciprocating (three-piston) positive displacement design, model number NP18-3.1 TFS, manufactured by Gaulin Corporation. The nominal shaft rotational speed of the CH pumps is 199 revolutions per minute (rpm), which is equivalent to approximately 3.3 Hz. Based on this frequency and ISTB-3510(e), the required frequency response range of instruments used for measuring pump vibration is to be 1.1 to 1,000 Hz. PVGS has determined there are no mechanical degradation scenarios where only a subsynchronous vibration component would develop on the CH pumps. Potential sub-synchronous and synchronous vibrations evaluated are as follows: a) Oil whirl, which presents itself at frequencies below the rotational frequency of the pump (0.38X - 0.48X, where X equals the rotational frequency of the pump), is not applicable to the PVGS horizontal, triplex, reciprocating charging pumps. These pumps have high reciprocating loads within their journal bearings, which prevents the oil whirl phenomena.

Charging Pump Vibration Instrumentation	
Reason for Request (continued):	b) A light rub/impact could generate a vibrational component at a frequency below the pump's rotational frequency (e.g., 0.5X (99.5 rpm)), but would normally generate a harmonic vibrational component that would present either as an integer or half-integer multiple of the running speed of the pump. (e.g., a light rub vibration occurring at 0.5X, where X equals the rotational frequency of the pump, could also produce a vibrational component that could be measured at integer multiples of the original frequency (i.e., 1X, 1.5X, 2X, etc.), and would, thus, be identified in the calibrated range of the equipment.) c) A heavy rub generates increased integer values of multiple running speed components, as well as processing the 1X phase measurement. In either case, the overall vibration level would still show an increase from both the attenuated sub-synchronous and 1X vibration components. d) Looseness in the power train would likely be identified through the measurement of a vibrational component(s) found at frequencies that are multiples of the pumps rotational frequency. (i.e., 1X and 2X, where X equals the rotational frequency of the pump). PVGS has many years of CH pump operating experience (OE) that supports the preceding analysis that there is no mechanical degradation scenario where only a sub-synchronous vibration component would reveal pump degradation. PVGS has determined that relative to the charging pumps, the significant modes of vibration, with respect to equipment monitoring, are as follows: 1-Times Crankshaft Speed (1X) – An increase in vibration at this frequency may be an indication of rubbing between a single crankshaft cheek and rod end, cavitation at a single valve, or coupling misalignment.

Charging Pump Vibration Instrumentation	
Reason for Request (continued):	2-Times Crankshaft Speed (2X) – An increase in vibration at this frequency may be an indication of looseness at a single rod bearing or crosshead pin, a loose valve seat in the fluid cylinder, a loose plunger crosshead stub connection, or coupling misalignment. Other Multiples of Shaft Speed – An increase in vibration at other frequencies may be an indication of cavitation at several valves, looseness at multiple locations, or bearing degradation. There are no probable sub-synchronous failure modes associated with these pumps under normal operating conditions. Furthermore, there are no known failure mechanisms that would be revealed by monitoring vibration at frequencies below those related to shaft speed (3.3 Hz.). Based on the foregoing discussion, it is clear that monitoring pump vibration within the frequency range of 3 to 1000 Hz will provide adequate information for evaluating pump condition and ensuring continued reliability with respect to the pumps' function.
Proposed Alternative and Basis for Use:	Vibration levels of the CH pumps will be measured in accordance with the applicable portions of ISTB-3500 with the exception of the lower frequency response limit for the instrumentation (ISTB-3510(e)). In this case, the lower response limit for the vibration measuring equipment will be 3 Hz. In addition to measurement of the Code-required normal CH pump IST peak vibration, PVGS will routinely perform post spectral/waveform analysis of the vibration data to ensure no adverse trends toward mechanical degradation go undetected. Based on the determination that the proposed alternative provides an acceptable level of quality and safety, this proposed alternative is requested pursuant to 10 CFR 50.55a(z)(1).
Duration of Proposed Alternative:	The proposed alternative identified in this 10 CFR 50.55a request shall be utilized during the Fourth 10-year IST Interval beginning January 15, 2018, and ending January 14, 2028.

Charging Pump Vibration Instrumentation	
Precedents:	1. Duane Arnold Energy Center Relief Request PR-01: Letter from the NRC (David J. Wrona) to Duane Arnold Energy Center (Richard L. Anderson), Duane Arnold Energy Center – Relief Request No. PR-01, PR-02, VR-01, VR-02, and VR-03 Related to the Inservice Testing Program for the Fifth 10-Year Interval, dated January 21, 2016 (ADAMS Accession No. ML16008A086) 2. Monticello Nuclear Generating Plant PR-05: Letter from the NRC (Istvan Frankl) to Northern States Power Company – Minnesota (Mark A. Schimmel), Monticello Nuclear Generating Plant – Relief from the Requirements of the American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants for the Fifth 10-Year Inservice Testing Program Interval, dated September 26, 2012 (ADAMS Accession No. ML12244A272)
References:	1) 10 CFR 50.55a, Codes and standards 2) ASME OM Code 2012 Edition 3) Interval 4 SER, dated Dec. 28, 2017

G. Cold Shutdown Justification No. 1 (CSJ-01)

Cold Shutdown Justification No. 1 (CSJ-01)

Auxiliary Feedwater (AFW) Discharge Header Check Valve Open Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
AFAV015	AFW Pump AFA-P01 Discharge Header Check Valve	3	C	AFP-001 / E05
AFBV024	AFW Pump AFB-P01 Discharge Header Check Valve	3	C	AFP-001 / C05

Function	The check valves open to provide flow paths from the respective auxiliary feedwater pump to the auxiliary feedwater headers. They close so that if one pump fails to start after an auxiliary feedwater actuation signal (AFAS), flow from the operating pump is not diverted back through the idle pump.
Alternate Testing	The valves will be full-stroke exercised open during cold shutdown periods.
Basis	These are simple check valves with no external means of exercising or for determining disc position. Full-stroke exercising open during plant operation is not practical because this would inject cold auxiliary feedwater into the main feedwater lines. The resulting temperature perturbations could lead to unnecessary thermal shock / fatigue damage to the feedwater piping and steam generators, and the cool down of the reactor coolant system could cause undesirable reactivity variations and power fluctuations. The CSJ is similar to CSJ-3 in the second interval IST Program and CSJ-2 in the first interval IST Program.

H. Cold Shutdown Justification No. 2 (CSJ-02)

Cold Shutdown Justification No. 2 (CSJ-02)

AFW Header Check Valve Open Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
AFAV079	AFW Header Check Valve	2	C	AFP-001 / E02
AFBV080	AFW Header Check Valve	2	C	AFP-001 / C02

Function	The check valves have a safety function to OPEN to support injection of 650 gpm of auxiliary feedwater flow. The valve also has a safety function to CLOSE in order to isolate containment and to prevent diversion of feedwater flow.
Alternate Testing	The valves will be full-stroke exercised open and closed during cold shutdown periods.
Basis	These are simple check valves with no external means of exercising or for determining disc position. Full-stroke exercising during plant operation is not practical because this would inject cold auxiliary feedwater into the main feedwater lines. The resulting temperature perturbations could lead to unnecessary thermal shock / fatigue damage to the feedwater piping and steam generators, and the cool down of the reactor coolant system could cause undesirable reactivity variations and power fluctuations. This cold shutdown justification is similar to CSJ-4 in the second interval IST Program and CSJ-3 in the first interval IST Program.

I. Cold Shutdown Justification No. 3 (CSJ-03)

Cold Shutdown Justification No. 3 (CSJ-03)

Auxiliary Pressurizer Spray Valve Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
CHBHV0203	Auxiliary Pressurizer Spray Isolation Valve	1	B	CHP-001 / H10
CHAHV0205	Auxiliary Pressurizer Spray Isolation Valve	1	B	CHP-001 / H11

Function	These valves have an open safety function to provide flow from the charging pump discharge header to the pressurizer for auxiliary pressurizer spray and a close safety function for spray/pressure control.
Alternate Testing	The auxiliary pressurizer spray isolation valves will be full-stroke exercised open and closed during cold shutdown periods. Stroke time testing and fail-safe testing will be performed in conjunction with exercise tests.
Basis	Opening of the auxiliary pressurizer spray isolation valves during plant operation initiates spray flow to the pressurizer. This could cause an RCS pressure transient that could adversely affect plant safety and lead to a plant trip. In addition, the pressurizer spray piping and nozzle would be subjected to unnecessary thermal shock. Opening the valves during plant operation is considered impractical for these reasons. The cold shutdown justification is similar to CSJ-6 in the second interval IST Program and CSJ-6 in the first interval IST Program.

J. Cold Shutdown Justification No. 4 (CSJ-04)

Cold Shutdown Justification No. 4 (CSJ-04)

Letdown Isolation Valve Closed Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
CHBUV0515	Reactor Coolant Letdown Isolation Valve	1	B	CHP-001 / H15
CHAUV0516	Reactor Coolant Letdown Inbd. Isolation Valve	1	A	CHP-001 / G15
CHBUV0523	Reactor Coolant Letdown Otbd. Isolation Valve	1	A	CHP-001 / F13

Function	These valves open to provide a flowpath for reactor coolant letdown flow - non-safety function. CHBUV0515 and CHAUV0516 have a closed safety function to secure letdown on a Safety Injection Actuation signal (SIAS). CHAUV0516 and CHBUV0523 have a safety function to close on a Containment Isolation Actuation signal (CIAS) signal for containment isolation.
Alternate Testing	These valves will be full-stroke exercised closed during cold shutdown periods. Stroke time testing and fail-safe testing will be performed in conjunction with exercise test.
Basis	Closing any of these valves isolates the letdown line from the RCS. During plant operation, this would result in undesirable pressurizer level transients with the potential for a plant trip. If a valve failed to reopen, then a plant shutdown may be required. This cold shutdown justification is similar to CSJ-9 in the second interval IST Program and CSJ-8 in the first interval IST Program.

K. Cold Shutdown Justification No. 5 (CSJ-05)

Cold Shutdown Justification No. 5 (CSJ-05)

Shutdown Cooling Suction Isolation Valve Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
SICUV0653	Shutdown Cooling Suction Inboard Containment Isolation Valve	1	A	SIP-002 / D03
SIDUV0654	Shutdown Cooling Suction Inboard Containment Isolation Valve	1	A	SIP-002 / D10

Function	These valves have a normally closed safety function to ensure the integrity of the reactor coolant system and to provide containment isolation. They have an open safety function during plant cooldown to initiate shutdown cooling.
Alternate Testing	Each of these valves will be full-stroke exercised open and closed during cold shutdown periods.
Basis	These valves provide pressure barriers between the reactor coolant system pressure and the lesser rated shutdown cooling piping systems. As an installed safety feature, the valves are provided with electrical interlocks that prevent them from being opened when pressurizer pressure is greater than 400 psig. Although this interlock can be overridden, routine operation of these valves with a large differential pressure across the seats is considered impractical due to the risk of damage to the seating surfaces of the valves. This cold shutdown justification is similar to CSJ-27 in the second interval IST Program. This cold shutdown justification is similar to CSJ-24 in the first interval IST Program, except that Valves SIAHV0651, SIBHV0652, SIAUV0655 and SIB-UV0656 have been deleted from that CSJ due to the implementation of ASME OM Code Case OMN-1 in accordance with VRR-12.

L. Cold Shutdown Justification No. 6 (CSJ-06)

Cold Shutdown Justification No. 6 (CSJ-06)

Instrument Air Containment Isolation Valve Closed Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
IAAUV0002	Instrument Air Supply To Containment Isolation Valve	2	A	IAP-003 / G07

Function	This valve opens to provide flow for instrument air to the containment - non-safety function. The valve has a closed safety function to provide containment isolation.
Alternate Testing	IAAUV0002 will be full-stroke exercised closed during cold shutdown periods. Stroke time testing and fail-safe testing will be performed in conjunction with exercise testing.
Basis	Closing this valve during plant operation isolates instrument air to important equipment within the containment building, including the pressurizer spray control valves and letdown isolation valves. This would, in turn, risk pressurizer level and pressure transients with a potential for a plant trip. If IAAUV0002 were to fail to re-open, an expedited plant shutdown would be required. This cold shutdown justification is similar to CSJ-13 in the second interval IST Program and CSJ-13 and CSJ-14 in the first interval IST Program.

M. Cold Shutdown Justification No. 7 (CSJ-07)

Cold Shutdown Justification No. 7 (CSJ-07)

Reactor Head Vent and Pressurizer Vent Valve Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
RCAHV0101	Reactor Vessel Vent Valve	2	B	RCP-001 / G15
RCBHV0102	Reactor Vessel Vent Valve	2	B	RCP-001 / G15
RCAHV0103	Pressurizer Vent Valve	2	B	RCP-001 / G14
RCBHV0105	Reactor Coolant System Common Vent Valve To RDT	2	B	RCP-001 / G13
RCAHV0106	Reactor Coolant System Common Vent Valve To Containment	2	B	RCP-001 / G13
RCBHV0108	Pressurizer Vent Valve	2	B	RCP-001 / G13
RCBHV019	Pressurizer Vent Valve	2	B	RCP-001 / G13

Function	These valves have an open safety function to remotely vent non-condensible gasses from the reactor vessel or pressurizer steam space. They can also be used to depressurize the RCS. They have a safety function to close for reactor coolant system integrity.
Alternate Testing	These valves will be full-stroke exercised open and closed during cold shutdown periods. Stroke time testing and fail-safe testing will be performed in conjunction with the exercise testing.
Basis	These valves are administratively controlled in the keylocked closed position to prevent inadvertent operation. Since these are reactor coolant system boundary valves, failure of a valve to close or significant RCS leakage following closure can result in a loss of coolant in excess of the limits imposed by the Technical Specifications leading to a plant shutdown. Furthermore, if a valve were to fail open or valve indication fail to show the valve returned to the fully closed position after exercising, it is likely that a plant shutdown would be required. Note also that Technical Specifications require that these valves be closed in Modes 1-4. This cold shutdown justification is similar to CSJ-15 in the second interval IST Program and CSJ-16 in the first interval IST Program.

N. Cold Shutdown Justification No. 8 (CSJ-08)

Cold Shutdown Justification No. 8 (CSJ-08)

Feedwater Isolation Valve Closed Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
SGBUV0130	Inbd. FWIV to SG #1 Downcomer	2	B	SGP-002 / G11
SGBUV0132	Inbd. FWIV to SG #1 Economizer	2	B	SGP-002 / E12
SGBUV0135	Inbd. FWIV to SG #2 Downcomer	2	B	SGP-002 / C11
SGBUV0137	Inbd. FWIV to SG #2 Economizer	2	B	SGP-002 / A12
SGAUV0172	Otbd. FWIV to SG #1 Downcomer	2	B	SGP-002 / G12
SGAUV0174	Otbd. FWIV to SG #1 Economizer	2	B	SGP-002 / E12
SGAUV0175	Otbd. FWIV to SG #2 Downcomer	2	B	SGP-002 / C12
SGAUV0177	Otbd. FWIV to SG #2 Economizer	2	B	SGP-002 / A12

Function	The main feedwater isolation valves (FWIVs) are normally open during steaming operations to provide flowpaths for main feedwater flow to the steam generators - non-safety function. They have a closed safety function to isolate and maintain the integrity of the steam generators and to secure feeding a faulted steam generator in the event of a steam leak inside containment.
Alternate Testing	Each of these valves will be full-stroke exercised closed during cold shutdown periods. Stroke time testing and fail-safe testing will be performed in conjunction with the exercise testing.

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
Basis	Closing any of these valves isolates the associated feedwater header. During plant operation, isolation of a feedwater header would require a significant power reduction and could result in unacceptable steam generator level and reactor power transients with the potential for a plant trip. The downcomer isolation valves do not have partial-stroke capability, however the economizer isolation valves are capable of partial stroke exercising. Part-stroke exercising is not considered practical because of the risk of full closure. This risk was recognized by NUREG-1432, Volume 1, Revision 1, "Standard Technical Specifications - Combustion Engineering Plants Specifications", which states that, "MFIVs should not be tested at power since even a part stroke exercise increases the risk of a valve closure with the unit generating power" as the basis for the 18-month test frequency specified by SR 3.7.3.1. Nevertheless, part-stroke exercising continues to be performed as an augmented test to satisfy System and Maintenance Engineering's desire to periodically exercise the 4-way pilot valves to confirm continued operability. This cold shutdown justification is similar to CSJ-18 in the second interval IST Program and CSJ-17 and CSJ-26 in the first interval IST Program.			

O. Cold Shutdown Justification No. 9 (CSJ-09)

Cold Shutdown Justification No. 9 (CSJ-09)

Main Steam Isolation Valve Closed Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
SGEUV0170	Main Steam Isolation Valve From Steam Gen. #1	2	B	SGP-001, Sh. 1/G10
SGEUV0171	Main Steam Isolation Valve From Steam Gen. #2	2	B	SGP-001, Sh. 1/D10
SGEUV0180	Main Steam Isolation Valve From Steam Gen. #1	2	B	SGP-001, Sh. 1/F10
SGEUV0181	Main Steam Isolation Valve From Steam Gen. #2	2	B	SGP-001, Sh. 1/B10

Function	These valves are normally open during steaming operations to provide flow paths for steam flow to the main turbine generators and associated auxiliaries - non-safety function. They have a closed safety function to isolate and maintain the integrity of the steam generators.
Alternate Testing	Full stroke testing of the MSIVs will occur only in Mode 3 or lower. Each of these valves will be full-stroke exercised closed during cold shutdown periods. Stroke time testing and fail-safe testing will be performed in conjunction with exercise testing.
Basis	Closing any of these valves isolates the associated steam header. During plant operations, isolation of a main steam header would require a significant power reduction and could result in unacceptable steam generator level and reactor power transients with the potential for a plant trip. The main steam isolation valves are capable of partial stroke exercising. Part-stroke exercising is not considered practical because of the risk of closure. This risk was recognized by NUREG-1432, Volume 1, Revision 1, "Standard Technical Specifications - Combustion Engineering Plants Specifications," which states that, "MSIVs should not be tested at power since even a part stroke exercise increases the risk of a valve closure with the unit generating power" as the basis for the 18-month test frequency specified by SR 3.7.2.1. This cold shutdown justification is similar to CSJ-19 in the second interval IST Program and CSJ-25 in the first interval IST Program.

P. Cold Shutdown Justification No. 10 (CSJ-10)

Cold Shutdown Justification No. 10 (CSJ-10)

SIT Vent Valve Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
SIAHV0605	Safety Inj. Tank 2A Vent Valve	2	B	SIP-002 / F15
SIAHV0606	Safety Inj. Tank 2B Vent Valve	2	B	SIP-002 / F12
SIAHV0607	Safety Inj. Tank 1A Vent Valve	2	B	SIP-002 / F07
SIAHV0608	Safety Inj. Tank 1B Vent Valve	2	B	SIP-002 / F04
SIBHV0613	Safety Inj. Tank 2A Vent Valve	2	B	SIP-002 / E15
SIBHV0623	Safety Inj. Tank 2B Vent Valve	2	B	SIP-002 / E12
SIBHV0633	Safety Inj. Tank 1A Vent Valve	2	B	SIP-002 / E07
SIBHV0643	Safety Inj. Tank 1B Vent Valve	2	B	SIP-002 / E04

Function	These valves have a normally closed safety function to ensure the integrity of the associated safety injection tank (SIT) so that the required nitrogen overpressure is maintained. They have an open safety function to reduce the nitrogen pressure in the SITs during RCS depressurization to preclude nitrogen injection into the RCS.
Alternate Testing	Each of these valves will be exercised open and closed during cold shutdown periods. Stroke time testing and fail-safe testing will be performed in conjunction with exercise testing.
Basis	These valves are normally closed during plant operation. Plant technical specifications require that power be removed from the valves, and that the SIT nitrogen cover gas pressure be maintained within the required range. Exercising a valve during operation would render the associated SIT inoperable if the cover gas pressure were reduced below the required range. A valve failing open during testing would completely depressurize the SIT and result in an expedited plant shutdown. This cold shutdown justification is similar to CSJ-26 in the second interval IST Program and CSJ-22 in the first interval IST Program.

Q. Refueling Outage Justification No. 1 (ROJ-01)

Refueling Outage Justification No. 1 (ROJ-01)

Containment Refueling Purge Valve Closed Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
CPAUV0002A	Containment Purge Supply Otbd. Isolation Valve	2	B	CPP-001 / D06
CPAUV0002B	Containment Purge Exhaust Inbd. Isolation Valve	2	B	CPP-001 / E03
CPBUV0003A	Containment Purge Supply Inbd. Isolation Valve	2	B	CPP-001 / D05
CPBUV0003B	Containment Purge Exhaust Otbd. Isolation Valve	2	B	CPP-001 / E02

Function	These 42" valves open to provide flowpaths for containment ventilation during shutdown periods - non-safety function. They have a safety function to close on a containment purge isolation actuation signal (CPIAS) during a loss of shutdown cooling or a fuel handling accident in containment. They are locked closed and blind flanged during plant operation (Modes 1-4).
Alternate Testing	These valves will be full-stroke exercised closed during refueling outage periods. Stroke time testing will be performed in conjunction with exercise test.
Basis	Per PVGS Technical Specification 3.6.3.1, these valves must remain closed during plant operation. These valves are administratively maintained in the closed position at all times when the plant is operating in Modes 1-4. The valves are not capable of closing against accident pressure. The outboard valves are blocked closed by the installation of blind flanges during Mode 1-4. Thus, they are not required to operate (stroke closed) during operational periods. Due to the large size of these valves and the potential for damage as a result of frequent cycling, it is not prudent to operate them more than is absolutely necessary. The blind flanges are only removed to place the refueling purge system inservice. This refueling outage justification is similar to CSJ-10 in the second interval IST Program and CSJ-11 in the first interval IST Program. The change to a refueling interval is based on the addition of blind flanges to ensure closure during plant operation.

R. Refueling Outage Justification No. 2 (ROJ-02)

Refueling Outage Justification No. 2 (ROJ-02)

RCP Seal Bleed-Off Isolation Valve Closed Exercising

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
CHBUV0505	Reactor Coolant Pump Seal Bleed-off Otbd. Isolation Valve	2	A	CHP-002 / H13
CHAUV0506	Reactor Coolant Pump Seal Bleed-off Inbd. Isolation Valve	2	A	CHP-002 / H14

Function	These valves are normally open during plant operation to provide a flowpath for seal bleed-off from the reactor coolant pumps (RCPs) – non-safety function. They have a closed safety function for containment isolation.
Alternate Testing	These valves will be exercised closed during refueling outage periods. Stroke time testing and fail safe testing will be performed in conjunction with exercise testing.
Basis	These air-operated valves cannot be closed when any of the reactor coolant pumps are in operation. Closing either of these valves during RCP operation would interrupt normal bleed-off flow from the RCP seals and could result in damage to the seals. Thus testing these valves during plant operation would require the unnecessary shutdown of all of the reactor coolant pumps. Operation of seal injection is also maintained during cold shutdown periods. It is noted that paragraph 3.1.1.4 of NUREG-1482, Revision 2, permits deferral of tests that require shutdown of RCPs until refueling outages. This refueling outage justification is similar to CSJ-32 in the second interval IST Program and CSJ-7 in the first interval IST Program. The change to a refueling outage interval is based on seal injection being used during cold shutdown periods.

S. Refueling Outage Justification No. 3 (ROJ-03)

Refueling Outage Justification No. 3 (ROJ-03)

HPSI, LPSI, CS Recirc Line Check Valve Bi-Directional Closed Testing

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
PSIAV424	HPSI Pump Recirc Line Check Valve	2	C	SIP-001 / F10
PSIAV451	LPSI Pump. Recirc Line Check Valve	2	C	SIP-001 / G11
PSIAV486	Containment Spray Pmp. Recirc Line CV	2	C	SIP-001 / G10
PSIBV426	HPSI Pump Recirc Line Check Valve	2	C	SIP-001 / A10
PSIBV448	LPSI Pmp. Recirc Line Check Valve	2	C	SIP-001 / B10
PSIBV487	Containment Spray Pmp. Recirc Line CV	2	C	SIP-001 / C10

Function	These valves have no safety function in the CLOSED position. In the event of a failed SI pump mini-flow check valve, the path of least resistance for a different SI pump's recirculation flow would be through the return lines, not the idle pump. The flow balance on this lineup would not provide sufficient flow to give motion to an idle pump. These normally closed check valves perform an ACTIVE safety function in the OPEN position to provide a minimum flow recirculation flowpath.
Alternate Testing	Each of these valves will be exercised open and bi-directionally closed at an interval controlled by the Check Valve Condition Monitoring Program. These testing activities are normally performed during refueling shut down periods but may be executed to support Post Maintenance Testing of the check valves at time other than plant shut down.

Valve ID	Valve Description	Code Class	Category	Drawing/Coord.
Basis	Difficulties in achieving consistent Bi-Directional Closure (BDC) Test results of the HPSI, LPSI, CS Recirc Line Check Valves using a "reverse pressure drop" methodology has resulted in the alternative to use a "reverse leakage flow" methodology for BDC Testing purposes. The reverse flow test methodology relies on establishing a source of pressure (demineralized water supply) applied to the downstream (outlet) side of the pump recirculation check valves while maintaining the upstream (inlet) side of the check valves at a lower pressure (Refueling Water Tank water level as the source of pressure). A flow meter in the demineralized water supply line is used to determine if the check valve is leaking. Motor Operated Valves (MOVs) located in the pump recirculation can be closed, as necessary, to assist in identifying which, if any of the three (per train) check valves, is the cause of the reverse flow leakage. Reverse flow leakage limits for BDC Testing are administratively controlled in accordance with the Check Valve Condition Monitoring Program and its associated test procedures for the check valves. The test interval of a refueling outage is sufficiently short to be within the required BDC test frequency for the check valves as established by the Check Valve Condition Monitoring Program.			
References	CRDR 4038258, PCR 4113324, PCR 4113320 and PCR 4324705. Refer to Developmental References for more information on content of the actions.			

4.15 Notes and Legends

Notes	
Note 1	Whenever check valve is disassembled for inspection, perform a manual exercise per 73ST-9ZZ25.
Note 2	Manual exercise per 73ST-9ZZ25 can be substituted for the regular check valve exercise test.
Note 3	Perform a partial stroke exercise with flow after reassembly, if practical.
Note 4	Check valve is tested under the PVGS Check Valve Condition Monitoring Program and 73DP-9XI05.
Note 5	As provided for in ASME OM Code Mandatory Appendix III, MOVs are tested in the PVGS 89-10 Program in lieu of the stroke time test and valve position verification surveillances that were performed in the past. Mandatory Appendix III requires Active MOVs to be exercised at least once per fuel cycle (1CY). More frequent exercising is performed for HSSC MOVs and at the Licensee's discretion as delineated in the component tables. Post maintenance retest requirements for MOVs are specified in 73DP-9ZZ12, Motor Operated Valve (MOV) Program - Appendix E.
Note 6	A 42-inch refueling purge valve is not a required containment isolation valve when the flow path is isolated with a blind flange tested per TS SR 3.6.1.1 (TS LCO 3.6.3 Note 5)

Pump Table Legend	
Pump ID	Plant equipment identifier. The first 2 letters in the ID indicate the system.
Description	Name / description of the pump
Code Class	ISI classification of the pump: 1, 2, 3, or N (non-class)
Drawing / Coord.	Piping and Instrument Diagram number and coordinates showing the pump
Test Parameters	The table indicates the frequency which pump speed, pressure, flow rate, and vibration are measured, along with any applicable relief requests
Test Procedure	Procedures which satisfy the testing requirements
Remarks	Additional explanation or clarification.

Valve Table Legend	
Valve ID	Plant equipment identifier. The first 2 letters in the ID indicate the system.
Description	Name / description of the valve
Drawing	Piping and Instrument Diagram number showing the valve
Coord	Coordinates where the valve is located on the drawing
Sht#	Drawing sheet number
Code Class	ISI classification of the valve: 1, 2, 3, or N (non-class)
Size	Nominal pipe size of the valve, in inches
Type	Valve type: BF - Butterfly Valve CK - Check Valve DI - Diaphragm valve GA - Gate Valve GL - Globe Valve PSV - Pressure Safety Relief Valve RD - Rupture Disk VR - Vacuum Relief
Act.	Valve actuator type: AO - Air Operated HY - Hydraulically Operated MA - Manually Operated MO - Motor Operated SA - Self Actuating SO - Solenoid Operated
Cat.	A, B, C, or D, per ISTC-1300, "Valve Categories"
A/P	A (active) or P (passive) valve, per ISTA-2000, "Definitions"
Safety Position	Normal Position: O (open) or C (closed)Safety position: O (open), C (closed), or O/C (both open and closed).Fail Safe: AI (as is), N (none), O (open) or C (close)
Test	Tests performed on the valve. The first two letters indicate the type of test: LJ - Appendix J Leak Test (Type A or C) BD - Bi-Directional Check Valve Test (non-safety direction) CV - Check Valve Test (safety function direction) FS - Full Stroke Exercise Test FT - Fail Safe Test LT - Leak Test other than an Appendix J Test PS - Partial Stroke Exercise Test REP - Replacement ST - Stroke Time Test SV - Pressure Safety Relief Valve Test VP - Valve Position Indication TestA third letter is used where required to indicate stroke direction: O (open) or C (closed), or a special activity, like I (inspection).
Freq	Frequency at which a test is performed: CLR - Per the Containment Leak Rate Program CMP - Per the Check Valve Condition Monitoring Program CSD - Cold Shut Down QTR - Quarterly RFO - Refueling Outage STF - Special Test Frequency 6M - Once per 6-months 1YR - Once per year 18M - Once per 18 months 1CY - Once per fuel cycle 2YR - Once every 2 years 5YR - Mandatory Appendix I-1320 (at least once every 5 years) 10Y - Mandatory Appendix I-1350 (at least once every 10 years)
Procedure	Procedure in which the test is performed.

Valve Table Legend	
CSJ/ROJ/VRR	Applicable Cold Shutdown Justification, Refueling Outage Justification, or Valve Relief Request.
Remarks	Additional explanation or clarification.

4.16 MOV Scope

4.16.1 The scope of the MOV program per GL 89-10, 96-05, and ASME OM Code Mandatory Appendix III is delineated in 73DP-9ZZ12, Motor Operated Valve (MOV) Program, Appendices A, B, D & E. The MOV program uses the Midas software suite for documenting MOV scope, design basis calculations, pre and post-test reviews of diagnostic tests and component trending.

4.17 Periodic Pump Verification Test

4.17.1 Analysis of OM Code Appendix V Pump Periodic Verification Test Program requirements determined existing pump testing meets the Appendix V requirements. The evaluation is documented in the EP-Plus pump basis.

5.0 REFERENCES

5.1 Implementing References

5.1.1 01DP-0AP12, Condition Reporting Process

5.1.2 30DP-9MP01, Conduct of Maintenance

5.1.3 30DP-9WP04, Post-Maintenance Testing Development

5.1.4 65DP-0QQ01, Industry Operating Experience Review

5.1.5 73DP-0AP05, Engineering Programs Management and Health Reporting

5.1.6 73DP-9XI05, Check Valve Condition Monitoring Program

5.1.7 73DP-9ZZ12, Motor Operated Valve (MOV) Program

5.1.8 73DP-9ZZ13, Motor Operate Valve - Thrust and Torque Calculations

5.1.9 73DP-9ZZ14, Surveillance Testing

5.1.10 73DP-9ZZ18, Motor Operated Valve-Post Test Evaluations

5.1.11 73DP-9ZZ19, Motor Operated Valve-Trending of Test Results

5.1.12 73DP-9ZZ26, Motor Operated Valve (MOV) Testing with Quiklook

5.1.13 73DP-9ZZ35, Aging Management of Motor-Operated Valves

5.1.14 73ST-9ZZ25, Check Valve Disassembly, Inspection, and Manual Exercise

5.1.15 81DP-0EE10, Design Change Process

5.1.16 84DP-0RM38, Document Management Control

5.1.17 93DP-0LC07, 10CFR 50.59 and 72.48 Screenings and Evaluations

5.1.18 10CFR 50.55, Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses (a)

5.1.19 ASME/ANSI OM Code 2012 Edition

5.1.20 ESP02-XX-008, Inservice Testing

5.1.21 ESP02-XX-009, IST Pumps

5.1.22 ESP02-XX-010, IST Valves

5.1.23 Interval 4 SER, dated Dec. 28, 2017

5.1.24 ISTA-1000, Introduction

5.1.25 ISTA-1100, Scope

5.1.26 ISTA-1500, Owner's Responsibilities

5.1.27 ISTA-2000, Definitions

5.1.28 ISTA-3100, Test and Examination Program

5.1.29 ISTA-3110, Test and Examination Plans

5.1.30 ISTA-3130 (d), Application of Code Cases

5.1.31 ISTA-9230, Inservice Test and Examination Results

5.1.32 Table ISTB-3000-1, Inservice Test Parameters

5.1.33 ISTB-3100, Tests and Examination Program

5.1.34 ISTB-3300, Reference Values

5.1.35 ISTB-3310, Effect of Pump Replacement, Repair and Maintenance on Reference Values

5.1.36 ISTB-3320, Establishment of Additional Set of Reference Values

5.1.37 Table ISTB-3400-1, Inservice Test Frequency

5.1.38 ISTB-3500-1, Required Instrument Accuracy

5.1.39 ISTB-3510(b), Range

5.1.40 ISTB-3510(e), Frequency Response Range

5.1.41 ISTB-3540, Vibration

5.1.42 ISTB-5100 (b), Bypass Loops

5.1.43 ISTB-5100-1, Centrifugal Pumps

5.1.44 ISTB-5121, Group A Test Procedure

5.1.45 ISTB-5122, Group B Test Procedure

5.1.46 ISTB-5123, Comprehensive Test Procedure

5.1.47 ISTB-5200, Vertical Line Shaft Centrifugal Pumps

5.1.48 ISTB-5300, Positive Displacement Pumps

5.1.49 ISTB-5110, Preservice Testing

5.1.50 ISTB-5210, Preservice Testing

5.1.51 ISTB-5310, Preservice Testing

5.1.52 ISTB-6200, Corrective Action

5.1.53 ISTB-6300, Systematic Error

5.1.54 ISTC-1300, Valve Categories

5.1.55 ISTC-3310, Effects of Valve Repair, Replacement, or Maintenance on Reference Values

5.1.56 ISTC-3320, Establishment of Additional Set of Reference Values

5.1.57 ISTC-3521, Category A and Category B Valves

5.1.58 ISTC-3522, Category C Check Valves

5.1.59 ISTC-3530, Valve Obturator Movement

5.1.60 ISTC-3610, Scope of Seat Leakage Rate Test

5.1.61 ISTC-3620, Containment Isolation Valves

5.1.62 ISTC-3630, Leakage Rate for Other Than Containment Isolation Valves

5.1.63 ISTC-3700, Position Verification Testing

5.1.64 ISTC-5000, Specific Testing Requirements

5.1.65 ISTC-5113, Valve Stroke Testing

5.1.66 ISTC-5114, Stroke Test Acceptance Criteria

5.1.67 ISTC-5121, Valve Stroke Testing

5.1.68 ISTC-5131, Valve Stroke Testing

5.1.69 ISTC-5141, Valve Stroke Testing

5.1.70 ISTC-5133, Stroke Test Corrective Action

5.1.71 ISTC-5142, Stroke Test Acceptance Criteria

5.1.72 ISTC-5143, Stroke Test Corrective Action

5.1.73 ISTC-5152, Stroke Test Acceptance Criteria

5.1.74 ISTC-5153, Stroke Test Corrective Action

5.1.75 ISTC-9100, Records

5.1.76 ISTC-9200, Test Plans

5.1.77 II-6000, Documentation

5.1.78 NUREG-1482, Guidelines for Inservice Testing at Nuclear Power Plants

5.1.79 Regulatory Guide 1.192, Operation and Maintenance Code Case Acceptability, OM Code

5.1.80 UFSAR Chapters 6, Engineered Safety Features

5.1.81 UFSAR 15, Accident Analyses

5.2 Developmental References

5.2.1 Developmental References are located in the Basis Document. ⓘ

6.0 RECORDS

6.1 None.

Appendix A - Determining When a Valve Exercise Test is "Not Practiable" (TP-07)

1. This Appendix contains TP-07 Determining When a Valve Exercise Test is "Not Practicable", Revision 2

Determining When a Valve Exercise Test is "Not Practicable"	Number:	**TP-07**
	Revision:	**2**

Position

The Code permits valve exercise tests to be deferred from quarterly to cold shutdown or refueling outages when testing is "not practicable" during plant operation. A test may be considered "not practicable" in the following cases:

- Design limitations preclude testing. This includes limitations of geometry and materials of construction of components. Examples include lack of test taps, pumps that cannot overcome pressure, or no available flow path. It also includes situations where measurements or observations cannot be made because of physical constraints, e.g. the component is located in an area inaccessible during power operation. Opening a mechanical joint such as a flange or valve bonnet is generally not considered practicable.
- Testing as required by the Code could cause significant equipment damage or place undue stress on components in certain plant conditions. This includes cycling of equipment that could unnecessarily reduce the life expectancy of plant systems or components. Examples include:
  - ◊ Stopping and restarting reactor coolant pumps at each cold shutdown solely to allow for the testing of certain valves. This would increase the wear and stress on pumps, increase the number of cycles of plant equipment, and extend the length of cold shutdown outages.
  - ◊ Shutting off cooling flow to an operating pump by exercising a valve in the cooling flow path, if interrupting the cooling flow could damage the pump.
  - ◊ Exercising valves which, when cycled, could subject a system to pressures in excess of their design pressures. In these cases, it may be assumed that one or more of the upstream check valves has failed unless positive methods are available for determining the pressure or lack thereof on the high-pressure side of the valve to be cycled. Valves in this category would typically include the isolation valves of the shutdown cooling system and, in some cases, certain ECCS valves.
- Testing could cause a plant trip, result in an unnecessary plant shutdown, or require a power reduction.
- Testing could cause unnecessary challenges to plant safety systems, such as tests where failure of a component during testing could disable multiple trains of a safety system. Examples include:
  - ◊ Valves whose failure in a non-conservative position during an exercising test would cause a total loss of system function (i.e. render both trains unable to perform their safety function), such as non-redundant valves in lines shared by both trains of a safety system.

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◊ Valves whose failure to close during a cycling test would result in a loss of containment integrity, such as valves in containment penetrations where the redundant valve is open and inoperable.

- Testing involves excessive radiation exposure or risk to personnel safety. ALARA (as low as reasonably achievable) is part of an overall program as required by 10CFR 20.1101, including activities such as Inservice Testing (IST). ALARA generally relates to controlling exposure during an activity, not specifically to eliminating activities; however, it may be a basis for deferring a test that is not practicable when exposure limits to perform testing (or possibly to access a valve for repair in the event it could fail during a test) is prohibitive. The NRC has not established ALARA "predetermined acceptable limits" for deferring an IST activity. ASME Section XI Code Case N-444 gives guidance on documenting ALARA as justification for alternative examinations and tests. If the exposure limits are prohibitive, testing may be deferred to cold shutdown or refueling outages when the exposure limits are no longer prohibitive.
- Check valves can be stroked quarterly, but must be monitored by a non-intrusive technique to verify full stroke. Full-stroke testing may be deferred to cold shutdowns or refueling outages if another method of verifying full-stroke exists at these plant conditions. However, the quarterly part-stroke testing would continue to be required, if practicable. The NRC is not requiring licensees to invest in non-intrusive equipment for the purpose of testing check valves quarterly in lieu of testing during cold shutdowns or refueling outages, though the use of nonintrusive techniques is recommended where practicable.
- Containment entry during power operation to perform quarterly valve exercise tests is generally not considered practicable. (i.e. entry into an inerted containment atmosphere)
- The need to set up test equipment may be adequate justification to defer check valve closure testing until a cold shutdown or refueling outage depending on the type and amount of test equipment required and the accessibility of the installation location. Deferrals must be evaluated on a case by case basis.

Limiting Condition for Operation (LCO) Considerations

Entry into an LCO is not sufficient as sole justification for deferring IST. Additional justification must be included in addition to entry into an LCO. If the deferral cannot be justified by additional basis, testing must be performed quarterly or during Cold Shutdown (as justified), with entry into the LCO for IST to be completed within the out-of-service time allowed by the Technical Specification (TS). If a system or subsystem is designed to realign automatically during testing and, therefore, is not considered out of service, the licensee need not enter an LCO.

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Risk / Safety Considerations

Some tests involve hardships which significantly increase the risk associated with performance of the test. The risk of performing these tests quarterly may outweigh the safety benefit achieved. Examples of hardships which may fall in this group include the need to enter a LCO of 3 to 4 hours in length, the repositioning of a breaker, or the necessity of manual operator actions to restore the system if an accident occurred while the test is in progress. In cases like this, the safety impact of performing the test can be weighed against the benefits of testing as a basis for deferring testing from quarterly to cold shutdowns or refueling outages. A method of doing this is described in NUREG/CR-5775.

When a train is removed from service to perform surveillance testing, technical specifications typically require that the other train is operable. The out-of-service time of the tested train should be minimized. The probability of a design basis accident occurring during the short period of time a train is out of service is considered low, while the assurance of component operational readiness through surveillance testing provides an increased level of safety. However, IST which results in a system being completely removed from service (i.e. both trains inoperable) may not be acceptable for safety. Entry into multi-train LCOs should be avoided.

Basis

The Code generally requires quarterly exercising of valves. OM Code 2012 Edition paragraphs ISTC-3521 and ISTC-3522 allow deferring valve exercising from quarterly to cold shutdown outages or refueling outages if exercising is not practicable during power operation. However the Code leaves the determination of what is "not practicable" up to the Owner. NUREG-1482, Rev. 2, sections 2.4.5, 2.5.1, 3.1.1, 3.1.2, and 4.1.6 provide guidance on what the NRC considers "not practicable". The position stated above is based on this guidance.

There is a slight difference between the definitions of "practical" and "practicable" which is not important for this discussion. The guidelines outlined above, not the dictionary definitions, should be used to determine test deferral. The term "practicable" is used in this discussion to be consistent with the OM Code.

References

1. Code of Federal Regulations, Title 10, Part 50, 10 CFR 50.55a, "Codes and standards"
2. Code of Federal Regulations, Title 10, Part 20, 10 CFR 20.1101, "Radiation Protection Programs"
3. NUREG-1482, Rev. 2,"Guidelines for Inservice Testing at Nuclear Power Plants", October 2013

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4. NUREG/CR-5775, "Quantitative Evaluation of Surveillance Test Intervals Including Test-Caused Risks"
5. NRC Inspection Manual Part 9900, "Technical Guidance - Maintenance - Voluntary Entry into Limiting Conditions for Operation Action Statements to Perform Preventive Maintenance"
6. ASME OM Code 2012 Edition, "Code for Operation and Maintenance of Nuclear Power Plants"
7. ASME Section XI Code Case N-444, "Preparation of Inspection Plans"

Revision Record

Rev. 2	- Changed NUREG-1482 revision from 1 to 2 (2 places) - Changed OM Code from 2001 Edition with 2003 Addenda to 2012 Edition (2 places)
Rev. 1	Clarified "burden" caused by setup of test equipment. Updated references to the current Code of Record for the IST Program and identified applicable subsection paragraphs. Updated reference to Revision 1of NUREG 1482. Changed references from a bulleted format to a number format. Moved signature block from first page to last page.

Review and Approval

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Appendix B - Clarifications to Valve Stroke Timing Requirements (TP-04)

1. This Appendix contains TP-04 Clarifications to Valve Stroke Timing Requirements Revision 3

Technical Position
PVNGS Pump and Valve IST Program Page 1 of 6

Clarifications to Valve Stroke Timing Requirements	Number:	TP-04
	Revision:	3

Position

When power-operated valves' new stroke time reference values are established the new reference values may be based on an average of multiple successful test performances on file in IST at the time (or multiple post maintenance stroke tests).

Reference Ranges and Acceptance Criteria will be based on the reference values, as shown in Table 1. It may be possible to justify different Acceptance Criteria in certain cases.

Table 1: Reference Ranges and Acceptance Criteria

Operator Type	Reference Value (Vr)	Reference Range	Acceptance Criteria[1]
Non-MOV (AOV, SOV, etc.)	> 10 sec	± 25% Vr	≤ 1.5 Vr
	≤ 10 sec	± 50% Vr	≤ 2 Vr

[1]Unless a more limiting criteria exists, or in certain cases where other criteria is justified

Acceptance Criteria for Rapid-Acting valves will be ≤ 2.0 seconds.

New reference values, Reference Ranges, Acceptance Criteria, and determinations of "Rapid-Acting" will be documented in Condition Reports (CRs) or other permanent plant documentation.

Basis

This Technical Position discusses changes to stroke timing reference values and Acceptance Criteria to satisfy the requirements of the OM Code and the recommendations of NUREG-1482, Rev. 2. Note that PVNGS uses different terminology than the OM Code to prevent confusion regarding Acceptance Criteria, as shown in Table 2. This Technical Position uses the PVNGS terminology unless stated otherwise.

Table 2: PVNGS and OM Code Terminology Differences

PVNGS Term	OM Code Term	Condition
Reference Range	Acceptance Criteria	Corrective action must be taken when the stroke time is outside this range or value
Acceptance Criteria	Limiting Value of Stroke Time	Component must be declared out of service when the stroke time exceeds this value

Clarifications to Valve Stroke Timing Requirements	Number:	TP-04
	Revision:	3

The Need to Establish New Reference Values

Accurate reference values are necessary to ensure that valves stroke within the Reference Range when they are operating acceptably. There are several reasons why the existing reference values may not be accurate. Maintenance or normal wear could have affected the performance of the valve, or the reference value might not have been representative of valve performance at the time it was established.

Basis and Methodology for Establishing New Reference Values

73DP-9XI01 requires determining reference values from inservice testing when the component is known to be operating acceptably and reconfirming or re-establishing reference values after maintenance, but does not address cases when reference values are simply no longer representative of valve performance.

The OM Code has no clear guidance on this subject either. Like 73DP-9XI01, the OM Code includes requirements that reference values be determined from inservice testing when the component is known to be operating acceptably (ISTC-3300), and that reference values must be reconfirmed or re-established after maintenance (ISTC-3310). ISTC-3320 also gives guidance for establishing additional sets of reference values (run the test under the old conditions, and if operation is acceptable, run the test again under the new conditions to establish the new reference values).

Although the Code and current procedures do not provide direction on changing reference values in cases like this, they do not prohibit it either. Since accurate reference values are important when stroke timing valves per the OM Code, new reference values should be established (or the old values reconfirmed) based on valve performance history. If new reference values are established, they must be based on test results when the valve is known to be operating acceptably (ref. 73DP-9XI01 and OM Code ISTC-3300). Averaging recent successful tests is an acceptable method of doing this (ref. NUREG-1482, Rev. 2, section 4.2.1). Three tests are considered the minimum acceptable number sufficient to characterize a valve's performance. If the stroke times being averaged include one or more "outliers" that are significantly different from the rest of the population being considered, the reason for the deviation should be identified (maintenance, unusual test conditions, etc.) or additional data points should be used to ensure that the final reference value is truly representative.

Reference Ranges

Power-operated valves are assigned a stroke time Reference Range per OM Code ISTC-5114, ISTC-5132, ISTC-5142 or ISTC-5152. The span of the Reference Range varies with the type of valve and the reference value, as shown in Table 1. Since Reference Ranges are specified by the Code, less conservative Reference Ranges cannot be used without regulatory approval.

Clarifications to Valve Stroke Timing Requirements	Number:	TP-04
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Acceptance Criteria

OM Code ISTC-5115(a), ISTC-5133(a), ISTC-5143(a) and ISTC-5153(a) require declaring a valve inoperable if the stroke time exceeds the "limiting value of full-stroke time" (OM Code terminology). OM Code ISTC-5113(b), ISTC-5131(b), ISTC-5141(b), and ISTC-5151(b) state that the limiting value(s) of full-stroke time shall be specified by the Owner. The Code gives no further guidance on how the Owner is to specify these values. However; in NUREG-1482, Rev. 2, paragraph 4.2.1, "Stroke-Time Testing For Power-Operated Valves," the NRC gives the following guidance regarding limiting values of full stroke time:

> *"The limiting value of full-stroke time should be based on the reference (or average) stroke time of a POV [power operated valve] when it is known to be in good condition and operating properly. The limiting value should be a reasonable deviation from this reference stroke time, based on the size and type of the valve and power actuator. The deviation should not be so restrictive that it results in a POV being declared inoperable as a result of reasonable stroke time variations. However, the deviation used to establish the limiting value should be such that corrective action would be taken to provide assurance that the POV would remain capable of performing its safety function."*
>
> *"... if the TS or safety analysis limit for a POV is less than the IST value established using the above guidelines, the TS or safety analysis limit should be used as the limiting value of full-stroke time. When the TS or safety analysis limit for a POV is greater than the IST value established using the above guidelines, the limiting value of full-stroke time should be based on the above guidelines instead of the TS or safety analysis limit."*

This guidance will be implemented by determining stroke time Acceptance Criteria in accordance with the following policy:

- Acceptance criteria will not exceed the maximum stroke times specified by or assumed in the Technical Specifications, UFSAR, safety analysis, or design basis. Minimum stroke time limits (if they exist) will also be met.
- Acceptance criteria may be set at double the code-prescribed percentage for the Reference Range, as shown in Table 1, unless a more limiting criteria exists, or in certain cases where other criteria is justified. The standard industry practice has shown that doubling the code-prescribed percentage allows for reasonable stroke time variations, yet ensures that corrective action will be taken for a valve that may not perform its intended function. Since this is a guideline, exceptions will be justified and documented on a case-by-case basis.

Clarifications to Valve Stroke Timing Requirements	Number:	TP-04
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Rapid-Acting Valves

Power operated valves which would have reference values less than 2 seconds may be treated as "Rapid-Acting" valves. The Acceptance Criteria for Rapid-Acting valves is ≤ 2 seconds per OM Code ISTC-5114(c), ISTC-5132(c), ISTC-5142(c) and ISTC-5152(c). Since Rapid-Acting valve Acceptance Criteria are specified by the Code, values greater than 2.0 seconds cannot be used without regulatory approval. The margin between the normal stroke time and the 2 second Acceptance Criteria and the variability of previous stroke time test results should both be considered when deciding whether a valve should be treated as Rapid-Acting. In general, a valve should use the rapid acting criteria when the average stroke time is less than 1.3 seconds.

Contingencies Under the OM Code

The OM Code requires a second stroke time test if the initial stroke time is outside the Reference Range. The "Contingencies" section of the IST valve stroke timing procedures contain the following to ensure compliance with OM Code ISTC-5115, ISTC-5133, ISTC-5143, and ISTC-5153:

1. If a valve fails to exhibit the required change in position, the valve is declared inoperable.
2. If a valve stroke time is greater than the Acceptance Criteria, the valve is declared inoperable.
3. If a valve stroke time is outside of the Reference Range but satisfies the Acceptance Criteria, the valve is retested as soon as the system can be returned to the pretest configuration.
   - If the retest stroke time is in the Reference Range, Valve Services Maintenance is contacted to evaluate the cause of the initial stroke time being outside the Reference Range. This evaluation can be documented in one of the following ways:
     - ◊ The evaluation itself is placed in the surveillance test package and referenced in the test log.
     - ◊ If an existing CR evaluation is applicable, the CR evaluation number is recorded in the test log.
     - ◊ If a new CR is initiated to perform the evaluation, the CR number is recorded in the test log.
   - If the retest stroke time is outside of the Reference Range but satisfies the Acceptance Criteria, a CR is initiated and Component Engineering is notified to determine if valve operation is acceptable or to perform corrective actions. If validation of acceptable operation or corrective actions are not completed within 96 hours, the valve is declared inoperable.

Clarifications to Valve Stroke Timing Requirements	Number:	TP-04
	Revision:	3

Revision Record

Rev. 3	- Changed NUREG-1482 from revision 1 to 2 (4 places) - Changed ASME OM Code from 2001 Edition with 2003 Addenda to 2012 Edition - Removed codes ISTC-5122, ISTC-5123(a), ISTC-5121(b), ISTC-5122(c) and ISTC-5123. -Changed CRDR to Condition Report (CR)
Rev. 2	Deleted outdated information. Updated references to the ASME Code to the current Code of Record for the IST Program and identified applicable subsections paragraphs. Updated reference to revision 1 of NUREG 1482. Changed references from a bulleted format to a numbered format. Review and Approval signature block moved from first page to last page. Stroke time references for MOV were deleted as this no longer applies. Eliminated three stroke time results as the mandated number for an average since this is only a guideline. Eliminated specific section or step references to 73DP-9XI01 as the pending revision renders this information incorrect. Updated organizational references to present titles. Incorporated additional guidance for when to apply the provision for rapid acting valves.
Rev. 1	Deleted statements that rapid-acting valves need not be assigned reference values, per CRAI # 2370417. During this revision it was recognized that some of the information in this TP is dated. For example, references to the codes and the procedures used in the first interval IST Program, and the focus on "updating" the testing, are no longer relevant. However this TP continues to contain a lot of useful information. A complete rewrite to bring it up to date is not warranted at this time.

Review and Approval

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Appendix C - Periodic Testing and Test Frequency Scheduling for Pressure Relief Devices (TP-09)

1. This Appendix contains TP-09 Periodic Testing and Test Frequency Scheduling for Pressure Relief Devices, Revision 3

Periodic Testing and Test Frequency Scheduling for Pressure Relief Devices	Number:	**TP-09**
	Revision:	**3**

The purpose of this document is to clarify test requirements for periodic testing of PSVs and to provide guidelines for scheduling PSV testing. This guidance does not apply to ASME Class 2 or 3 thermal relief valves, which simply must be replaced on a 10 year periodicity.

Position

Required Tests and Sequence for Periodic Testing of PSVs

When testing safety valves per OM Code 2012, Mandatory Appendix I, the visual examination, seat tightness determination, and set pressure determination shall be done in the specified sequence prior to maintenance or set pressure adjustment. The remaining activities (determination of compliance with the Owner's seat tightness criteria, verification of the integrity of the balancing device on balanced valves, etc.) may be done after maintenance or set pressure adjustment. [Ref. OM Code Mandatory Appendix I, I-7300]

Guidelines for Scheduling Class 1, 2 and 3 IST Program PSVs

1. Vender drawings define valves of each type and manufacture. A Valve group is defined as valves of the same manufacturer, type, system application, and service media.
2. When determining the minimum acceptable sample size, any fractions of valves calculated are to be rounded up. A single Class 2 or 3 valve would be tested at least every 48 months. [Ref. NUREG 1482, Rev. 2, paragraph 4.3.5]
3. The test interval for any individual valve shall not exceed 5 years (Class 1 PSVs) or 10 years (Class 2 and Class 3 PSVs). This interval is from test-to-test regardless of the installation status of the valve.
4. Typically schedule the same train valves as the train being worked.
5. ASME Code requires that all Main Steam Safety Valves (MSSVs) and Pressurizer Safety Valves (PSVs) be tested every 5 years with a minimum of 20% of the valves tested within any 24 months (See 73ST-9ZZ18 for test schedule requirements).
6. Typical Scheduling and Scope Expansion Guide (Based on an 18 month cycle) is as follows:

CLASS 1 GROUP SIZE	SCHEDULING REQUIREMENTS	SCOPE EXPANSION AFTER 1st FAILURE	SCOPE EXPANSION AFTER 2nd FAILURE
2	TEST 1 PSV EVERY OUTAGE	TEST OTHER VALVE	NONE REQUIRED

Periodic Testing and Test Frequency Scheduling for Pressure Relief Devices | Number: **TP-09** | Revision: **3**

CLASS 2 & 3 GROUP SIZE	SCHEDULING REQUIREMENTS	SCOPE EXPANSION AFTER 1st FAILURE	SCOPE EXPANSION AFTER 2nd FAILURE
1	TEST PSV EVERY OTHER OUTAGE	NONE REQUIRED	NONE REQUIRED
2	TEST 1 PSV EVERY OTHER OUTAGE	TEST OTHER VALVE	NONE REQUIRED
3	TEST 1 PSV EVERY OTHER OUTAGE	TEST OTHER 2 VALVES	NONE REQUIRED
4	TEST 1 PSV EVERY OTHER OUTAGE plus AN ADDITIONAL PSV EVERY 6th OUTAGE	TEST 2 ADDITIONAL VALVES	TEST REMAINING VALVE
6	TEST 1 PSV EVERY OUTAGE	TEST 2 ADDITIONAL VALVES	TEST REMAINING VALVES
8	TEST 1 PSV EVERY OUTAGE plus AN ADDITIONAL PSV EVERY 3rd OUTAGE	TEST 2 ADDITIONAL VALVES	TEST REMAINING VALVES
9	TEST 1 PSV EVERY OUTAGE plus AN ADDITIONAL PSV EVERY OTHER OUTAGE	TEST 2 ADDITIONAL VALVES	TEST REMAINING VALVES
15	TEST 2 PSVs EVERY OUTAGE plus AN ADDITIONAL PSV EVERY OTHER OUTAGE	TEST 2 ADDITIONAL VALVES	TEST REMAINING VALVES

Basis

The clarification regarding tests performed after maintenance or set pressure adjustment is now incorporated in the IST Program Code of Record, the OM Code 2012 Edition. There has been an issue in the industry regarding the meaning of the Code terminology "test interval." ASME OM Code Interpretation 01-18 was issued in June of 2003 clarifying the term "test interval" to mean test-to-test. The installation/operational status of the valve (i.e.: installed, wetted, etc.) is not relevant to determining the start of the "test interval".

Periodic Testing and Test Frequency Scheduling for Pressure Relief Devices	Number:	**TP-09**
	Revision:	**3**

References

1. NUREG-1482, Rev. 2, "Guidelines for Inservice Testing at Nuclear Power Plants", October 2013
2. ASME OM Code 2012 Edition, "Code for Operation and Maintenance of Nuclear Power Plants", Mandatory Appendix 1, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants"
3. ASME OM Code Interpretation 01-18, Subject "ASME OM Code-1995 With ASME OMa Code-1996 Addenda, Appendix I"

Revision Record

Rev. 3	- Removed reference to requirement driven by TRM 5.0.500, which was removed by LDCR 17-R003
Rev. 2	- Changed NUREG-1482 revision from 1 to 2 (2 places) - Changed ASME OM Code from 2001 Edition with 2003 Addenda to 2012 Edition (3 places)
Rev. 1	Added a disqualifier for ASME Class 2 and 3 relief valves. Added discussion on ASME Code Interpretation 01-18 and "test interval". Updated references to the current Code of Record for the IST Program and identified applicable subsection paragraphs. Updated reference to Revision 1of NUREG 1482. Changed references from a bulleted format to a number format. Moved signature block from first page to last page. Referenced 73ST-9ZZ18 for MSSV and PSV test schedule requirements.

Review and Approval

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Appendix D - Skid Mounted Components (TP-06)

1. This Appendix contains TP-06 Skid-Mounted Components, Revision 2

Technical Position
PVNGS Pump and Valve IST Program Page 1 of 2

Skid-Mounted Components	Number:	TP-06
	Revision:	2

Position

Skid-mounted components are included in the IST Program if they are classified as ASME Class 1, 2, or 3, and perform a required safety function.

It is permissible to test skid-mounted IST components by testing the major component, if the test of the major component adequately tests the function of the skid-mounted pumps or valves. Components tested in this manner are identified in the EP-Plus database.

Basis

Various pumps and valves were purchased as subassemblies of larger components. Examples of these "skid-mounted" components include certain diesel air-start subassemblies, diesel fuel oil pumps and valves, turbine steam admission and trip-throttle valves, and solenoid-operated air supply valves to AOVs. This term also applies to components that are not mounted on the skid, but function much the same as skid-mounted components, e.g. check valves in a cooling water system that provides cooling to a pump.

As stated in NUREG-1482, Rev. 2, section 3.4, skid-mounted components classified as ASME Class 1, 2, or 3 are subject to the requirements of IST and are included in the IST Program. If these components are not ASME Class 1, 2, or 3, they are outside the scope of IST defined by 10 CFR 50.55a. However, these components may be subject to periodic testing in accordance with 10 CFR 50, Appendix A and Appendix B.

In section 3.4 of the NUREG, the NRC states the following position regarding testing of skid-mounted components:

> "Subsections ISTB-1200(c) and ISTC-1200(c) define the components that are subject to IST. The staff has determined that *testing the major component is an acceptable means to verify the operational readiness of the skid-mounted components and component subassemblies* if the licensee discusses this approach in the IST Program document. This is acceptable for both Code class components and non-Code class components that are tested and tracked by the IST Program." [emphasis added]

The current Code of record for the PVNGS IST Program, the ASME OM Code 2012 Edition, includes statements in ISTB-1200 and ISTC-1200 excluding skid-mounted pumps and valves, from the requirements of these Subsections provided they are tested as part of the major component and are justified by the Owner to be adequately tested.

As stipulated in NUREG-1482, Rev. 2, section 3.4, skid-mounted components tested under these provisions are documented in the IST Program. This documentation is normally in the form of a relief request in 73DP-9XI01, consistent with other Code deviations in the PVNGS IST Program. Specific NRC approval is not required for implementation because documentation is consistent with the NUREG and complies with ASME OM Code-ISTB-1200 & ISTC-1200 exclusion requirements.

Skid-Mounted Components	Number:	TP-06
	Revision:	2

References

1. ASME OM Code-2012 Edition "Code For Operation and Maintenance of Nuclear Power Plants"
2. NUREG-1482, Rev. 2, "Guidelines for Inservice Testing at Nuclear Power Plants", October 2013

Revision Record

Rev. 2	- Changed code year from 2001 Edition with 2003 Addenda to 2012 Edition (2 places) - Changed NUREG-1482 revision from 1 to 2 (3 places) - Removed "[1.2(c)]" from ISTB-1200(c) and ISTC-1200(c) -Changed PV-Plus to EP-Plus
Rev. 1	Updated references to the ASME Code to the current Code of Record for the IST Program. Moved signature block from the first page to the last page. Changed references to a numbered format. Updated NUREG 1482 reference to Revision 1. Removed the introduction reference to unapproved relief requests as this is an inappropriate reference and replaced with reference to PV-Plus.

Review and Approval

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Appendix E - Retest Requirements for Solenoid-Operated Valves (TP-01)

1. This Appendix contains TP-01 Retest Requirements for Solenoid-Operated Valves, Revision 2

Technical Position
PVNGS Pump and Valve IST Program Page 1 of 6

Retest Requirements for Solenoid-Operated Valves	Number:	**TP-01**
	Revision:	**3**

Position

When maintenance is performed that could affect valve performance parameters, the valve shall be tested to demonstrate that the performance parameters that could be affected are within acceptable limits. This may include performing the applicable Operation and Maintenance (OM) Code surveillance test(s).

- When a solenoid-operated valve (SOV) is known to open and close fully, and maintenance is performed on the position indicating system, a Valve Position Indicator (VPI) test is required to verify that valve operation is accurately indicated.

- When maintenance is performed on an SOV that could affect the measured stroke time, an OM Code Stroke Time test is required to verify that the stroke time is acceptable.

- When maintenance is performed on an SOV that could affect the ability of the valve to reposition, or the valve is not positively known to open and close fully, an OM Code Stroke Time test is required to verify that the stroke time is acceptable and a Valve Position Indicator (VPI) test is required to verify that valve operation is accurately indicated.

The application of this position for commonly-performed SOV maintenance is summarized in the table on the next page.

Technical Position
PVNGS Pump and Valve IST Program Page 2 of 6

Retest Requirements for Solenoid-Operated Valves	Number:	**TP-01**
	Revision:	**3**

Post-Maintenance Testing For SOVs[1]

Maintenance Performed	Light Check[2]	OM Code Stroke Time Test	OM Code VPI Test[4]
Measure coil electrical characteristics without lifting leads	X		
Lifting and re-landing leads in the position indicating system	X		
Replace position-indicating switch (defective or PM)			X
Adjust position-indicating switch that is obviously mis-positioned			X
Lifting and re-landing lead(s) in the actuation system, such as the coil leads	X	(Note 5)	
Coil replacement	(Note 3)	X	X
Adjust position-indicating switch to correct faulty indication (if stroke test gauge is used to verify acceptable valve stroke length during maintenance).	X		
Adjust position-indicating switch to correct faulty indication (if stroke test gauge is **not** used to verify acceptable valve stroke length during maintenance)	(Note 3)	X	X
Repair or replacement of wetted parts (valve body, disk, seat, etc.)	(Note 3)	X	X

Notes:

1. Certain valves may require other types of testing, such as leak rate testing of containment isolation valves.

2. Observation that the proper position indicating light(s) are illuminated when the valve is actuated to the open and closed positions.

3. A Light Check is less rigorous than an OM Code VPI Verification. Therefore when an OM Code VPI Verification is performed, a separate Light Check is not required.

4. Verification that valve operation is accurately indicated, by observing that the proper position indicating light(s) are illuminated while the valve is verified to be open and closed. The valve position is verified by monitoring appropriate system parameters, by measuring the valve stroke length, or by other positive means.

5. Stroke time testing in the direction of movement on coil energization (if the valve receives a stroke time test in the 1ST Program).

Retest Requirements for Solenoid-Operated Valves	Number:	TP-01
	Revision:	3

Basis

OM Code paragraph ISTC-3310 requires the following post-maintenance testing for valves:

> **ISTC-3310 Effects of Valve Repair, Replacement, or Maintenance on Reference Values**
>
> When a valve or its control system has been replaced, repaired, or has undergone maintenance that could affect the valve's performance, a new reference value shall be determined or the previous value reconfirmed by an inservice test run before the time it is returned to service or immediately if not removed from service. This test is to demonstrate that performance parameters that could be affected by the replacement, repair, or maintenance are within acceptable limits. Deviations between the previous and new reference values shall be identified and analyzed. Verification that the new values represent acceptable operation shall be documented in the record of tests (see ISTC-9120).
>
> [1] Adjustment of stem packing, limit switches, or control system valves, and removal of the bonnet, stem assembly, actuator, obturator, or control system components are examples of maintenance that could affect valve performance parameters.

This position expands on the guidance contained in the OM Code and procedure 30DP-9WP04, Post-Maintenance Testing Development, and is consistent with the information in EPRI Technical Report 1009709, Post-Maintenance Testing: A Reference Guide, Rev.1, and INPO 87-028, Post-Maintenance Testing. These documents are referenced in 30PD-9WP04.

Measuring Coil Electrical Characteristics without Lifting Leads

Measuring the coil electrical characteristics (voltage, current, resistance, etc.) without lifting the leads is an example of maintenance that would not normally affect the performance of the valve. A Light Check is recommended after this type of maintenance to verify that the valve continues to change position and indicate properly.

Lifting and Re-landing Leads in the Position Indicating System

Lifting and re-landing leads in the position-indication system could potentially affect the valve position indication. A Light Check should be performed after this type of maintenance to verify electrical continuity and that the position indication continues to work properly.

Replace Position-Indicating Switch (Defective or PM) Adjust Position-Indicating Switch That Is Obviously Mis-Positioned

Position indicating switches are commonly to blame for dual-indication or no-indication conditions. When one of these conditions exists, the cause could be a defective switch (switch stuck open or stuck closed), a switch mis-position problem (switch incorrectly located), or a valve travel problem (valve travel is impaired).

If the problem is traced to a defective switch, or if a switch is replaced during a PM, it can be assumed that the valve travel is not impaired. A new switch can be installed and positioned so that valve position is correctly indicated when the valve is stroked. Post-maintenance testing would consist of verifying that the proper position indicating light(s) are illuminated when the valve is actuated to the open and closed positions, i.e.: a Valve Position Indicator (VPI) test. An OM Code Stroke Time test to verify that changes in the switch position have not significantly affected the stroke time is not required, because the band in which the switches must be adjusted to get proper position indication is so narrow that the stroke time variation would be very small, in any case much less than the minimum precision of one second required by ISTC-5151(c).

For obvious switch mis-position, such as a switch working loose and falling, it is also reasonable to assume that the problem is due to the switch and that valve travel is not impaired. The switch may be reinstalled so that valve position is correctly indicated when the valve is stroked. Post-maintenance testing would consist of a VPI test per ISTC-3700, Position Verification Testing. An OM Code Stroke Time test to verify that changes in the switch position have not significantly affected the stroke time is not required, because the band in which the switches must be adjusted to get proper position indication is so narrow that the stroke time variation would be very small, in any case much less than the minimum precision of one second required by ISTC-5151(c).

Lifting and Re-landing Leads in the Actuation System, Such As the Coil Leads

The coil provides the motive force to open the pilot valve. Therefore lifting and re-landing leads in the actuation system, such as coil leads, is maintenance to the valve control system per ISTC-3310. There is a possibility that an increased resistance, reversed polarity, or other condition could occur during this work which could affect the ability of the valve to open/close or cause the valve to move slowly. A Light Check would detect a reversed-polarity condition. An OM Code Stroke Time Test would detect a slow-moving condition. Therefore post-maintenance testing requires performing a Light Check and an OM Code Stroke Time test in the direction of valve movement on coil energization. Stroke-time testing in the spring-assist direction is not required because the ability of the spring to move the valve disc is not affected. A VPI test per ISTC-3700 is not required because work on the actuation system would not affect the ability of the position indication system to accurately indicate valve position.

Coil Replacement

The coil provides the motive force to move the pilot valve. Therefore coil replacement is maintenance to the valve control system per ISTC-3310. One parameter that could be affected by coil replacement is the ability of the valve to stroke fully. A weak coil could also cause the valve to stroke slowly. These situations might occur if the coil were somehow defective or other condition existed so that it didn't act on the valve properly. Therefore post-maintenance testing requires verification that the valve opens and closes properly. This is accomplished by performing an OM Code Stroke Time test per ISTC-5151 and a VPI test per ISTC-3700.

Adjust Position-Indicating Switch to Correct Faulty Indication

Sometimes it is not immediately clear whether an indication problem is due to switch mis-position or impaired valve travel. In these cases, it is the normal maintenance practice to use a valve stroke gauge to measure the valve stroke length and verify that it is acceptable. If the stroke length is measured with the gauge, it is not necessary to perform an OM Code Valve Position Indicator (VPI) test per ISTC-3700 to verify movement of the valve internals to the required position. An OM Code Stroke Time test per ISTC-5151 to verify that changes in the switch position have not significantly affected the stroke time is not required, because the band in which the switches must be adjusted to get proper position indication is so narrow that the stroke time variation would be very small, in any case much less than the minimum precision of one second required by ISTC-5151(c).

Repair or Replacement of Wetted Parts (Valve Body, Disk, Seat, Etc.)

When wetted parts such as the valve body, seat, or disk are repaired or replaced, this work could affect the ability of the valve to open and close fully. Therefore post-maintenance testing requires performance of an OM Code VPI test. An OM Code Stroke Time test is also required to verify that the work did not significantly affect the stroke time.

References

1. CRDRs 940546, 170186
2. 30DP-9WP04, Post-Maintenance Testing Development, Rev. 19
3. EPRI Technical Report 1009709, Post-Maintenance Testing: A Reference Guide, Rev.1
4. ASME Operation and Maintenance Code, 2012 Edition
5. Memo 315-00804-TCC-BPL dated 12-6-95

6. Memo 315-00820-TCC-BPL dated 12-13-95

Revision Record

Rev.3	Changed Code Edition of ASME Operation and Maintenance Code from "2001 Edition, 2003 Addenda", to "2012 Edition." Updated references.
Rev.2	Revised technical position to show ASME OM Code requirements as replacements to previously referenced ASME Section XI requirements. Revised Basis section in its entirety for ASME OM Code ISTC-3310 requirements. Added Revision Record section. Provided references as numbered items rather than bulleted items. Removed signature approval block from first page to the last page. Replaced superseded reference to 30DP-9WP04 with reference to procedure AC-0244. Revised post-maintenance testing table for SOVs.
Rev.1	Added discussion for lifting and re-landing leads in the actuation system. Added note 5 to table for SOV post-maintenance testing. Added CRDRs 940546 and 170186 to references.

Review and Approval

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