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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE

SAFETY EVALUATION REPORT BY THE UNITED STATES NUCLEAR REGULATORY COMMISSION, REGION II

RELATED TO THE INSERVICE TESTING PROGRAM

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

DOCKET NOS. 50-259, 50-260 AND 50-296

1.0 INTRODUCTION

1.1 General

This report provides the NRC staff safety evaluation of the Browns Ferry Nuclear Plant, Units 1, 2, and 3 (BFN 1, 2, & 3) program for inservice testing (IST) of pumps and valves. The current program was submitted to the NRC by the Tennessee Valley Authority (TVA or the licensee) in a letter dated March 25, 1988. The program describes the IST the licensee will perform to meet the requirements of the Code of Federal Regulations (10 CFR 50.55a(g)) and contains requests for relief from certain of the requirements. It was submitted to the NRC pursuant to obtaining approval of the relief requests.

The 10 CFR 50.55a(g) requirements considered by the staff in performing the evaluation specify that the licensee implement an IST program for pumps and valves in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (ASME Section XI or the Code). Criteria are given for determining the edition and addenda of the Code that apply for a given unit. 10 CFR 50.55a(g)(5) provides that the Commission may grant the licensee relief from requirements of the Code upon making necessary findings.

In practice, the NRC staff evaluates a licensee's entire IST program along with the licensee's relief requests in determining whether relief should be granted. The staff's evaluation and their conclusions are summarized in Section 1.5 below and are described in detail in Sections 2.0 and 3.0. The conclusions represent the staff's determinations regarding the granting of relief. The granting of relief is based upon the fulfillment of the commitments made by the licensee in its basis for each relief request and the alternative proposed testing.

1.2 Inspection Interval and ASME Edition and Addenda

10 CFR 50.55a(g) specifies the Code edition and addenda to apply to a facility for a specified term, normally a 120-month interval. The dates for the term and the applicable edition and addenda of the Code are determined based on the

operating license date. The TVA program specifies that it covers the 120-month interval from August 31, 1982 through August 31, 1992 and that it is in accordance with ASME Section XI (80W80). This is not in accordance with the requirements of 10 CFR 50.55a(g). In a letter to the Commission dated April 6, 1983 and supplemented in a letter dated February 17, 1988, TVA requested an exemption to permit use of the interval and Code revision stated in their program. That exemption has been approved by the Commission in a letter dated March 18, 1988. The evaluation herein is based on the code edition and addenda and the interval dates stated in the licensee's program and approved in the exemption.

1.3 Technical Specification Requirements

The BFN Technical Specifications provide no reference, direct or indirect, to inservice testing requirements of the Code.

1.4 Past Reviews and Approvals of IST Program

The licensee has previously submitted programs for NRC review (e.g., submittals of August 31, 1982 and October 1, 1984 and December 23, 1986). The previous NRC reviews were not completed. Consequently, there was no NRC approval of these programs or relief requests. The March 25, 1988 submittal addressed herein contains the licensee's most recent IST program and relief requests.

1.5 Summary Results

The NRC staff found that the licensee's program, exclusive of their relief requests, was acceptable. One relief request, identified as PV-30 was partially denied for lack of a sufficient basis. For relief request PV-21, the licensee was informed that the relief would be in accordance with a separate staff determination for exemption from a similar 10 CFR 50, Appendix J requirement. For relief requests PV-3, 4 and 5; relief was granted based on conditions identified in the staff's evaluation. It is our understanding that the licensee is in agreement with these conditions. The conditions have not been formally documented by the licensee, however, and are included in this SER to assure that they are formally recognized. In each instance, relief is granted only if the conditions are met. The remaining relief requests were granted without condition. Each granting of relief is based on the fulfillment of commitments made by the licensee in its basis for each relief request. This is in addition to any conditions identified by the staff for the granting of conditionally granted requests.

The staff's findings with regard to individual relief requests are summarized in Table 1.5 and described in detail in Section 2.0 of this SER.

The staff's evaluation of the licensee's program utilized previously submitted drawings. Based on discussions with licensee personnel, it is our understanding that there have been changes to the drawings which will require further revision to the IST program. The drawing changes were the result of modifications in hardware, correction of drawing errors and the renumbering of some valves. Licensee personnel have advised us that they will revise their

program to reflect these changes and that the revisions needed to assure that pumps and valves are correctly tested will be completed by startup. The licensee has indicated that there will be few changes to valve testing from the program revisions and that the testing, in principle, will remain the same as in the current program. On this basis, the staff considers that a formal NRC safety evaluation of the changes associated with the drawing revisions will not be required, but that the changes will be subject to Region II inspection to assure that they are consistent with the program evaluated by the staff.

Table 1.5

Summary of Relief Requests

Relief Request Number	SER Section	ASME Section XI Requirements and Subject Pump or Valve Number	Alternate Test Method	Relief Action by USNRC
PV-1	2.2.2.1	IWP-3100, 3300 and 3500 bearing temperature measurements for all pumps	Quarterly vibration velocity measurements on pumps	Granted IAW 50.55a(g)(6)(i)
PV-1	2.2.2.1	IWP-3100, 3300 and 3500 lubricant oil level or pressure observation for RHR, RHRSW, CS and DFT pumps	Quarterly vibration velocity measurements on pumps	Granted IAW 50.55(a)(3)(ii)
PV-2	2.2.2.2	IWP-3300 inlet and differential pressure measurements for DFT and SLC pumps	Discharge flow and pump vibration for DFT. Discharge pressure for SLC	Granted IAW 50.55(a)(3)(i)
PV-3	2.2.2.3	IWP-3500(a) five minute stabilizing run time for SLC and DFT pumps	Two-minute run time for SLC pumps, immediately following 15 minute functional test. Perform DFT pumps test with five-minute stabilization at least every six months	Granted conditionally IAW 50.55(a)(3)(i)

IAW - In accordance with 10 CFR

Relief Request Number	SER Section	ASME Section XI Requirements and Subject Pump or Valve Number	Alternate Test Method	Relief Action by USNRC
PV-4	2.3.2.1	IWV-3416 requirements for exercising a valve prior to returning a system to operable status and IWV-3417(b) requirements for corrective action and retesting on failed valves prior to startup.	As specified by TS	Granted conditionally IAW 50.55a(a)(3)(i)
PV-5	2.2.2.4	Table IWP-4110-1 instrument accuracies for all pumps except DFT pumps	Utilize installed instruments plus vibration velocity measurements	Granted conditionally IAW 50.55a(a)(3)(i)
PV-5	2.2.2.4	Table IWP-4110-1 instrument accuracies for DFT pumps	Calculated flow	Granted conditionally IAW 50.55a(a)(3)(i)
PV-5	2.2.2.4	IWP-4120 full scale range requirements for all pumps	Utilize installed instruments	Granted conditionally IAW 50.55a(a)(3)(i)
PV-5	2.2.2.4	IWP-4150 and Table IWP-3100-2 requirements for measurement of vibration displacement on all pumps	Utilize vibration velocity measurements	Granted conditionally IAW 50.55a(a)(3)(i)
PV-5	2.2.2.4	Table 3100-2 allowable ranges of flow and differential pressure for all pumps	Increase high value alert range of 1.02 to 1.05 and 1.03 to 1.06	Granted conditionally IAW 50.55a(a)(3)(i)
PV-6	2.3.2.2	IWV-3410 quarterly exercising and stroke timing (including trending) ADS valves	Per TS 4.6.D.2 and verify stroke time not exceeding 2 seconds	Granted IAW 50.55(g)(6)(i)

IAW - In accordance with 10 CFR

Relief Request Number	SER Section	ASME Section XI Requirements and Subject Pump or Valve Number	Alternate Test Method	Relief Action by USNRC
PV-7	2.3.2.3	IWV-3521 quarterly exercising of MSRV discharge pipe vacuum breakers	Test only at cold shutdowns when drywell is deinerted	Granted IAW 50.55a(3)(ii)
PV-8	2.3.2.4	IWV-3521 and 3522 quarterly closure testing of FW valves 3-554, 558, 568 and 572	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)
PV-9	2.3.2.5	IWV-3521 and 3522 quarterly exercising to open and closed positions for SLC check valves 63-525 and 526	Verify opening per TS 4.4.A.2.C closure by leak testing each refueling outage	Granted IAW 50.55a(a)(3)(ii)
PV-10	2.3.2.6	Same as PV-8 but for Recirculation System valves 68-508, 523, 550 and 555	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)
PV-11	2.3.2.7	Same as PV-8 but for RWCU valves 69-579 and 624	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)
PV-12	2.3.2.8	IWV-3417 full stroke time testing for RHRSW valves 23-34, 40, 46 and 52 (throttle valves)	Stroke time from a reference position	Granted IAW 50.55a(a)(3)(i)
PV-13	2.3.2.9	Same as PV-8 but for RHRSW valves 23-601, 603, 605 and 607	Verify closure every 24 months by a method such as disassembly or acoustic testing	Granted IAW 50.55a(a)(3)(ii)

IAW - In accordance with 10 CFR

Relief Request Number	SER Section	ASME Section XI Requirements and Subject Pump or Valve Number	Alternate Test Method	Relief Action by USNRC
PV-14	2.3.2.10	Same as PV-8 but for EECW (67-) and RCW (24-) valves as follows: 67-541, 542, 584, 585, 648, 649, 657, 659, 660, 528, 529, 634, 635, 521, 522, 627, 628, 507, 508, 502, 622, 619, 656, 558, 559, 638, 639, 600, 601, 630, 631, 624, 625, 514, 515, 671, 679, 638 3-24-831, 833, 796, 798 3-67-639, 694, 695, 696, 703, 704, 705, 724, 725, 726, 771, 772, 774, 775, 761, 706, 715, 716, 713, 714, 723, 762, 764, 765, 737, 738, 735, 736	Verify closure every refueling outage by a method such as disassembly or acoustic testing	Granted IAW 50.55(a)(3)(ii)
PV-15	2.3.2.11	Same as PV-8 but for RBCCW valve 70-506	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)
PV-16	2.3.2.12	Same as PV-8 but for HPCI valve 73-559 and RCIC valve 71-547	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)
PV-17	2.3.2.13	IWV-3513 requirements for testing an additional quantity of valves following failures in set point tests. For all MSRVs	Test valves per TS 4.6.D.1 Determine both as found and as left set pressures before startup or within 120 days of removal, and assess failures to determine need for additional testing	Granted IAW 50.55a(a)(3)(i)
PV-18	2.3.2.14	Same as PV-8 but for HPCI valves 73-603 and 609 and RCIC valves 71-580 and 592	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)

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Relief Request Number	SER Section	ASME Section XI Requirements and Subject Pump or Valve Number	Alternate Test Method	Relief Action by USNRC
PV-19	2.3.2.15	IWV-3521 and 3522 quarterly exercising to open and closed positions for HPCI check valves 73-633, 634, 635 and 636 and RCIC check valves 71-597, 598, 599 and 600	Verify opening and closing functions each refueling outage by disassembly acoustics or other positive means	Granted IAW 50.55a(a)(3)(ii)
PV-20	2.3.2.16	IWV-3521 and 3522 quarterly exercising to the open position for HPCI valve 73-517 and RCIC valve 71-508	Verify opening function each refueling outage by disassembly, acoustics or other positive means	Granted IAW 50.55a(a)(3)(ii)
PV-21	2.3.2.17	Performance of IWV-3413 seat leakage tests on single disk gate valves with pressurization in the direction which they perform their function for the following valves: MS valve 1-55 RHR valves 74-61, 75 HPCI valves 73-2, 26 RCIC valves 71-21, 17 RW valves 77-2A, 15A	Test with pressure in direction opposite that for valve to perform function	Licensee referred to NRC evaluation perform Appendix J exemption request
PV-22	2.3.2.18	Same as PV-8 but for FPC check valves 78-526 and 527	Verify closure each refueling outage by disassembly, accoustics or other positive means	Granted IAW 50.55a(a)(3)(i)

IAW - In accordance with 10 CFR

Relief Request Number	SER Section	ASME Section XI Requirements and Subject Pump or Valve Number	Alternate Test Method	Relief Action by USNRC
PV-23	2.3.2.19	IWV-3410 quarterly stroke timing for CRD valves 85-39A and 39B and IWV-3521 quarterly exercising for CRD valves 85-589, 597, 616 and 617	Stroke time and exercise test per TS 4.3.C. Closure test 85-589 and 597 each cold shutdown by disassembly, acoustics or other positive means	Granted IAW 50.55a(a)(3)(i)
PV-24	2.3.2.20	Same as PV-8, but for CA check valves 32-336, 2521, 2163 and 2516	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)
PV-25	2.3.2.21	IWV-3417(a) trending and test frequency increases for all rapid acting valves (stroke times of 2 seconds or less) in the SAWQ, CI, HPCI, CAD, DGAS, SW, RHRSW and TIP systems	Rapid acting valve stroke times will not be trended but their maximum specified stroke times will be 2 seconds	Granted IAW 50.55a(a)(3)(i)
PV-26	2.3.2.22	Same as PV-8 but for CI valve X-35f	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)
PV-27	2.3.2.23	IWV-3521 and 3522 quarterly exercising RHR testable check valves 74-54 and 68 and CS testable check valves 75-26 and 54.	Exercise at cold shutdowns in which the containment is deinerted, time permitting	Granted IAW 50.55a(a)(3)(ii)
PV-28	2.3.2.24	Same as PV-8 but for CRD check valve 85-576	Leak test at refueling outages	Granted IAW 50.55a(a)(3)(ii)

IAW - In accordance with 10 CFR

Relief Request Number	SER Section	ASME Section XI Requirements and Subject Pump or Valve Number	Alternate Test Method	Relief Action by USNRC
PV-29	2.3.2.25	IWV-3423 leak testing at maximum function differential pressure or adjustment of measured leak rates to maximum function differential pressure. MS valves 1-14, 26, 37 and 51.	Leak test per TS	Granted IAW 50.55(a)(3)ii)
PV-30	2.3.2.26	Same as PV-9 but for RHR valves 74-661 and 662 and for CAD valves 84-600, 601, 602. 603, and 617	Leak test at refueling outages to verify closure. Verify opening at cold shutdowns provided the containment is entered	Granted for RHR valves and closure testing CAD valves. Denied for open testing CAD valves IAW 50.55a(a)3)(ii)
PV-31	2.3.2.2.7	Same as PV-8 but for RCIC check valve 71-589 and HPCI check valve 73-625	Closure test at refueling outages	Granted IAW 50.55a(a)(3)(ii)

IAW - In accordance with 10 CFR

2.0 EVALUATION

2.1 Scope

The Browns Ferry IST program submitted by TVA was reviewed and evaluated by the NRC staff to verify that all pumps and valves required to be tested by the Code are included in the program and that the periodic testing required by the Code is specified for each, except where relief from the Code requirements is requested.

Each of the relief requests described in the program was evaluated to determine if the licensee's bases and proposed alternative testing adequately support a finding to grant the relief.

The review and evaluation of the program and its included relief requests was performed as follows:

(1) Systems containing ASME class pumps and/or valves apparently needed for safe shutdown or to mitigate the consequences of an accident were determined from a review of the Final Safety Analysis Report (FSAR). An informal guidance list developed by the NRC was used as an aid in the review. The list is given in Appendix A.

(2) Utilizing design and functional information from piping drawings and the FSAR and criteria given in ASME Section XI, the pumps and valves apparently required to be inservice tested was established. A list of drawings utilized is provided in Appendix B.

(3) Coincident with (2) above, the IST program was reviewed to determine if it contained the pumps and valves being identified.

(4) Utilizing ASME Section XI criteria and system functional information described in the FSAR, the IST program was reviewed to determine if appropriate testing is specified for each pump and valve.

(5) The relief requests were reviewed to determine if they accounted for any deficiencies identified in the IST program and if the bases and alternate testing proposed were adequate to justify granting relief.

(6) The licensee's justifications for testing certain valves at cold shutdown, rather than quarterly, were reviewed to verify that they were adequately based.

(7) Communications between TVA and the staff were held throughout the evaluation to aid in understanding the functioning of the systems and hardware involved and information presented in the program itself.

Throughout this safety evaluation report, abbreviations are utilized in place of plant system names. A list of the abbreviations and corresponding system names is included in the Drawing Listing in Appendix B.

2.2 Pump Testing Program

2.2.1 Program (Excluding Relief Requests)

The NRC staff review determined that the program specifies the periodic testing required by the Code, except where relief from the Code requirements has been requested.

2.2.2 Relief Requests (Applicable to Requirements in Code Subsection IWP)

2.2.2.1 PV-1, Measuring Bearing Temperatures and Observing Lube Oil Level/ Pressure

Relief Request

The licensee has requested relief from Code (IWP-3100, 3300 and 3500) requirements for annual measurement of stabilized bearing temperature for all of the following pumps: RHR, HPCI, RCIC, CS, SLC, RHRSW, and DFT.

Licensee's Basis for Requesting Relief

The RHR, CS, and RHRSW pump bearings are lubricated by water supplied by the pump itself and satisfactory pump operation is indicative of sufficient bearing lubrication. HPCI and RCIC have oil cooled bearings, but these pumps cannot be operated long enough to reach stable bearing temperatures without overheating the torus and causing plant shutdown. SLC and DFT bearings are not instrumented. The HPCI bearings, which are instrumented, are monitored during testing. RCIC bearings do not have temperature instrumentation.

Vibration tests performed on the pumps ensure detection and correction of changes in bearing performance while the pumps are still capable of satisfactory operation.

Evaluation

The NRC staff finds that the Code required bearing temperature measurements referred to in the licensee's request are impractical for the following reasons:

(1) The annual bearing temperature measurements required by the Code are considered unreliable in detecting bearing failure.

(2) Vibration testing which the licensee will be required to perform on the pumps is considered to provide adequate assurance of detection of bearing or bearing cooling degradation.

(3) The pumps and systems described in the licensee's request were not designed to have the Code bearing temperature measurements performed and the required measurements could not be accomplished by conventional or standard means.

Relief Request

The licensee requested relief from Code (IWP-3100, 3300 and 3500) requirements for observation of lubricant level or pressure for pump bearings for the following pumps: All RHR, RHRSW, CS and DFT.

Licensee's Basis for Requesting Relief

The RHR, CS, and RHRSW pump bearings are lubricated by water supplied by the pump itself and satisfactory pump operation is indicative of sufficient bearing lubrication. HPCI and RCIC have oil cooled bearings, but these pumps cannot be operated long enough to reach stable bearing temperatures without overheating the torus and causing plant shutdown. SLC and DFT bearings are not instrumented. The HPCI bearings, which are instrumented, are monitored during testing. RCIC bearings do not have temperature instrumentation.

Vibration tests performed on the pumps ensure detection and correction of changes in bearing performance while the pumps are still capable of satisfactory operation.

Evaluation

The licensee's written request for relief from observation of lubricant level/pressure was unclear or insufficient with regard to the following:

(1) The pumps for which relief was requested was unclear.

(2) There was not sufficient information to ascertain whether the designs of all the pumps precluded any simple observations or measurements to aid in assuring proper distribution of the required lubricating fluid or fluids.

In view of the above, responsible personnel (H. Hodges and P. Gilbert) were contacted by telephone on June 8, 1988, and they informed us that:

(1) Relief from observation of lubricant level/pressure was required only for the RHR, RHRSW, CS and DFT pumps

(2) The subject pumps were not designed such that adequate lubrication could be determined through observation of lubricant level or pressure

(3) Lube oil level/pressure is observed on the pumps that are not water or diesel fuel lubricated, those being the HPCI, RCIC and SLC.

Based on the information provided in the licensee's IST program document and via the telephone calls with responsible licensee personnel, the staff is satisfied that the designs of the RHR, RHRSW, CS and DFT pumps make observation of lubricant level/pressure an unnecessary hardship. Design changes (or pump replacements) to permit the Code specified observation would not in themselves provide significantly increased assurance of operability for the subject pumps.

Conclusions

The NRC staff finds the Code requirements for annual measurement of stabilized bearing temperature referred to in the licensee's request are impractical. The vibration testing, as the NRC staff determines is authorized by law, which the licensee will be required to perform on the pumps is considered to provide adequate assurance of detection of bearing or bearing cooling degradation.

The annual bearing temperature measurements required by the Code are considered unreliable in detecting bearing failure.

The pumps and systems described in the licensee's request were not designed to have the Code bearing temperature measurements performed and the required measurements could not be accomplished by conventional or standard means.

The proposed vibration testing provides reasonable assurance of operational readiness, and based on the impracticability of complying with the Code requirements and the burden on the licensee if the Code requirements were imposed and considering the proposed testing, relief is granted on the annual measurement of stabilizing bearing temperature for all the RHR, HPCI, RCIC, CS, SLC, RHRSW and DFT pumps.

The NRC staff finds that compliance with the Code requirement for observation of lubricant level or pressure for pump bearings would result in hardships without a compensating increase in the level or quality or safety.

The Code requirement is for observation of lubricant level or pressure.

Vibration testing which the licensee will be required to perform on the pumps is considered to provide adequate assurance of detection of bearing or bearing cooling degradation.

The RHR, RHRSW, CS, and DFT pumps are not designed such that adequate bearing lubrication could be determined through observation of lubricant level or pressure.

The proposed vibration testing provides reasonable assurance of operational readiness and compliance with the Code would result in safety, therefore relief is granted on the observation of lubricant level or pressure for all the RHR, RHRSW, CS and DFT pumps.

2.2.2.2 PV-2, Measurement of Inlet Pressure and Differential Pressure in Standby Liquid Control (SLC) and Diesel Fuel Transfer (DFT) Pump Tests

Relief Request

The licensee has requested relief from quarterly measurement of inlet pressure and differential pressure in accordance with Code requirement IWP-3300 for the SLC and DFT pumps.

Licensee's Basis for Requesting Relief

During testing, these pumps take suction from tanks that have a relatively small range of level variation during pump operation. In addition, these are positive displacement pumps whose inlet pressure does not affect pump operating characteristics. Therefore, differential pressure measurement is not meaningful in monitoring pump performance. Also, the DFT pumps are not instrumented or constructed to allow measurement of discharge pressure.

Pump discharge pressure can and will be used in place of the differential pressure test parameter for the SLC pumps. Although there will be no pump pressure parameter measured for the DFT pumps, flow will be determined and used in assessing pump operability.

Evaluation

The staff agrees with the licensee that inlet pressure measurements are not important for positive displacement pump tests. The significant pressure parameter for such pumps is discharge pressure, and the licensee indicates it will be used in place of differential pressure for the SLC pumps. The staff finds that it is correct and appropriate to substitute discharge pressure measurement for differential pressure measurement on the SLC pumps. The testing proposed by the licensee is equivalent to that specified by the Code and provides an acceptable level of quality and safety.

The licensee does not have instrumentation installed for the DFT pumps that would permit them to measure discharge pressure. Taking into account the fact that the functioning of the DFT pumps is not as immediate or safety-significant as other safety-related pumps, and that they are readily accessible if maintenance proves necessary during plant operation; the staff finds that the installation and use of instrumentation for DFT pump discharge pressure measurements is unnecessary. The flow and vibration testing that is specified for these pumps is considered to provide an acceptable level of quality and safety.

Conclusions

The Code (IWP-3300) requires quarterly measurement of inlet and differential pressure for all pumps.

For the DFT pumps, discharge flow and pump vibration testing, and for the SLC pumps, discharge pressure, will be used to monitor pump performance.

Due to the type of pump (positive displacement) the NRC staff finds the proposed alternatives would provide an acceptable level of quality and safety, therefore relief is granted on the quarterly measurement of inlet and differential pressure for the DFT and SLC pumps.

2.2.2.3 PV-3, Five Minute Minimum Run Time for SLC and DFT Pump Tests

Relief Request

The licensee has requested relief from running the SLC pumps for five minutes under stable conditions prior to measurement or observation of the specified test parameters as required by IWP-3500(a) of the Code. They propose to limit the time of the Code test to two minutes and to perform the Code test immediately following a 15-minute functional test of the pumps.

The five minute run time of IWP-3500(a) also poses a problem to the licensee in their DFT pump testing as, depending on diesel oil usage, day tanks may be too full to permit the pumps to be run long enough for completion of testing. Because of anticipated difficulties in scheduling pump testing to coincide with day tank levels low enough to permit stable runs of five minutes or more, the licensee requested relief from IWP-3400 requirements for quarterly testing. Based on clarification provided in a telephone conversation between responsible TVA (H. Hodges and P. Gilbert) and NRC (E. Girard) personnel on August 11, 1988, TVA considers that day tank levels will be low enough to permit pump runs of the required time and test measurements to be completed at least once every six months. They propose to perform the tests at that frequency instead of the three month frequency specified by IWP-3400.

Licensee's Basis for Requesting Relief

The SLC pumps are tested by circulating liquid to a test tank for two minutes and measuring the volume change in the tank. Running for five minutes before measuring parameters is not compatible with the system design. The volume of the test tank (210 gallon capacity) prohibits running the pumps (flow rate of approximately 55 gpm) for five minutes. However, a 15-minute functional test which involves recirculating water back to the test tank is run before the system is lined up for the Section XI test requirement. This 15-minute test is of sufficient length for all parameters to stabilize and the two-minute test is run immediately afterward.

Depending upon diesel oil usage, day tank level may be so high that high level switches will stop DFT pumps before the scheduled periodic testing required by the Code can be completed. The licensee proposes that the test will be performed when day tank level permits the pumps to be run for as long as possible, but not less often than once per six months (as compared to quarterly testing required by the Code). In the July 11, 1988 telephone call referred to above, the licensee indicated that "for as long as possible" meant that the IWP-3500(a) requirement would be met.

Evaluation

The staff agrees, based on the system description provided by the licensee, that it is impractical to run the Code required SLC pump tests for five minutes. The proposed alternative of running the Code pump test for two minutes immediately following a 15-minute functional pump test is considered to provide an equivalent test.

As already noted in 2.2.2.2 above, the functioning of the DFT pumps is not as immediate or safety-significant as other safety-related pumps. Therefore, the staff finds that the steps the licensee would have to take to assure quarterly testing, versus the testing they propose, are unwarranted from a safety standpoint. The other testing to be performed by the licensee, including improved vibration testing, provides an acceptable level of quality and safety.

Conclusion

The Code (IWP-3500(a)) requires a minimum of a five minute run time under stable conditions prior to measurements or observations of specified test parameters.

The SLC pumps would only be for two minutes immediately following 15-minute functional test. The DFT pumps would not be tested once per six months vice quarterly. The proposed running of the SLC pumps for two minutes immediately following the 15-minute functional test is considered to be equivalent to the required testing and the running of the DFT pumps for five minutes at least every six months, along with improved vibration testing provides an acceptable level of quality, therefore relief is granted, provided the DFT pumps IWP-3500(a) requirements are met in tests performed at least every six months.

2.2.2.4 PV-5, Pump Test Instrumentation Accuracy and Full-Scale Requirements, Allowable Ranges of In-service Test Quantities, and Vibration Amplitude Requirements

Relief Request

The licensee has requested the following relief for all Code IST of pumps:

(1) Relief is requested from the ±2% pressure and flow instrument accuracies specified by Code Table IWP-4110-1. The licensee proposes to use the originally installed plant instrumentation which provide accuracies of ±2.5% and ±3.0% for pressure and flow respectively on all pumps except the DFT pumps. The DFT pumps are not instrumented for flow and the licensee proposes to use level change in the diesel fuel day tank to assess flow.

(2) Relief is requested from the IWP-4120 requirement that the full-scale range of each instrument shall be three times the reference value or less.

(3) Relief is requested from the requirements to measure displacement vibration amplitude in accordance with IWP-4510 and to use the vibration amplitude allowable ranges in Code Table IWP-3100-2. The licensee proposes to instead measure velocity vibration amplitude replacing the Table IWP-3100-2 vibration ranges with the following:

Test Quantity	Acceptable Range	Alert Range	Required Action Range
V	0 V $1.5V_r$	1.5 V $3.0V_r$	V $3.0V_r$

NOTE: V is defined as vibration amplitude in in/sec and V_r is the baseline value.

One point (i.e., the value from one measurement location) will be trended, utilizing broad band unfiltered measurements with an instrument with a calibrated frequency response range of 10-1000 HZ.

(4) Relief is requested to change the allowable ranges of inservice test flow and differential pressure quantities stated in Code Table 3100-2. The licensee proposes to use a multiplier of 1.05 in place of 1.02 and 1.06 in place of 1.03, for all pumps except the DFT pumps. For the DFT pumps they simply propose that the pumps will be proven to pump within 10% of their baseline flow rates.

Licensee's Basis for Requesting Relief

(1) The proposed instrument accuracies are those of the currently installed instrumentation. Use of alternate instrumentation conforming to the requirements of the Code would not significantly increase the repeatability of the instrument data for use in trending.

(2) Same as (1).

(3) The licensee did not state a basis for the change from use of vibration displacement to vibration velocity.

(4) The increases in upper flow and differential pressure limits are necessary because of inaccuracies in the installed instrumentation.

Evaluation

The staff's evaluation of the relief requested is as follows:

(1) The staff finds that the reduced measurement accuracies that result from the licensee's instrumentation accuracies are minor and are more than offset by the benefits of licensee's proposal for using velocity measurements in performing vibration testing.

This finding does not take into account the affects of deviations from code range requirements described in (2) below.

(2) Code requirements for instrument accuracy are specified as a percent of full scale (range). Therefore, the instrument range limit stated in the Code affects permitted measurement in accuracies. The licensee's relief request did not indicate the extent to which the instruments exceeded the Code requirement for range, such that the effects on measurement accuracy could be determined. On June 10, 1988, we contacted responsible licensee personnel (H. Hodges and P. Gilbert) regarding this matter and were informed that the Code range limit was exceeded as follows:

Code requirement: Full scale range not to exceed three times reference values.

Browns Ferry Instruments:

Pumps	Instrument	Range (As a Multiple of Minimum Except Reference)
Core Spray	Suction Pressure	15
	Flow	3.1
RHR	Suction Pressure	38
	Flow	4.4
EECW	Flow	5
HPCI	Suction Pressure	3.3
	Discharge Pressure	5
RCIC	Suction Pressure	3.7
	Discharge Pressure	6.7

Based on our evaluation of the above, we find that the inaccuracies that may result from the ranges of the installed instrumentation and their affect on the capability to detect significant pump degradation are minor as compared to the benefits of the improved vibration testing being proposed in this relief request. However, we encourage the licensee to upgrade their instrumentation and note that approval of this relief request expires at the end of the program interval.

(3) The staff finds that the vibration testing proposed by the licensee is superior to that specified by the Code and, therefore, we consider their proposal acceptable. In stating this evaluation we note that, where the licensee has not specifically stated alternative vibration testing requirements, we consider Code requirements to still be applicable. For example, Code test frequency and measurement location (and quantity) requirements still apply.

(4) Considering the improved pump testing that will result from the vibration testing referred to in (3) above, the staff finds that the small increase in allowable and acceptable range limits proposed is acceptable.

Conclusions

The overall effect of the four parts of the licensee's proposed alternative would provide an acceptable level of quality and safety that is equivalent to or exceeds the intent of the Code requirements. Therefore, the NRC staff granted the requested relief provided:

(1) The licensee's performance of vibration testing complies with the test criteria specified in their request and with any Code vibration test criteria they did not propose an alternative to (e.g. number and location of measurements).

(2) The licensee recognizes that, unless they can demonstrate significant hardship or burden, instrumentation not meeting Code requirements will not be acceptable in the next interval.

2.3 Valve Testing Program

2.3.1 Program (Excluding Relief Requests)

The NRC staff review found that the specified periodic testing conforms with Code requirements except where relief has been requested.

2.3.2 Relief Requests (Applicable to Requirements in Code Subsection IWV)

2.3.2.1 PV-4, Requirements for Valve Operability Before Startup

Relief Request

The licensee has requested relief from IWV-3416 requirements that valves be exercised within 30 days prior to the return of a system to operable status. Also, they have requested relief from IWV-3417(b) requirements that valves which fail cold shutdown testing must have necessary corrective actions and retesting per Code performed before startup.

Licensee's Basis for Requesting Relief

The plant Technical Specifications (TS) limiting conditions of operation clearly state the minimum requirements for safe operation of the plant. The failure of a particular valve may not require plant shutdown or prevent startup. System requirements for operation will be per technical specification requirements.

Evaluation

The TS provide conditions for system operability which may permit individual components or trains of systems to be out of service with the systems still considered operable. The controls provided by the TS in such cases are considered to provide satisfactory assurance of plant safety. The staff finds that the TS provides an acceptable alternative to the Code requirement.

Corrective actions and Code required tests must be performed within 30 days prior to considering the valve operable.

Conclusion

The proposed alternative would provide an acceptable level of quality and safety. Therefore, the NRC staff granted the requested relief provided:

(1) The corrective action and testing required by the Code are performed prior to declaring a valve operable and,

(2) The testing must be done within 30 days prior to return of the valve to operable status.

2.3.2.2 PV-6, Quarterly Exercising Automatic Depressurization System (ADS) Valves

Relief Request

The licensee has requested relief from Code, IWV-3410, requirements for exercising ADS safety/relief valves (SRVs). As these valves may be power actuated, IWV-3410 requires them to be exercised (to the position required to fulfill their function) and stroke time tested. The Code requires the testing to be performed at least once every three months, except that if full-stroke testing cannot be performed during operation, the valves must be full-stroke tested at cold shutdowns and part-stroke exercised during operation. The Code also requires comparisons of stroke times with previously obtained values (trending). The licensee proposes as an alternative to IWV-3410, to test these valves in accordance with TS 4.6.D.2. This TS does not require stroke timing and only requires exercising once each operating cycle. The licensee also proposes that, during the TS testing, they will verify that the valves stroke in two seconds or less.

Licensee's Basis for Requesting Relief

The six SRVs assigned to the ADS system perform an essential safety function when operated by the pneumatic actuator with gas supplied through the ADS solenoid valves. Operation of these valves is not practical during power operation because this action will vent main steam to the suppression pool, inducing a transient condition and increasing the potential for an open failure of SRVs valve. Also, no stroke time trending is practical, as these are pneumatic assisted SRVs. Since "position indication" of the SRVs is provided by acoustic monitors attached to the valve discharge piping, exercising during cold shutdown cannot be accomplished because of lack of steam flow (and attendant noise).

The ADS valves will be exercised once each operating cycle in accordance with Technical Specification 4.6.D.2, which provides manual opening of each ADS valve (with reactor dome pressure greater than or equal to 100 psig) and observing either control valve or bypass valve response or corresponding change in measured steam flow. No stroke time trending will be done but the valves will be verified to stroke in two seconds or less.

Evaluation

The staff finds that it is impractical to operate the ADS valves during power operation - because of the safety hazard that would result if a valve failed open. This open failure could create a loss of coolant accident. From safety and design considerations the most appropriate time to test these valves is during startup and, even then, there is some hazard from an open valve failure. It is the staff's position that testing of these valves should not be required at a frequency greater than refueling outages and that the TS provides satisfactory exercising of the valves. The staff also finds that it is desirable to stroke time these valves with a maximum stroke time of two seconds specified for acceptance. Trending of stroke times is considered unnecessary

as the valves are not designed or instrumented for measurements of sufficient accuracy to make stroke time trending useful or practical.

The staff has determined that Code exercising and trending of stroke times for the ADS valves, as opposed to testing per TS 4.6.D.2, is both impractical and undesirable. The safety hazard and burden of the additional testing outweigh the possible increased assurance of valve operability that it would provide.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Code, IWV-3410, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore, the partial relief requested by the licensee from Code, IWV-3410, requirements for exercising ADS safety/relief valves (SRVs) is granted.

2.3.2.3 PV-7, Quarterly Exercising of Main Steam Relief Valve (MSRV) Discharge Pipe Vacuum Breakers

Relief Request

The licensee has requested relief from Code, IWV-3521, requirements for quarterly testing MSRV discharge pipe vacuum breakers. They propose to perform the required tests only during cold shutdowns in which drywell entry is made (time permitting). As a minimum the valves would be tested each refueling outage. Testing frequency will be consistent with requirements applied to other cold shutdown tested valves.

Licensee's Basis for Requesting Relief

These valves are located in the drywell and access to perform the testing during operation is not practical. The drywell is inerted with nitrogen, and entry would involve personnel safety hazards or deinerting.

Evaluation

The staff finds that deinerting a drywell or entering an inerted drywell solely for MSRV vacuum breaker testing represents an expenditure of effort and/or personnel safety hazards without a compensating increase in safety. Having taken this into consideration, we are satisfied that the alternative proposed by the licensee provides reasonable assurance that the MSRV vacuum breakers are operational.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Code, IWV-3521, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore the partial relief request by the licensee from Code, IWV-3521, requirements for quarterly testing MSRV discharge pipe vacuum breakers is granted.

2.3.2.4 PV-8, Quarterly Exercising Reactor Feedwater Valves 3-554, 558, 568, and 572

Relief Request

The licensee has requested relief from the Code, IWV-3521 and 3522, requirements to stroke these valves to the closed position every three months during operation or at cold shutdowns. The licensee proposes to use the 10 CFR 50, Appendix J testing performed each refueling outage to verify that these valves stroke to the closed position.

Licensee's Basis for Requesting Relief

All four check valves remain open, maintaining the flow path to the reactor vessel whenever the feedwater/condensate systems are supplying feedwater to the reactor vessel. When RCIC or RWCU are returning flow to the reactor vessel, check valve 3-572 remains open. When HPCI is injecting to the vessel, check valve 3-558 remains open. Due to the necessity of maintaining this flow path in virtually all modes of operation, closure testing is only practical during extended outages, such as refueling, during which these systems are shut down. Also, plant design does not provide a practical means of demonstrating closure other than by upstream pressurization during the leak rate testing performed in accordance with Appendix J of 10 CFR 50. This testing involves significant effort for installation of temporary equipment, and requires entry into the reactor containment. Such entry into containment poses a hazard to personnel safety or necessitates deinerting.

Evaluation

The staff finds, for the reasons stated in the licensee's basis, that there is no practical means of both causing the closure of these values and verifying that closure (or even partial closure) has occurred during power operation or at cold shutdowns. The closure function of these valves will be adequately verified by 10 CFR 50, Appendix J, Type C tests that are performed at refueling outages.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore the partial relief requested by the licensee from Code IWV-3521 and 3522, requirement for stroking RFW valves 3-554, 3-558, 3-568, and 3-572 to the closed position every three months is granted.

2.3.2.5 PV-9, Quarterly Exercising of SLC Check Valves 63-525 and 526

Relief Request

The licensee has requested relief from IWV-3521 and 3522 requirements to stroke these check valves to the positions required to fulfill their functions every three months during operation or at cold shutdowns. The licensee proposes

instead to verify the opening and closing functions of these check valves at each refueling outage. Opening will be demonstrated by a Technical Specification injection test and closure will be demonstrated through 10 CFR 50, Appendix J, local leak testing.

Licensee's Basis for Requesting Relief

To verify proper opening of these check valves, it is necessary to pass fluid through each valve. This action would result in an injection into the vessel and would require actuation of an explosive valve, both undesirable during power operation. Closure testing is only practical by pressurizing downstream of the valve (the upstream side being vented) and verifying absence of flow on the upstream side. This requires installation of temporary equipment and access to the containment which is inerted during power operation.

Evaluation

The staff agrees that it is not practical to exercise test these valves to the positions required to fulfill their functions either at three month intervals during operation or at cold shutdowns. Performing exercise tests at the frequency specified by IWV-3521 and 3522 is not considered to provide sufficient additional assurance of the proper functioning of the valves, as compared to the licensee's proposal, to justify the burden of the methods that would have to be used to accomplish the testing. The alternative testing proposed by the licensee provides reasonable assurance the valves will be operational.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship without a compensating increase in safety, therefore, the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements to verify proper opening of SLC check valves, 63-525 and 63-526, every three months is granted.

2.3.2.6 PV-10, Quarterly Closure Exercising of Reactor Recirculation System Containment Isolation Check Valves 68-508, 523, 550 and 555

Relief Request

The licensee has requested relief from the requirements of IWV-3521 and 3522 to exercise these valves to closure at least once every three months during operation or at cold shutdowns. They propose to perform the testing only at each refueling outage and to verify proper closure through 10 CFR 50, Appendix J local leak rate tests.

Licensee's Basis for Requesting Relief

These check valves serve as inboard and outboard containment isolation valves. The valves are not equipped with remote indication, and there is no pressure

indication downstream of the valves. For these valves, closure testing is only practical through pressurization downstream of the valve, with the upstream piping vented and the absence of flow upstream verified. Interruption of the CRD flow (seal injection) is required to perform this testing, and during reactor recirculation pump operation, could result in seal damage.

The practical method for verifying closure is the local leak rate test performed at refueling outages. This test would be impractical on a cold shutdown basis due to the burden of installing the associated temporary test equipment.

Evaluation

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore, the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements for exercising Reactor Recirculation System Containment Isolation Valves 68-508, 68-523, 68-550 and 68-558 every three months is granted.

2.3.2.7 PV-11, Quarterly Closure Exercising of Reactor Water Cleanup (RWCU) Check Valves 69-579 and 69-624 (Unit 3)

Relief Request

The licensee has requested relief from the requirements of IWV-3521 and 3522 to exercise these valves to closure at least once every three months during operation or at cold shutdowns. The licensee proposes to perform the closure test at each refueling outage. They propose to verify closure through 10 CFR 50, Appendix J, Type C tests.

Licensee's Basis for Requesting Relief

These check valves remain open to return water to the reactor vessel whenever the reactor water cleanup (RWCU) system is operating. The valves are not testable whenever the RWCU, feedwater/condensate, or RCIC system is returning flow to the reactor vessel. Testing requires entry into primary containment and the disruption of system flow (RWCU, feedwater/condensate or RCIC). For these reasons, closure testing is only practical during extended outages such as refueling when no return flow is required through the valves. Also, plant

design does not provide a practical means of demonstrating closure other than by upstream pressurization performed during leak rate testing conducted in accordance with 10 CFR 50, Appendix J. This testing involves significant effort for installation of temporary equipment. This would require valve lineups to abnormal positions, installation of pressurizing equipment and associated test lines, as well as deinerting the drywell for safe entry.

Evaluation

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements for exercising RWCU check valves 69-579 and 69-624 every three months is granted.

2.3.2.8 PV-12, Quarterly Stroke Timing Residual Heat Removal Service Water (RHRSW) Valves 23-34, 40, 46 and 52

Relief Request

The licensee has requested relief from IWV-3413 requirements to measure the full stroke time of these power operated valves. The licensee proposes to set an intermediate stroke "reference" position to which the valves will be stroked and timed. This test will be performed quarterly and the reference position will be 4500 gpm.

Licensee's Basis for Requesting Relief

In order to obtain good stroke times for baseline values, these valves would have to be stroked from the same position. Since the valves are throttle valves, the position to obtain the desired flow of 4500 gpm would change due to system variables such as corrosion, tube blockage, plugged tubes, etc. Additionally, full opening the valve would overflow the heat exchanger and possible damage it.

Evaluation

Considering that full stroking these valves might result in heat exchanger damage, the staff agrees that the such testing is a safety hazard. The alternative proposed by the licensee, stroke timing to a reference flow, is a

satisfactory alternative test. The staff finds that this alternative meets the intent of the Code.

Conclusion

The NRC staff concludes that the proposed alternate testing would provide an acceptable level of quality and meets the intent of the Code, IWV-3413, therefore the partial relief requested by the licensee from Code, IWV-3413, requirements to measure the full stroke of RHRSW valves 23-34, 23-40, 23-46 and 23-52 is granted.

2.3.2.9 PV-13, Quarterly Closure Exercising RHRSW Check Valves 23-601, 603, 605 and 607

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirement for exercising these valves to closure at least once every three months during operation or at cold shutdowns. The licensee proposes to exercise these valves and to verify proper closure once every 24 months. The valves will be proven to close by disassembly, acoustic monitoring techniques or other proven methods.

Licensee's Basis for Requesting Relief

These check valves, located in keep fill lines for the RHR service water system, permit raw service water flow into the respective headers while preventing process flow in the reverse direction during RHRSW system operation. There are two check valves in each line located in parallel. There are no vent, drain, or test connections located upstream of the check valves. Therefore, no practical method exists to directly verify closure of either valve upon cessation or reversal of flow.

Evaluation

The lines upstream of the subject valves do not contain vent, drain or test connections needed to facilitate valve exercising to closure. In the absence of such connections, the staff considers that the proven exercising methods which could be used would be unnecessarily burdensome, as compared to the increased confidence in valve operability obtained by performing the exercising at the Code specified frequency. The 24 month frequency proposed by the licensee provides reasonable assurance of operational readiness and is judged satisfactory by the staff.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship without a compensating increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and

3522, requirement for exercising RHRSW check valves 23-601, 23-603, 23-605, and 23-607 every three months is granted.

2.3.2.10 PV-14, Quarterly Closure Exercising of the Following Emergency Equipment Cooling Water (EECW) (67-) and Raw Cooling Water (RCW) (24-) Check Valves

67-541, 542, 584, 585, 648, 649, 657, 558, 559, 638, 639, 600, 601, 659, 660, 528, 529, 634, 635, 521, 522, 630, 631, 624, 625, 514, 515, 627, 628, 507, 508, 502, 622, 619, 656, 671, 679, 638

3-24-831, 833, 796, 798

3-67-639, 694, 695, 696, 703, 704, 705, 706, 715, 716, 713, 714, 723, 724, 725, 726, 771, 772, 774, 775, 761, 762, 764, 765, 737, 738, 735, 736

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements for exercising these valves to closure at least once every three months during operation or at cold shutdowns. The licensee proposes to exercise these valves and to verify proper closure by positive means once per refueling cycle.

Licensee's Basis for Requesting Relief

The EECW valves pass rated flow for the emergency coolers and prevent backflow from opposite header. The RCW valves prevent backflow of EECW into RCW. System design prevents the valves from being verified closed by reverse flow measurements or other conventional means. Therefore, an alternate test such as acoustic monitoring or disassembly will be required. Since the valves can be verified open quarterly by flow verification, apparent disc free movement will be indicated.

Evaluation

For the given design, the staff considers the IWV-3521 and 3522 quarterly closure test frequency to be unnecessarily burdensome. The additional efforts required to perform the tests at the IWV-3522 frequency (versus the proposed refueling outage frequency) are not compensated by significantly increased confidence in operation safety to warrant the hardship involved. The staff finds that the refueling outage test frequency proposed by the licensee provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship without a compensating increase in safety,

therefore, the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirement for exercising EECW and RCW check valves, as listed above, once every three months is granted.

2.3.2.11 PV-15, Quarterly Closure Exercising of Reactor Building Closed Cooling Water (RBCCW) Check Valve 70-506

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements for exercising this check valve to closure at least once every three months during operation or at cold shutdowns. The licensee proposes to verify closure of this valve through the 10 CFR 50, Appendix J, Type C leak testing.

Licensee's Basis for Requesting Relief

This containment isolation valve is in the cooling water supply for the reactor recirculation pump bearing and seal coolers. Testing this valve closed during power operation would interrupt this cooling water flow, possibly causing pump bearing damage or seal failure. Due to the necessity of maintaining this flow path in virtually all modes of operation, closure testing is only practical during extended outages, such as refueling, during which this system is shutdown. Plant design does not provide a practical means of demonstrating closure other than by downstream pressurization, as is performed during leak rate testing. This testing involves significant effort for installation of temporary equipment, abnormal valve lineups for test boundaries, and complete purging of the inerted reactor containment.

Evaluation

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship without a compensating increase in safety, therefore, the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirement for exercising RBCCW check valve 70-506 to closure at least once every three months is granted.

2.3.2.12 PV-16, Quarterly Closure Exercising of High Pressure Coolant Injection (HPCI) (73) and Reactor Core Isolation Cooling (RCIC) (71) Valves 73-559 and 71-547

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements that these valves be exercised to closure at least once every three months during operation or at cold shutdowns. The licensee proposes to exercise and verify closure of these valves through the 10 CFR 50, Appendix J, Type C tests performed each refueling outage.

Licensee's Basis for Requesting Relief

These valves are not equipped with position indication. Their configuration with an open discharge into the suppression pool prevents usage of reverse flow to demonstrate closure. No practical method exists to perform closure testing other than the downstream pressurization in leak rate testing. Such testing conducted per Appendix J, requires installation of temporary equipment and closure of valves which render the system inoperable.

Evaluation

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore, the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements for exercising to closure of HPCI valve 73-559 and RCIC valve 71-547 every three months is granted.

2.3.2.13 PV-17, Additional Testing for Main Steam Relief Valves (MSRVs) 1-4, 1-5, 1-18, 1-19, 1-22, 1-23, 1-30, 1-31, 1-34, 1-41, 1-42, 1-179, and 1-180

Relief Request

The licensee has requested relief from the IWV-3513 requirements for testing an additional quantity of valves (based on a Code formula) following the failure of a valve in the set point testing of IWV-3511. They propose that their testing will be conducted in accordance with Technical Specification (TS) 4.6.D.1, which provides for either bench checking one-half the valves each operating cycle or replacing one-half the valves with bench checked valves.

IWV-3513 requires that, if any additional valves fail in the additional testing, all valves in the system in this category shall be tested. There is no similar requirement in the TS and it would not even assure that all valves are tested for as found conditions.

The licensee proposes to supplement the TS with requirements that:

(1) Both as-found and as-left set pressures will be determined

(2) As-found pressures (for valves replaced) will be determined either prior to the respective unit's startup or within 120 days of removal from the system, whichever is longer

(3) Failures will be evaluated to determine if additional testing is warranted

Licensee's Basis for Requesting Relief

The current Technical Specification 4.6.D.1 requires one-half of all relief valves to be bench checked or replaced with bench checked valves. All 13 valves will have been checked or replaced upon completion of every second cycle. Although this does not require additional sampling based on results, all the valves are tested at a minimum of every other refueling, which is more stringent than the potential of every five years per code.

Also, in short outages, it may not be practical to remove the valves, ship them offsite for testing, and have the tests completed in time to determine additional testing without delaying unit startup.

To assure that deficiencies that have developed in installation and subsequent operation of MSRVs are identified and that the causes are corrected, the TS requirements have been supplemented as indicated above (see description under "Relief Request").

Evaluation

The NRC staff finds that while the testing proposed by the licensee differs from the Code requirements, it does satisfactorily address the important aspects of the Code requirements including:

- Original testing (as-found and as-left)
- Additional testing (per TS and evaluation of any failures).
- Corrective action (evaluations and replacements)

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

The staff considers that the TS and supplemented requirements proposed by the licensee provide a level of assurance of valve operability that is equivalent to or exceeds the IWV-3413 requirements.

Conclusion

The NRC staff concludes that the proposed alternate testing would provide an acceptable level of quality and meets the intent of the Code, IWV-3513, therefore the relief requested by the licensee from Code, IWV-3513, requirements for testing an additional quantity of valves (based on Code formula) following the failure of a valve in the set point testing of Code, IWV-3511 is granted.

2.3.2.14 PV-18, Quarterly Closure Exercising of HPCI and RCIC Valves 73-603 and 609 and 71-580 and 592

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements that these valves be exercised to closure at least once every three months during operation or at cold shutdowns. The licensee proposes to verify exercising of these valves to closure through 10 CFR 50, Appendix J, Type C tests each refueling outage.

Licensee's Basis for Requesting Relief

These check valves are not equipped with position indication, and system design does not provide any practical method of verifying closure other than pressurization similar to leak rate testing. Such testing requires installation of temporary equipment which is impractical on a quarterly basis, and it would render the system inoperable during the testing period. Additionally, the valve location (top of torus) could present a personnel safety hazard during operation. Normally, testing of this type is accomplished by required containment local leak rate testing in accordance with Appendix J.

Evaluation

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating

increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements for exercising to closure HPCI valves 73-603 and 73-609 and RCIC valves 71-580 and 71-592 every three months is granted.

2.3.2.15 PV-19, Quarterly Exercising of HPCI and RCIC Valves 73-633 through 636 and 71-597 through 600

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements that these valves be exercised to the position required to fulfill their functions at least once every three months or at cold shutdowns. The licensee proposes to exercise test these valves each refueling outage by disassembly, acoustic monitoring, or other positive means.

Licensee's Basis for Requesting Relief

Valve configuration prevents the valves from being individually proven open or closed. No test connections or isolation valves exist to allow reverse testing. Additionally, the valves are located in the torus room adjacent to the top of the torus. Access requires scaffold erection which would present a safety hazard during operation.

Evaluation

Having reviewed the system configuration, the staff agrees that exercising tests may not be easily accomplished on these valves. Methods such as disassembly would be required and we do not consider that the burden of such tests should be imposed at a frequency greater than refueling outages. Performing the tests at a greater frequency than refueling outages does not result in a sufficiently improved assurance of plant safety to warrant the additional burden on the licensee.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements for exercising HPCI valves 73-633 through 73-636 and RCIC valves 71-597 through 71-600 to the position required to fulfill their functions every three months is granted.

2.3.2.16 PV-20, Quarterly Exercising of HPCI and RCIC Check Valves 73-517 and 71-508

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements that these valves be exercised to the positions required to fulfill their functions

at least once every three months during operation or at cold shutdowns. The licensee proposes to exercise test these valves each refueling outage by disassembly, acoustic monitoring or other positive means.

Licensee's Basis for Requesting Relief

To verify proper opening of these check valves, it is necessary to initiate system flow while taking suction from the suppression pool. Since the water quality in the suppression pool is not maintained at reactor coolant standards, it is not advisable to initiate this flow at any time during normal operations. The resulting contamination of the HPCI or RCIC system from such flow testing would affect the condensate storage tank purity and ultimately affect the chemistry control of the reactor coolant system. There exists no other practical method of verifying proper valve operation.

Evaluation

Taking into consideration the system configurations and types of valves, the staff finds that the only practical method for exercising these valves during operation or cold shutdown would be through initiation of system flow through these valves from the torus. We agree with the licensee that this is undesirable, in that it would result in degradation of reactor coolant water quality through introduction of lower quality water from the torus. Other methods which might be used during operation or cold shutdown, such as manual exercising after disassembly, are considered impractical by the staff on the basis that they result in the system being inoperable when required for safety and/or that the additional assurance of safe operation gained through the tests is insufficient to warrant the burden on the licensee. Although the staff considers the exercising tests impractical during operation or cold shutdown, we find that testing is warranted at refueling outages to assure the continued operability of these valves. The refueling outage testing proposed by the licensee provides reasonable assurance of the operational readiness of the valves.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and meets the intent of Code, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore, the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements that HPCI check valve 73-517 and RCIC check valve 71-508 be exercised to the position required to fulfill their function every three months is granted.

2.3.2.17 PV-21; Leak Testing the Following Gate Type Containment Isolation Valves with Incorrect Pressure Differential Direction

System	Valve
Main Steam (1)	FCV 1-55
RHR (74)	FCV 74-61, 75
HPCI (73)	FCV 73-2 FCV 73-26
RCIC (71)	FCV 71-2 FCV 71-17
Floor & Dirty Radwaste Drainage (77)	FCV 77-2A
Clean Radwaste & Decontamination Drainage (77)	FCV 77-15A

Relief Request

Code subsection IWV-3423 requires that seat leakage tests on single disk gate valves be made in the same direction as when the valve is performing its function. The licensee has requested relief from this requirement for the subject gate valves. The licensee proposed to test the valves in the opposite direction. These valves are containment isolation valves.

Licensee's Basis for Requesting Relief

These containment isolation valves are configured such that there is no practical means of pressurizing and testing them in the direction of safety function (lack of proper isolation valves, test connections, etc.). Pressurization in the direction of safety function would require actions such as pressurizing the containment (equivalent to an ILRT) or precisely controlling the entire Reactor Coolant System (RCS) at the valve test pressure.

Evaluation

The staff considers that the requirements of IWV-3421 through 3425 are adequately addressed by 10 CFR 50, Appendix J, Type C test requirements. Test direction requirements similar to those of IWV-3423 apply to Appendix J testing and the licensee must meet those requirements or request NRC approval of an exemption.

Conclusion

The staff concludes that the evaluation and granting of relief relative to the subject valves should be accomplished in accordance with NRC evaluations of requests for exemptions from 10 CFR 50, Appendix J.

2.3.2.18 PV-22, Quarterly Exercising of Fuel Pool Cooling and Cleanup Check Valves 78-526 and 527

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements that these valves be exercised to the position required to fulfill their function at least once every three months during operation or at cold shutdowns. The licensee proposes to verify closure for these valves each refueling outage by disassembly, acoustic monitoring, or other positive means. The valves will be verified to open quarterly.

Licensee's Basis for Requesting Relief

These valves are located directly over the fuel pool. Valve configuration (open ended to fuel pool) prevents reverse flow testing to prove closure.

Evaluation

The valves were not designed to be closure tested. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of the valves closure operation to justify the efforts involved. The licensee proposed use of disassembly or other positive methods to verify closure on a refueling outage frequency is considered to provide a reasonable alternative to the code requirements.

Conclusions

The NRC staff concludes that the proposed alternate testing would provide an acceptable level of quality and meets the intent of the Codes, IWV-3521 and 3522, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements to exercise FPC check valves 78-526 and 527 to the position required to fulfill their function every three months is granted.

2.3.2.19 PV-23, Quarterly Exercising and Stroke Timing of the Following Control Rod Drive Hydraulic Valves

Valve Number	Code Category
85-39A (1-185)	B
85-39B (1-185)	B
85-589 (1-185)	C
85-597 (1-185)	C
85-616 (1-185)	C
85-617 (1-185)	C

Relief Request

The licensee has requested relief from the exercising and stroke timing requirements of IWV-3410 for the above Category B valves; and from the

exercising requirements of IWV-3521 for the above Category C valves. The licensee proposes that the testing of the above valves will be accomplished as follows:

Scram testing and rod insertion timing will be performed in accordance with Technical Specifications Section 4.3.C (at reactor coolant pressure 800 psig) for:

(1) All control rods prior to THERMAL POWER exceeding 40-percent after each refueling outage.

(2) 10-percent on a rotating basis at least once every 16 weeks.

(3) Valves 85-589 (1-185) and 85-597 (1-185) will be proven closed by disassembly, acoustic monitoring techniques, or by other positive means each refueling outage.

Licensee's Basis for Requesting Relief

These valves, located on the hydraulic control units for the 185 control rod drives, function on a reactor scram signal from the reactor protection system to insert the control rods rapidly into the reactor core.

Cycling these valves requires scramming a control rod. There are 185 control rods in the reactor. Scramming every rod once every three months is not practical for the following reasons:

(1) A power reduction is required to test the scram function. Reducing power for the length of time required to scram 185 rods is not practical.

(2) Fuel preconditioning must follow this power reduction to avoid possible fuel damage. The longer the reduction in power, the longer the preconditioning.

Their proper functioning is most practically verified by an actual scram test (except for closure of 85-589 and 85-597).

Evaluation

For the design of this system the subject valves cannot be exercised during operation except by scramming the associated control rods. Scram tests which exercise and verify the functioning of these valves (except for closure of check valves 85-589 and 85-597) are performed on a frequency in accordance with TS 4.3.C. This frequency has been previously approved by the staff and any increase is undesirable because of increased wear to the control rod drive mechanisms, as well as the reasons stated by the licensee. With the licensee's design, closure of valves 85-589 and 85-597 cannot be verified during operation. The staff is satisfied that closure testing valves 88-589 and 85-597 at greater than cold shutdown frequencies is impractical for the licensee's design and that the cold shutdown testing frequency proposed by the licensee provides reasonable assurance of operational readiness. Redesign to permit CRD valve exercising at the Code specified frequency is impractical and the TS and cold shutdown frequencies proposed provide reasonable assurance of operational readiness.

The licensee did not describe a basis for not measuring the stroke times of the Category B valves. However, TS 4.3.C is referenced in their proposal and it specifies limits on rod insertion times. The insertion times are a function (in part) of the valve stroke times and we are satisfied that their measurement and assessment per TS 4.3.C will provide a satisfactory assurance of valve operational readiness.

Conclusion

The NRC staff concludes that the proposed alternate testing would provide an acceptable level of quality and meets the intent of the Codes, IWV-3410 and 3521, therefore the partial relief requested by the licensee from Codes IWC-3410 and 3521, exercising and stroke timing of valves 85-39A and 85-39B and exercising of 85-589, 597, 616 and 617 is granted.

2.3.2.20 PV-24, Quarterly Closure Exercising of Control Air Check Valves 32-336, 2521, 2163 and 2516

Relief Request

The licensee has requested relief from the Code requirements that these containment isolation valves be closure exercised at least once every three months during operation or at cold shutdowns. The licensee proposes to closure exercise test these valves only at refueling outages.

Licensee's Basis for Requesting Relief

The inboard valves are inside containment and, therefore, could not be proven closed without entry into the drywell. The drywell is inerted, and entry would be a hazard to personnel safety.

Evaluation

Valves 2163 and 2516 are the inboard CIVs on penetrations X-22 and X-50, 336 and 2521 are the respective outboard CIVs on the same penetrations. All four are check valves. The licensee's design does not provide for closure testing these valves during operation or cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide sufficiently increased assurance of the closure to justify the hazards (e.g., personnel hazards for containment entry during operation) and/or efforts involved. The Appendix J, Type C testing which will be performed these valves at refueling outage frequency provides reasonable assurance of their operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore, the partial relief requested by the licensee

from Codes, IWV-3521 and 3522, requirements the CA check valves 32-336, 2521, 2163 and 2516 be closure exercised every three months is granted.

2.3.2.21 PV-25, Stroke Timing Rapid-Acting Valves in the Following Systems

Sampling and Water Quality (43), HPCI (73), Containment Inerting (76), Containment Atmosphere Diluting (84), Control Rod Drive (85), Diesel Generator Air Start (86), Service Water (23), Residual Heat Removal Service Water (23) and Traversing Incore Probe.

Relief Request

The licensee has requested relief from the power operated valve stroke time trending and increased frequency of testing of IWV-3417(a) for the subject valves, which have stroke times of less than two seconds. For these valves they will specify a limiting full stroke time maximum of two seconds.

Licensee's Basis for Requesting Relief

Valves with stroke times 2 seconds cannot be accurately timed.

Evaluation

The staff recognizes that the licensee does not have such special equipment and setups as would be required to accurately stroke time the subject valves for trending in conformance IWV-3417(a) requirements. Stroke timing rapid-acting valves to the Code requirements is not considered to result in sufficiently improved assurance of plant safety to warrant the burden of such special test equipment and setups.

The staff finds that the licensee's proposal of two second maximum stroke times for the valves provides an acceptable level of quality.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and meets the intent of Code, IWV-3417(a), therefore, the partial relief requested by the licensee from Code IWV-3417(a), power operated valve stroke time trending and increased frequency of testing for the above subject valves is granted.

2.3.2.22 PV-26, Closure Exercising Containment Inerting System Check Valve X-35f

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirement to stroke this containment isolation valve to the closed position every three months or at cold shutdowns. They propose to use 10 CFR 50, Appendix J, Type C testing performed each refueling outage to verify the stroking of this valve to the closed position.

Licensee's Basis for Requesting Relief

This purge check valve serves as an outboard containment isolation valve. Testing of this valve requires entry into primary containment and disconnection of the purge line for installation of test equipment. Because of the plant design, demonstrating closure can only practically be accomplished by pressurizing downstream, as is performed during leak rate testing in accordance with 10 CFR 50 Appendix J. Conducting such a test would therefore pose a hazard to personnel safety or require the deinerting of containment for safe entry and would also require the depressurization of the purge line which could result in the introduction of moisture in these lines.

Evaluation

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements to stroke valve X-35f to the closed position every three months is granted.

2.3.2.23 PV-27, Quarterly Exercising of the following RHR and Core Spray Testable Check Valves

System	Valve
RHR	74-54
RHR	74-68
Core Spray	75-26
Core Spray	75-54

Relief Request

The licensee has requested relief from IWV-3521 and 3522 requirements that these valves be exercised to the positions required to fulfill their functions once each three months during operation or at cold shutdowns. They propose to conduct the exercising at cold shutdowns, but only when the containment is deinerted and there is sufficient time to perform the testing. Additionally, the testing will be performed during refueling outages.

Licensee's Basis for Requesting Relief

Due to potentially inadvertent valve operation caused by nonclass 1E circuitry to the valve operator, the air supply is normally disconnected. Since these valves are located in containment, entry to connect the air supply is not practical during operation and may not be practical during cold shutdown.

Evaluation

The NRC reviewed documentation relevant to the licensee's basis during NRC Inspection 259, 260, 296/87-22. As described in the report for that inspection, the documentation supported the licensee's contention that the valves should not have to be tested quarterly during operation because of concerns for inadvertent actuation and that, with the present designs the valves could not practically be tested during any shutdown of short duration or when the containment was not deinerted.

Testing with the containment inerted would be both a hardship and a personnel safety hazard. Deinerting solely for the testing would be an undue hardship. Redesign to permit Code testing is also an undue hardship. The licensee defines "short duration" cold shutdowns in I.C.11 of their program and the staff finds that definition acceptable. The testing frequency proposed by the licensee provides adequate assurance of operational safety.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard without a compensating increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements that testable check valves, 74-54, 74-68, 75-26 and 75-54, be exercised to the positions required to fulfill their functions every three months is granted.

2.3.2.24 PV-28, Quarterly Closure Exercising of CRD Check Valve 85-576

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements that this valve be closure exercised at least once each three months or at cold shutdowns. They propose to perform the closure exercising through 10 CFR 50, Appendix J, Type C testing conducted each refueling outage.

Licensee's Basis for Requesting Relief

This check valve may be open or closed during system operation. Plant design does not provide a practical means of demonstrating closure other than upstream pressurization, disassembly, or acoustical monitor techniques. Upstream pressurization or disassembly would require entry into primary containment to isolate Feedwater from the vessel.

Evaluation

The staff finds that the licensee's design did not provide for testing these valves during plant operation or at cold shutdowns. Modifications or special test installations needed to demonstrate closure at the Code specified frequency do not appear to provide a sufficiently increased assurance of their closure operation to justify the hazards and/or efforts involved. The Appendix J, Type C testing proposed with refueling outage frequency provides reasonable assurance of operational readiness.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes IWV-3521 and 3522, would be an undesirable hardship and saftey hazard without a compensating increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirement that CRD check valves 85-576 be exercised to closure every three months is granted.

2.3.2.25 PV-29, Leak Testing Inboard Main Steam Isolation Valves at Full Maximum Function Pressure Differential

Relief Request

The licensee has requested relief from the IWV-3423 requirement that leak testing of the subject valves be performed at maximum function differential pressure or that leakage be adjusted to function maximum pressure differential. The licensee proposes to test the valves at a reduced differential pressure of 26 psig. In informal discussions the licensee noted that this is the pressure specified by TS 4.7.A.2.i.

Licensee's Basis for Requesting Relief

Due to testing techniques, valve manifold design does not allow testing at full function pressure differential. Such a test would subject the valve manifold to potentially damaging loads.

Evaluation

Leak testing requirements for these valves are specified by TS 4.7.A.2.i. These requirements are acceptable to the staff for the subject valves. Additional testing or adjustment of leak rate values to conform fully with Code requirements would not result in sufficiently increased assurance of plant safety to warrant the burden of the testing or adjustment. The TS test requirement provides an acceptable level of quality and safety.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Code IWV-3423 would be an

undesirable hardship and safety hazard without a compensating increase in IWV-3423, requirement that leak testing of inboard MSIV's at maximum functional safety, therefore the partial relief requested by the licensee from Core differential pressure or that leakage be adjusted to perform at maximum differential is granted.

2.3.2.26 PV-30, Quarterly Exercising of the Following RHR (74) and CAD (84) System Thermal Relief/Containment Isolation Check Valves

Valve Number	Code Category
74-661	C
74-662	C
84-600	C
84-601	C
84-602	C
84-603	C
84-617	C

Relief Request

The licensee has requested relief from the IWV-3521 and 3522 requirements for exercising these valves to the positions required to fulfill their functions (open and close) at least once each three months or at cold shutdowns.

The licensee proposes to exercise these valves to verify adequate opening during cold shutdowns in which the drywell is entered if there is sufficient time. They propose to verify proper closure through 10 CFR.50, Appendix J, Type C testing performed at refueling outages.

Licensee's Basis for Requesting Relief

RHR: These valves provide thermal relief between the inboard and outboard shutdown cooling suction valves. Since these valves are in series, with no isolation valve or test connection between them, they individually cannot be proven to close. As they are located inside containment, access to perform testing during operation is impractical due to the drywell being inerted. Cycling by system manipulation is not possible during reactor operation due to pressure interlocks which prevent the suction valves from operating.

CAD: These valves provide an injection path when open and containment isolation when closed. Cycling the valves open would require establishing flow through the valve or disassembly. Cycling the valve closed would require setup of temporary test equipment and abnormal valve lineups.

Evaluation

The licensee did not provide a sufficient basis to demonstrate that exercising the CAD valves to the open position in accordance with Code requirements would be a hardship.

Taking into account the system and valve designs involved, the staff agrees that closure exercising the CAD and RHR valves is impractical except at refueling outages. Similarly, we agree that open exercising the RHR valves is impractical except at cold shutdowns in which there is containment entry. Performing this exercising at the Code frequency is not considered to be of sufficient value in assuring operational safety to warrant the burden and/or hazards of the methods that would be necessary. The RHR valve open exercising and the CAD and RHR closure exercising frequencies provide adequate assurance of the capabilities of the valves to perform the associated opening (RHR only) and closing functions.

Conclusion

The NRC staff concludes that the proposed testing provides assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship and safety hazard, except for the open exercising frequency requirements for the CAD valves, without a compensating increase in safety, therefore the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirement that RHR and CAD system thermal relief/ containment isolation valves be exercised open and closed every three months is granted, except for the CAD valves open exercising frequency requirements which is denied.

2.3.2.26 PV-31, Quarterly Closure Exercising of RCIC Check Valve 71-589 and HPCI Check Valve 73-625

Relief Request

The licensee has requested relief from the closure exercising frequency requirement of IWV-3521 and 3522 for the subject check valves. They propose to perform the closure testing of the valves once each refueling cycle by positive means such as disassembly, acoustic monitoring or other proven methods.

Licensee's Basis for Requesting Relief

System design prevents the valves from being verified closed by reverse flow or other conventional means. Therefore, an alternate test such as acoustic monitor verification or disassembly will be required. Since the valves can be verified open quarterly by flow verification, apparent disc free movement will be indicated.

Evaluation

The staff finds that for the given designs these valves cannot be verified closed by conventional means. Redesign would be an excessive burden. Alternate test methods, such as acoustic monitoring or disassembly must be used to demonstrate closure. These tests are burdensome and we consider that limiting the test frequency to refueling outages is appropriate. This frequency of testing will provide adequate assurance of operability.

Conclusion

The NRC staff concludes that the proposed testing provides reasonable assurance of operational readiness and full compliance with Codes, IWV-3521 and 3522, would be an undesirable hardship without a compensating increase in safety, therefore, the partial relief requested by the licensee from Codes, IWV-3521 and 3522, requirements for closure exercising of HPCI check valve 73-625 and RCIC check valve 71-589 every three months is granted.

3.0 CONCLUSION

The Browns Ferry IST program establishes that inservice testing will be performed in accordance with 10 CFR 50.55a(g). Of the 31 relief requests submitted, three were granted conditionally, one will be evaluated against 10 CFR 50, Appendix J requirements in order to determine whether an exemption is needed, one was partially denied, and the remainder were granted in their entirety. With respect to the relief granted, the staff has determined that: (1) pursuant to 10 CFR 50.55a(3), that (a) the alternative testing proposed will provide an acceptable level of quality and safety or (b) compliance with the code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; and/or (2) pursuant to 10 CFR 50.55a(g)(6)(i), that the requirements of the code are impractical and relief is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facilty.

Principal Contributor: E. Girard

APPENDIX A

SYSTEMS THAT SHOULD BE CONSIDERED IN IDENTIFYING PUMPS AND VALVES TO BE INSERVICE TESTED

The pumps and valves in the following systems should be considered for inclusion in a comprehensive inservice testing program. The list is not intended to be all inclusive. Key components in instrumentation and auxiliary sytems that are required to directly support plant shutdown or safety system function should also be considered.

- Reactor Coolant Recirculation System (RCS)
- Portions of Main Steam Supply
- High Pressure Injection System (HPIC)
- Low Pressure Injection System (LPCI)
- Residual Heat Removal System (Steam Condensing, Shutdown Cooling, Suppression Pool Cooling)
- Low Pressure Core Spray System
- Safety, Relief, and Safety/Relief Valves of RCS and secondary systems
- Reactor Core Isolation Cooling System
- Containment Cooling System (Spray)
- Containment Isolation Valves Required to Change Position on a Containment Isolation Signal
- Standby Liquid Control System
- Automatic Depressurization System
- Control Rod Drive Hydraulic System
- Active Valves In Service and Backup Water, Closed Cooling Water, Firewater, or Well Water Systems
- Emergency Diesel Engine Fuel Oil Storage and Transfer System
- Portions of Main Feedwater System
- Instrument Air Systems That Are Required to Support Safety System Functions

NOTE: The terminology for various systems may vary depending on the preference of the individual nuclear steam system supplier, architech-engineer or licensee.

APPENDIX B

DRAWING LISTING

The drawings listed below were used in this review:

System	Abbreviation	System No.	Drawing No.	Revision
Main Steam	MS	1	47W801-1	13
Demineralized Water	DW	2	47W856-2	G
Feedwater	FW	3	47W803-1	14
Main Steam (Vac Brkr)	MS	10	47W801-2	A
Auxiliary Boiler	AB	12	47W815-1	B
Diesel Fuel Transfer	DFT	18	47W840	8
Residual Heat Removal Service Water	RHRSW	23	47W858-1	G (Units 2 & 3) F (Unit 1)
Raw Cooling Water	RCW	24	47W844-2	K
Control Air	CA	32	47W1847-6,9,10	A (Unit 1)
			47W2847-5,8,9	A (Unit 2)
			47W3847-5,9	A (Unit 3)
Service Air	SA	33	47W845-2	J
Sampling and Water Quality	SAWQ	43	47W610-43-1	C
Standby Liquid Control	SLC	63	47W854-1	C
Reactor Building Heating and Ventilation	RB HVAC	64	47W865-12	8 (Units 2 & 3) 6 (Unit 1)

System	Abbreviation	System No.	Drawing No.	Revision
Emergency Equipment Cooling Water	EECW	67	47W859-2	F (Unit 3)
			47W866-7	3 (Unit 3)
			47W859-1	N (Unit 3)
			47W859-1	0 (Units 2 & 3)
Reactor Water Recirculation	RECIRC	68	47W817-1	15 (Unit 2) 13 (Unit 3 14 (Unit 1)
Reactor Water Cleanup	RWCU	69	47W810-1	15 (Unit 1)
			47W810-1	14 (Units 2 & 3)
Reactor Building Closed Cooling Water	RBCCW	70	47W822-1	12 (Units 2 & 3) 14 (Unit 1)
Reactor Core Isolation Cooling	RCIC	71	47W813-1	D
High Pressure Coolant Injection	HPIC	73	48W812-1	F
Residual Heat Removal	RHR	74	47W811-1	18 Units 1 & 3) 16 (Unit 2)
Core Spray	CS	75	47W814-1	D
Containment Inerting	CI	76	47W860-1	A

System	Abbreviation	System No.	Drawing No.	Revision
Radwaste	RW	77	47W852-1	12 (Unit 1) 10 (Units 2 & 3)
			-2	D (Unit 3)
			-2	E (Units 2 & 3)
Fuel Pool Cooling and Demineralizing	FPC	78	47W855-1	C
Containment Atmosphere Dilution	CAD	84	1-47E862-1	2(Unit 1)
			2-47E862-1	2(Unit 2)
			3-47E862-1	1(Unit 3)
Control Rod Drive	CRD	85	47W820-5	0
			47W820-2	K (Unit 1)
			47W820-6	E (Unit 2 & 3)
				A (Unit 1)
				B (Unit 3)
Radiation Monitoring	RM	90	47W610-90-1	E (Units 2 & 3)
				B
Diesel Generator Starting Air	DGAS	86	3-47E861-1	4(Unit 3)
			4-47E861-1	4 (Units 2 & 3)
			3-47E861-1A	0(Unit 3)

Docket Nos.: 50-259/260/296

ENCLOSURE 2

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

SALP REPORT

LICENSEE: Tennessee Valley Authority
PLANT: Browns Ferry Nuclear Plant, Units 1, 2 and 3
REVIEWER: E. Girard
FUNCTIONAL ACTIVITY: Review of Licensee's IST Program (TAC NOS. 11324, 11325 and 11326)

(1) Management Involvement in Assuring Quality

Licensee management involvement appeared to be adequate.

Rating Category: 2

(2) Approach to Resolution of Technical Issues from a Safety Standpoint

Licensee personnel appeared to have an adequate understanding of the technical issues.

Rating Category: 2

(3) Responsiveness to NRC Initiatives

Licensee provided timely informal responses but was somewhat slow in responding formally.

Rating Category: 2

(4) Staffing

Meetings and other contacts with the licensee were staffed with competent personnel.

Rating Category: 2

(5) Reporting and Analysis of Reportable Events

N/A

(6) Training and Qualifications

N/A

(7) Enforcement History

N/A