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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
LIMERICK GENERATING STATION, UNITS 1 AND 2

Docket Nos. 50-352 and 50-353

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ABSTRACT

This EG&G Idaho, Inc., report presents the results of our evaluation of the Limerick Generating Station, Units 1 and 2, Inservice Testing Program for pumps and valves whose function is safety-related.

PREFACE

This report is supplied as part of the "Review of Pump and Valve Inservice Testing Programs for Operating Reactors (III)" and, "Review of Pump and Valve Inservice Testing Programs for Operating License Plants (II)" programs being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Mechanical Engineering Branch, by EG&G Idaho, Inc., Regulatory and Technical Assistance.

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TECHNICAL EVALUATION REPORT

PUMP AND VALVE INSERVICE TESTING PROGRAM

LIMERICK GENERATING STATION, UNITS 1 AND 2

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) program submitted by Philadelphia Electric Company for its Limerick Generating Station, Units 1 and 2.

By a letter dated July 21, 1987, Philadelphia Electric Company submitted Revision 6 of the Limerick Generating Station, Units 1 and 2, IST Program for the first ten year interval which commenced on February 1, 1986 for Unit 1 and January 8, 1990 for Unit 2. A working meeting with NRC, EG&G Idaho, Philadelphia Electric Company, and Limerick Generating Station representatives was conducted February 24 and 25, 1988. The licensee's IST Program, Revision 0, as revised by Philadelphia Electric Company, dated November 23, 1988, was reviewed to verify compliance of proposed tests of pumps and valves whose function is safety related with the requirements of the ASME Boiler and Pressure Vessel Code (the Code), Section XI, 1986 Edition. Any IST program revisions subsequent to those noted above are not addressed in this technical evaluation report (TER). Any program revisions should follow the guidance of Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs."

In their IST program, Philadelphia Electric Company has requested relief from the ASME Code testing requirements for specific pumps and valves. These requests have been evaluated individually to determine if the criteria in 10 CFR 50.55a for granting relief has indeed been met. This review was performed utilizing the acceptance criteria of the Standard Review Plan, Section 3.9.6, the Draft Regulatory Guide and Value/Impact Statement titled, "Identification of Valves for Inclusion in Inservice Testing Programs", and Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The IST Program testing requirements apply only to component testing (i.e., pumps and valves) and are not intended to provide the basis to change the licensee's current Technical Specifications for system test requirements.

Section 2 of this report presents the Limerick Generating Station, Units 1 and 2, relief requests and EG&G's evaluations and conclusions regarding these requests for the pump testing program. Similar information is presented in Section 3 for the valve testing program.

This TER, including all relief requests and component identification numbers, is applicable to Units 1 and 2. Unit 2 pump and valve numbers are identified within parenthesis (2).

Inconsistencies and omissions in the licensee's program noted during the course of this review are listed in Appendix A. The licensee should resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

2. PUMP TESTING PROGRAM

The Limerick Generating Station, Units 1 and 2, IST program submitted by Philadelphia Electric Company was examined to verify that all pumps that are included in the program are subjected to the periodic tests required by the ASME Code, Section XI, 1986 Edition, except for those pumps identified below for which specific relief from testing has been requested. Each Philadelphia Electric Company basis for requesting relief from the pump testing requirements and the reviewer's evaluation of that request is summarized below and grouped according to system.

2.1 Multiple Pumps

2.1.1 Measurement of Pump Bearing Temperatures

2.1.1.1 Relief Request. The licensee has requested relief from the annual bearing temperature measurement requirements of Section XI, Paragraph IWP-3300, for the below listed pumps. The licensee has proposed monitoring bearing condition using the vibration monitoring program.

Pump Number	Description
0AP162 0BP162	Control Room Chill Water Pumps
1AP256 1BP256 2AP256 2BP256	Safeguard Piping Fill Pumps
1AP208 1BP208 1CP208 2AP208 2BP208 2CP208	Standby Liquid Control Pumps
1OP203 2OP203	Reactor Core Isolation Cooling Pumps
1OP204 2OP204	High Pressure Coolant Injection Pumps

2.1.1.1.1 Licensee's Basis For Requesting Relief--The measuring of bearing temperatures along with vibration monitoring are both means of determining the mechanical condition of a pump. However, in order for bearing temperature measurements to be useful, continuous monitoring would be required. The rise in temperature due to bearing degradation is a very sudden occurrence which is much more detectable in its early stages by utilizing vibration monitoring. Serious degradation would have to occur to cause a detectable rise of temperature on the bearing housing. Vibration monitoring is a more logical means of detecting bearing degradation prior to an increase in temperature. Pump bearing mechanical condition will be determined using the vibration monitoring program. Bearing temperature will not be measured.

2.1.1.1.2 Evaluation--There are many factors other than pump bearing condition that affect bearing temperature measurements such as the temperature of the pumped fluid, the bearing lubricant temperature, and the ambient temperature. Fluctuations of these parameters could mask any change in bearing temperature due to degradation. Industry experience has shown that during bearing degradation a significant temperature rise does not occur until just prior to and during catastrophic failure. This makes the probability of detecting a degraded pump bearing using yearly bearing temperature measurements extremely small. Experience has also shown that a pump vibration monitoring program can detect bearing degradation early enough that corrective actions can be taken thereby avoiding catastrophic bearing failure. Quarterly pump vibration measurements provide the ability to monitor pump mechanical condition and detect mechanical degradation and would, therefore, provide an acceptable level of quality and safety.

Based on the determination that the licensee's proposed alternative would provide an acceptable level of quality and safety, relief may be granted as requested.

2.1.2 Instrument Accuracy

2.1.2.1 Relief Request. The licensee has requested relief from the instrumentation accuracy requirements of Section XI, Paragraph IWP-4110, for all pumps in the IST program with the exception of the safeguard piping fill, diesel fuel oil transfer, and standby liquid control pumps. The licensee has proposed to use installed instruments which are accurate to ±3% of full-scale range.

2.1.2.1.1 Licensee's Basis For Requesting Relief--Various permanently installed pressure, flow and speed instruments are accurate to ±3% in lieu of the code required ±2%, Per the Code, full scale range of each instrument shall be three times the reference value or less. The instrumentation involved fall into two categories.

(1) Where the ±3% accuracy converts to an absolute accuracy equal to or better than the code required ±2% accuracy.
For example, using a pressure reference value of 50 PSI and an actual full scale range of 100 psi:

(a) Code

(i.e., reference value = 50 psi
3 x reference value = 150 psi)
Instrument accuracy in units of pressure converts to:
±2% x 150 psi = ±3 psi

(b) Limerick

(i.e., full scale = 100 psi)
Instrument accuracy converts to:
±3% x 100 psi = ±3 psi

As demonstrated in the example, if (b) is less than or equal to (a) then the existing instrumentation is considered to be sufficiently accurate.

(2) Where (1b) is greater than (1a) but the difference is less than one increment (resolution) of the existing scale then the existing instrumentation is considered to be sufficiently accurate. This is

based on the likelihood that two different people recording the same reading can very well be off by one increment from each other on the same scale.

i.e., (1a) = ±100 psi
(1b) = ±175 psi
Resolution = 100 psi increments

Since 175-100 + 75 psi is less than 100 psi, the existing instrument is considered to be sufficiently accurate.

<u>Actual Examples</u>:

(a) RCIC -FI-49-1R600-1 (flow indicator)
Reference value = 560 gpm
Full scale range = 0-700 gpm
±2% x 3(560 gpm) = ±33.6 gpm
±3% x 700 gpm = ±21.0 gpm

Since the code required accuracy is more than the actual instrument error the flow indicator is considered to be sufficiently accurate.

(b) Core Spray - FI-52-1R601A (flow indicator)
Reference Value = 3400 gpm
Full scale range = 0-8800 gpm
Resolution = 200 gpm
±2% x 3(3400 gpm) = ±204 gpm
±3% x 8800 gpm = ±264 gpm

Since the difference of 60 gpm is less than the resolution of 200 gpm the flow indicator is considered to be sufficiently accurate.

The existing pump instrumentation, which is accurate to ±3%, is considered sufficiently accurate based on the reasons discussed above. No alternate testing will be performed.

2.1.2.1.2 Evaluation--It is possible to use combinations of instrument accuracy and full-scale range other than those required by Section XI and still be able to provide the same or better indication accuracy at the reference value as allowed by the Code. Use of instrumentation that meets an indication accuracy of ±6% of the reference value, which corresponds to the indication accuracy obtained by multiplying the IWP-4110 accuracy requirement times the IWP-4120 allowable range requirement (±2% accuracy times a range of up to 3 times the reference value), should be a reasonable alternative to the Code even though the Code accuracy and full-scale range requirements are not met. Replacing the installed instrumentation would result in hardship for the licensee due to the costs involved. Further, replacing instruments that yield accuracy, at the reference value, equivalent to that required by the Code would not provide a compensating increase in quality or safety.

The second category of instruments addressed by this relief request do not provide the same indication accuracy at reference values as required by the Code. The licensee stated that these instruments would provide indication accuracy within one scale increment of the ±6% accuracy permitted by the Code. In example 2.b of the licensee's basis for relief, the installed instrument provides an indication accuracy of ±7.8% at the reference value. Other instruments could feasibly have an indication accuracy as poor as ±9% by the provisions of this relief request. The licensee did not identify each affected pump instrument, the reference value, and the full-scale range, therefore, it is not possible to determine the available accuracies and the effect that use of these instruments would have on the licensee's ability to monitor pump hydraulic condition and detect degradation. General relief cannot be granted for instrumentation that does not provide indication with equivalent accuracy as required by the Code. To obtain such relief, it would be necessary to submit separate relief requests which provide the specific accuracies, reference values, and ranges along with a justification that demonstrates the adequacy of the installed instruments and identifies the burden of replacing them with instruments that meet the Code requirements.

Based on the determination that the proposed testing would provide reasonable assurance of operational readiness, and that compliance with the

Code requirements would result in hardship without a compensating increase in the level of quality or safety, relief may be granted for those instruments that provide the same or better indication accuracy at the reference value as required by the Code. Since neither the actual indication accuracy nor the effect that their use will have on the licensee's ability to detect pump hydraulic degradation is known, relief should not be granted for those installed instruments that do not provide the same or better indication accuracy at the reference value as required by the Code.

3. VALVE TESTING PROGRAM

The Limerick Generating Station, Units 1 and 2, IST program submitted by Philadelphia Electric Company was examined to verify that all valves included in the program are subjected to the periodic tests required by the ASME Code, Section XI, and the NRC positions and guidelines. The reviewers found that, except as noted in Appendix A or where specific relief from testing has been requested, these valves are tested to the Code requirements and NRC positions and guidelines. Each Philadelphia Electric Company basis for requesting relief from the valve testing requirements and the reviewer's evaluation of that request is summarized below and grouped according to system and valve Category. All relief requests and evaluations are applicable to both Units 1 and 2 unless otherwise noted.

3.1 General Valve Relief Requests

3.1.1 Leak Rate Testing Containment Isolation Valves

3.1.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWV-3420, to leak rate test Category A containment isolation valves. The licensee has proposed leak rate testing these valves in accordance with 10 CFR 50, Appendix J, Type C, leak rate testing procedures during refueling outages.

3.1.1.1.1 Licensee's Basis For Requesting Relief--Containment isolation valves are required to be leakage rate tested in accordance with 10 CFR 50, Appendix J. The leakage rate requirement is based on a total allowable leakage rate for all valves instead of an individual valve leakage rate. IWV-2100(a) defines Category A as "valves for which seat leakage is limited to a specific maximum amount in the closed position of fulfillment of their function." Although for containment isolation valves leakage rates are not limited on an individual basis by Appendix J, they have been determined to be Category A valves.

Since containment isolation valves are Category A, the leakage rate testing requirements of IWV-3420 must be satisfied. The leakage rate testing performed per Appendix J satisfies the requirements of IWV-3421 through -3425, however, it does not satisfy the individual valve leakage rate analysis and corrective actions of IWV-3426 and IWV-3427.

Appendix J testing is accomplished by performing individual local leak rate tests on each containment penetration. The results of these tests represents the total leakage from the boundary valves associated with the penetration. In order to prevent duplicate leakage testing of these valves, a maximum permissible leakage will be established for each individual local leak rate test. If this value is exceeded, then corrective action will be taken to restore the leakage rate to within acceptable limits. The proposed actions will be taken in lieu of IWV-3426 and IWV-3427(a). Double frequency testing, as required by IWV-3427(b), shall not be performed. The usefulness of the data does not justify the burden of complying with this requirement. Corrective action previously addressed will be sufficient in maintaining acceptable leakage rates.

Containment isolation valves will be leak rate tested in accordance with the 10 CFR 50, Appendix J, Type C testing program. In addition, a maximum permissible leakage criterion will be established for each individual local leak rate test. If the local leak rate test leakage criterion is exceeded, corrective action will be taken to restore the leakage rate to within the acceptable value.

3.1.1.1.2 Evaluation--The licensee has proposed performing Appendix J, Type C, leak rate testing of all containment isolation valves by penetration groups in lieu of the individual valve leak rate testing requirements of IWV-3420. The leak test procedures and requirements for containment isolation valves identified in 10 CFR 50, Appendix J, incorporate all the major elements of Paragraphs IWV-3421 through -3425. However, 10 CFR 50, Appendix J, does not require trending of leakage rates or corrective actions based on individual valve leakage rates. Where individual leakage limits can be assigned and valve leakage determined, the licensee should comply with the requirements of IWV-3426 and -3427(a). Testing containment isolation valves in accordance with 10 CFR 50, Appendix J, and complying with the Analysis of Leakage Rates and Corrective Action

Requirements of Section XI, Paragraphs IWV-3426 and -3427(a), would provide an acceptable level of quality and safety and would be an acceptable alternative to the Code requirements as addressed in NRC Generic Letter No. 89-04, Attachment 1, Item 10.

The piping configurations for some containment penetrations do not allow for the individual leak rate testing of the containment isolation valves that isolate the penetrations. The only feasible method of verifying the leak-tight integrity of these valves is to leak rate test the penetration valves in groups. For situations where there are multiple containment isolation valves branching from a common header, ascribing all leakage through the penetration to one valve could cause the performance of baseless maintenance on operable valves. The licensee has stated that maximum leakage rates will be assigned to each valve group and if the measured leakage exceeds the assigned group limit, corrective actions will be taken as required by Paragraph IWV-3427. This test method would provide an acceptable level of quality and safety if the assigned limiting leakage rate for each valve group is conservatively established regarding the number and sizes of valves in the group. The assigned maximum group leakage rates should be based on the smallest valve in the group so that corrective actions are taken whenever the leak-tight integrity of any valve of that group is in question.

Based on the determination that 10 CFR 50, Appendix J, Type C leak rate testing would provide an acceptable level of quality and safety, relief may be granted from the requirements of IWV-3421 through -3425 and -3427(b). For those valves that can only be tested in groups, relief from the individual leak rate testing requirements of the Code may be granted provided the assigned maximum group leakage rates are based on the smallest valve in the group so that corrective actions are taken whenever the leak-tight integrity of any valve of that group is in question.

3.1.2 Excess Flow Check Valves

3.1.2.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWV-3520, to full-stroke exercise all excess flow check valves to the closed position quarterly or during cold shutdowns. The licensee has proposed performing functional testing of the closure capability of these valves during refueling outages.

3.1.2.1.1 Licensee's Basis For Requesting Relief--Excess flow check valves are installed on instrument lines penetrating containment to minimize leakage in the event of an instrument line failure outside the containment in accordance with Regulatory Guide 1.11. The excess flow check valve is basically a spring loaded check valve. Since the system is normally in a static condition, the valve poppet is held open by the spring. Any sudden increase in flow through the valve (i.e., line break) will result in a differential pressure across the valve which will overcome the spring and close the valve. Functional testing of valve closure is accomplished by venting the instrument side of the valve while the process side is under pressure, observing that the remote position indicator indicates closed and/or verifying the absence of leakage through the vent. The testing described above requires the removal of the associated instrument or instruments from service. Since these instruments are in use during plant operation and cold shutdown, removal of any of these instruments from service may cause a spurious signal which could result in a plant trip, an inadvertent initiation of a safety system, loss of decay heat removal and/or the defeating of safety interlocks.

In addition to the plant safety concerns, personnel safety concerns must be considered since the process side of these valves is normally high energy (>200^{0} and >500 psig) and highly radioactive reactor coolant.

In summary, due to the plant and personnel safety concerns and plant operating conditions that prohibit the testing of these valves quarterly or at cold shutdown, testing will be performed at refueling when decay heat loads are at a minimum and safety systems can be removed from service to prevent inadvertent initiation.

3.1.2.1.2 Evaluation--The excess flow check valves function to limit flow in case of an instrument line break outside containment. Verification of valve closure capability requires the isolation of instruments that are necessary for reactor protection and control.

Performing this testing during power operation could inhibit safety system actuation or cause spurious system actuations which could result in a reactor trip. Performing this testing during cold shutdowns could disrupt the operation of systems necessary for decay heat removal.

The licensee has proposed performing functional testing during refueling outages by venting the downstream side of the excess flow check valves and verifying (by position indication and/or limited leakage) that the valves have moved to the closed position. The licensee's proposed testing would provide reasonable assurance that these valves are capable of performing their design function and would, therefore, provide an acceptable level of quality and safety.

Based on the determination that the licensee's proposed alternative would provide an acceptable level of quality and safety, relief may be granted as requested.

3.1.3 Rapid Acting Power Operated Valves

3.1.3.1 Relief Request. The licensee has requested relief from the corrective action requirements of Section XI, Paragraph IWV-3417(a), for power operated valves that normally stroke in 2 seconds or less. The licensee has proposed assigning a maximum limiting stroke time of 2 seconds to these valves and taking corrective action in accordance with IWV-3417(b) if the valve stroke times exceed the 2 second limit.

3.1.3.1.1 Licensee's Basis For Requesting Relief--For rapid actuating power-operated valves, the application of the Code requirements could result in increased testing when the valves are functioning normally. These valves generally are small air and solenoid operated valves which, because of their size and actuator types, stroke very quickly. Operating history on this type of valve indicates that they generally either operate immediately or fail to operate. The intent of the referenced testing requirement is to trend valve stroke time as a means of detecting valve degradation. For rapid actuating power-operated valves, comparison of stroke times to the previous stroke time is not an effective means of detecting valve degradation. Because of the reasons mentioned above, rapid actuating power-operated valve stroke times will not be compared with the previous stroke times, but will be assigned a maximum limiting stroke time of 2 seconds.

A maximum limiting stroke time of 2 seconds will be specified for each rapid actuating power operated valve. If the valve strokes in 2 seconds or less, it will be considered acceptable and no corrective action will be required. If the valve exceeds 2 seconds, appropriate corrective action will be taken.

3.1.3.1.2 Evaluation--The NRC staff position on evaluating stroke times of rapid-acting valves is explained in Generic Letter No. 89-04, Attachment 1, Position 6. The licensee's proposed testing is in accordance with this position and would provide an acceptable level of quality and safety.

Based on the determination that the proposed alternative would provide an acceptable level of quality and safety, relief may be granted as requested.

3.1.4 Series Check Valve Testing

3.1.4.1 Relief Request. The licensee has requested relief from the exercising method requirements of Section XI, Paragraph IWV-3522, for the series sets of safeguards piping stay fill check valves listed below. The licensee has proposed verifying the closure capability of each set of series check valves as a unit.

49-1(2)032	49-1(2)033	51-1(2)115A	51-1(2)116A
51-1(2)115C	51-1(2)116C	52-1(2)045A	52-1(2)046A

3.1.4.1.1 Licensee's Basis For Requesting Relief--These check valves are installed in series and are not provided with a means to facilitate individual exercising. There are no vents, drains, or test valves located between each pair of valves; therefore, no practical method exists to verify proper operation of the individual valves upon reversal of flow. The fact that two valves are in series lessens the probability of failure to retard backflow. In all cases of check valves in series, there is a means provided to verify proper valve operability of at least one of the two valves.

Each set of series check valves will be exercised quarterly, in the reverse direction, as a unit.

3.1.4.1.2 Evaluation--These are simple check valves without position indication. There are no drain lines, vent lines, or test connections installed between these series valve pairs to individually verify the closure capability of each valve. These valves can only be practically tested in pairs, which verifies that at least one of the two check valves is capable of closing, but provides no indication about the condition of the other valve.

Individual verification of each valve's closure capability would require significant system modifications which would be burdensome for the licensee due to the costs involved.

Since only one valve is required to actuate to perform the closed safety function, testing these series valves as a unit would demonstrate that the pair is capable of performing its intended design function. The licensee's proposed alternative, to test each series pair of valves as a unit quarterly, would give reasonable assurance of operational readiness provided both valves are repaired or replaced as necessary if excessive leakage is detected.

Based on the determination that compliance with the Code required testing is impractical, that the licensee's proposed alternative would provide reasonable assurance of operational readiness, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted provided both valves in the pair are declared inoperable and repaired or replaced if excessive leakage is detected during testing.

3.1.4.2 Relief Request. The licensee has requested relief from the exercising method and frequency requirements of Section XI, Paragraph IWV-3522, for the sets of series safeguards piping stay fill check valves listed below. The licensee has proposed verifying the reverse flow closure capability of each check valve by disassembly during associated system mini-outages or at refueling outages.

51-1(2)032A	51-1(2)032B	51-1(2)048A
55-1(2)048B	51-1(2)115B	51-1(2)115D
55-1(2)F078	51-1(2)F090A	51-1(2)F090B
51-1(2)F090C	51-1(2)F090D	52-1(2)045B
52-1(2)F030A	52-1(2)F030B	

3.1.4.2.1 Licensee's Basis For Requesting Relief--The above valves function as the safeguard piping stay fill or condensate transfer stay fill check valves. Because of system configuration, these valves cannot be verified closed using visual verification, system parameters or by leak testing methods. Valve disassembly will be required to verify reverse direction closure. Disassembly of the valves, if attempted at cold shutdown, could result in a delayed plant startup.

Condensate transfer stay fill check valves will be verified to operate in the reverse direction during refueling or associated system mini outages by valve disassembly. Safeguard piping stay fill check valves will be verified to operate in the reverse direction during refueling or Safeguard Piping Fill System mini outages by valve disassembly.

3.1.4.2.2 Evaluation--These are simple check valves that are normally open to allow the flow of water from the safeguard piping stay fill or condensate transfer pumps to maintain the ECCS system piping water solid. These valves do not have position indication or any other external means of determining the obturator position. In each case the listed valves are one of two check valves installed in series in the stay fill lines. There are no pressure instruments installed in the upstream lines. Also, there are no test connections installed in the lines either between the series valves or upstream of the valve pairs. Verifying the closure capability of these valves by leak testing would require system modifications that would be burdensome for the licensee due to the costs involved.

The Minutes of the Public Meeting on Generic Letter No. 89-04 state that the use of disassembly to verify closure capability may be acceptable depending on whether verification by flow or pressure measurements is practical. These Minutes also state that exercising with flow is expected to be performed after valve disassembly and inspection is completed, but before returning the valve to service. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

The licensee's disassembly program, combined with a part-stroke exercise test after reassembly, should adequately determine valve condition and provide reasonable assurance of operational readiness. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition and, as such, should be performed under the maintenance program at a frequency commensurate with the valve type and service. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the Code required exercise testing. This procedure has risks which may make its routine use as a substitute for testing undesirable when some other method of testing is possible. The licensee should actively pursue the use of leak rate testing or non-intrusive diagnostic techniques such as acoustics or radiography to demonstrate that these valves close when subjected to reverse flow conditions.

Based on the determination that it is impractical to verify the reverse flow closure capability of these valves by leak testing or observation of system parameters, that the licensee's proposed alternative would provide reasonable assurance of operational readiness, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted provided the licensee full or part-stroke exercises these valves open with flow after they have been reassembled. The licensee should investigate ways, other than disassembly and inspection, of verifying the reverse flow closure capability of these valves. If another method is developed to verify the closure capability of these check valves, this relief request should be revised or withdrawn.

3.1.5 Series-Parallel Check Valve Testing

3.1.5.1 Relief Request. The licensee has requested relief from the exercising method requirements of Section XI, Paragraph IWV-3522, for the following vacuum relief check valves. The licensee has proposed full-stroke exercising each set of four series-parallel check valves as a unit.

49-1(2)017	49-1(2)018	49-1(2)F068	49-1(2)F081
55-1(2)025	55-1(2)026	55-1(2)F080	55-1(2)F094

3.1.5.1.1 Licensee's Basis For Requesting Relief--These check valves, that function as vacuum relief valves, are installed in series-parallel and were not provided with air operators to facilitate testing (exercising). The piping configurations in the High Pressure Coolant Injection and Reactor Core Isolation Cooling systems do not allow for individual testing of these valves. Since a series-parallel arrangement was used, there are multiple combinations of flow paths any one of which would provide vacuum relief. No single valve failure would prevent the system from providing vacuum relief. Because single valve failure will not prevent the system from functioning as designed, and system configuration does not allow for individual valve testing, testing as a unit will verify the system can provide vacuum relief as designed.

Vacuum relief valves will be tested quarterly, in the forward direction, as a unit.

3.1.5.1.2 Evaluation--These check valves perform a vacuum breaker function to prevent suppression pool water from being drawn into the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) turbine exhaust lines during cooldown after turbine operation. These valves also perform a safety function in the closed position to prevent exhaust steam from entering the wet-well air space.

With the series-parallel configuration, the existing test taps, and lack of isolation valves, it is not practicable to individually verify that these valves move to the open position during any plant mode. The licensee's proposed testing would verify that these valves are capable of performing their design function in the open position by demonstrating that the valves, as a unit, are capable of passing the flow necessary to prevent drawing a vacuum in the turbine steam exhaust lines after operation of the HPCI and RCIC turbines. However, group testing gives no indication of individual valve condition. A failed valve could remain undetected for extended periods and may not be discovered until a second failure occurs. Since two failures must occur prior to detection by group testing, repairing only one valve is not acceptable. When the group fails to permit the required forward flow, all valves in the group are suspect and should be declared inoperable until they are repaired, replaced, or individually verified capable of performing their safety function. The licensee's proposed alternative, combined with the above corrective action requirements would provide reasonable assurance of operational readiness.

It would be necessary to make system modifications to permit verifying the full-stroke open capability of each check valve with flow. Due to the costs involved, it would be burdensome to require the licensee to modify this design, which affords a great deal of operational reliability.

In response to a request for additional information from the NRC staff, the licensee stated that valve closure is verified by a temperature sensor in the upstream line that provides an alarm in the main control room if reverse flow was allowed by the combined failure of one check valve in each parallel pair. For this series-parallel arrangement, this test verifies that at least one of the parallel valve combinations is closed, but it does not provide information about the condition of the remaining valve combination. One valve, or a pair of parallel valves could be failed in the open position and could go undetected. Adequate isolation valves and test taps are available to leak test each parallel valve combination to verify that each individual valve is capable of preventing reverse flow. Therefore, since the Code requirements for verifying the closure capability of each valve can be met, the licensee is expected to comply with this Code requirement.

Based on the determination that compliance with the Code exercising method requirement for valve opening is impractical, that the licensee's proposed alternative would provide reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided all valves are disassembled and repaired or replaced as necessary if the opening capability of any of these valves is questionable.

3.2 Emergency Diesel Generators

3.2.1 Category B Valves

3.2.1.1 Relief Request. The licensee has requested relief from the exercising and stroke time measurement requirements of Section XI, Paragraphs IWV-3412 and -3413, for the following diesel generator air start solenoid valves. The licensee has proposed testing these valves as a unit during the monthly diesel testing and to alternately isolate the air headers during diesel testing every 18 months.

92-1(2)302A	92-1(2)302B	92-1(2)302C	92-1(2)302D
92-1(2)303A	92-1(2)303B	92-1(2)303C	92-1(2)303D
92-1(2)308A	92-1(2)308B	92-1(2)308C	92-1(2)308D
92-1(2)309A	92-1(2)309B	92-1(2)309C	92-1(2)309D

3.2.1.1.1 Licensee's Basis For Requesting Relief--These valves are non ASME but are in air starting lines that are designed to ASME III Class-3 requirements. The valves were not provided with any position indication; therefore, stroke timing by local or remote position indication is not possible. Significant degradation or failure of these valves to operate would however, be indicated by an increased starting time on the Emergency Diesel Generator or its failure to start. Because it is not possible to measure individual valve stroke times, Emergency Diesel Generator starting times will be measured in its stead.

Alternate isolation of the air start headers, to verify individual valve performance, requires complex valve manipulations and de-energizing of a portion of the engine control logic, both of which increases the probability of a testing induced failure. Therefore, alternate isolation of the air start headers will be performed every 18 months. This interval is consistent with the recommendations of INPO SOER #80-1 "Loss of Redundant Emergency Diesel Generator Start Air System."

In lieu of the individual valve exercise testing required by IWV-3413, failure of the Emergency Diesel Generator to start, during monthly testing will be evaluated to determine if the cause can be attributed to the associated starting air valves. Alternate isolation of the air headers every 18 months, during the emergency Diesel Generator testing required by Technical Specifications, will verify individual performance of these valves. Valve stroke time testing will not be performed.

3.2.1.1.2 Evaluation--Stroke timing these rapid-acting solenoid valves using conventional techniques is not practical because they are not equipped with position indication and valve stem movement cannot be observed.

These valves could be tested to the Code requirements only after significant redesign and modifications to the control circuitry for these valves, such as the addition of individual control switches and valve position indication. Modifications to add position indication for these solenoid valves may not be possible due to the valve design. Therefore, addition of valve position indication may also require valve replacement with a design which would make indication of valve position possible. These modifications would be burdensome for the licensee due to the cost involved.

The diesel generator air start system is designed with redundant air start valves and headers. One air start train is capable of successfully starting the diesel generator. The licensee has proposed measuring diesel start times during monthly testing using both air start trains and alternately isolating the air headers to verify individual valve operability once every 18 months. However, the monthly testing would not adequately demonstrate the operability of all air start valves. The valves in one train could be degraded for extended periods without detection and correction. The licensee has not provided an adequate justification for not isolating one air start train to verify operability of the valves in the other train on a quarterly basis. Piping and Instrument Drawing ISI-M-20 shows manual valves that could possibly be used to isolate an air start train during diesel testing to verify operability of the other train. Since valve degradation would be evidenced by increased diesel starting time, measuring the diesel start time, assigning a maximum limiting start time, and verifying the operability of the valves in each air start train at least quarterly should provide an indication of degradation and reasonable assurance of operational readiness. This maximum start time should be less than or equal to the Technical Specification requirement.

Based on the determination that compliance with the Code requirements is impractical, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted provided the licensee assigns a maximum limiting diesel start time which is less than or equal to the Technical Specification limit and verifies the operability of the valves in each air start train at least quarterly by isolating one air start train on an alternating basis during diesel testing.

3.3 Nuclear Boiler

3.3.1 Category A/C Valves

3.3.1.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the feedwater system inside containment isolation valves, 41-1(2)F010A and B, to the closed position. The licensee has proposed verifying the closure capability of these valves using Appendix J, Type C, leak rate testing during refueling outages.

3.3.1.1.1 Licensee's Basis For Requesting Relief--Verification of reverse flow closure of these valves is accomplished by leak testing. Since these valves are containment isolation valves, they are leak tested during Appendix J, Type C testing at refueling. In order to perform leak testing manual valves located inside primary containment must be opened and temporary test equipment installed. During power operation and normally at cold shutdown, the primary containment atmosphere is inerted with nitrogen, limiting access to emergencies only. Because leak testing at power is not possible, and is impractical at cold shutdown due to the probability of delaying plant startup, these valves will be leak tested at refueling. Reverse flow closure will be verified during Appendix J, Type C testing during refueling.

3.3.1.1.2 Evaluation--These valves are containment isolation check valves located inside containment and are, therefore, inaccessible during reactor operation. The only method available to verify valve closure is leak rate testing which would require a containment entry.

These check valves are located in the main feedwater flow path to the reactor vessel and testing them closed during power operation is impractical since it would necessitate isolating a main feedwater header which could result in loss of reactor vessel level control and a reactor trip. Further, during power operation the containment atmosphere is maintained with a high concentration of inert gas which reduces the oxygen level sufficiently to make entry a personnel hazard.

Leak testing during cold shutdowns is impractical since the containment is often maintained inerted. This testing would require a significant amount of time for test equipment setup, test performance, and test equipment removal and could result in a delay in the return to power. These delays, and the increased expense and manpower requirements due to testing at a cold shutdown frequency would be burdensome for the licensee due to the costs involved. Verifying the reverse flow closure of these valves using Appendix J, Type C, leak rate testing during refueling outages would provide reasonable assurance of operational readiness.

Based on the determination that it is impractical to verify the closure capability of these valves quarterly or during cold shutdowns, that the proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.3.2 Category B/C Valves

3.3.2.1 Relief Request. The licensee has requested relief from the exercising frequency and stroke timing requirements of Section XI, Paragraphs IWV-3411 and -3413, for the reactor coolant system automatic depressurization system (ADS) valves, PSV-41-1(2)F013E, H, K, M, and S. The licensee has proposed full-stroke exercising these valves at restart after refueling outages with no stroke timing.

3.3.2.1.1 Licensee's Basis For Requesting Relief--If any of these valves fail to reclose after testing, the plant would be placed in a Loss of Coolant Accident (LOCA) condition requiring plant shutdown in accordance with Technical Specification 3.4.2.b. In addition, a recent study (BWR Owner's Group Evaluation of NUREG-0737, Item II.K.3.16, Reduction of Challenges and Failures of Relief Valves) recommends that the number of ADS opening be reduced as much as possible. Based on this study and the potential for causing a LOCA condition, exercise testing of the ADS valves will be delayed to restart after refueling.

Stroke time on these valves cannot be accurately determined since the control room position indication only indicates if the solenoid valve is energized, and not the actual valve disc position. The only way possible to determine the opening of the relief valve is by acoustics monitoring of the SRV line discharge to the torus. Measuring the time from the initiation signal for the valve and the acoustic monitoring detection does not provide meaningful data for predicting valve degradation.

3.3.2.1.2 Evaluation--The ADS valves act both as power operated valves, in response to a manual or automatic control signal, and as safety relief valves. As a result, these valves should be tested to both the Category B and C requirements. Full-stroke exercising these valves quarterly during power operation is impractical as this greatly increases the risk of creating a small break LOCA. NUREG-0626, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in GE-Designed Operating Plants and Near Term Operating License Applications," and NUREG-0737 Section II.K.3.16, "Reduction of Challenges and Failures of Relief Valves," recommend the reduction of challenges to relief valves to lessen the risk of a small break LOCA. Also, opening these valves during power operation would cause reactor pressure and power fluctuations that could lead to a reactor trip. Full-stroke exercising these valves requires reactor steam pressure and is not practical during cold shutdowns when the reactor pressure is low.

These valves are not equipped with direct sensing valve position indication and have extremely short stroke times that are dependent on steam pressure. Obtaining trendable stroke times using acoustic monitoring of the discharge is not practical since this indirect indication of valve position would not yield measurements that are sufficiently repeatable. Trending of valve stroke times would not be meaningful since response times and test pressure variations could mask changes in valve condition.

Significant system design changes would be necessary to enable valve exercising and stroke time trending quarterly or during cold shutdowns. Those modifications would be burdensome for the licensee due to the costs involved.

The licensee's proposal to exercise these valves during refueling outages would demonstrate their ability to perform their safety function. However, to monitor for valve degradation, the licensee should assign a maximum stroke time limit to these valves that is based on previous test data and verify that they stroke within that limit during testing. The measured stroke times need not be trended or compared to previous values, but if the maximum limit is exceeded, the valve should be declared inoperable and corrective action taken in accordance with IWV-3417(b). The licensee's proposed testing during refueling outages combined with verification that valve stroke times are less than the maximum limiting value would provide reasonable assurance of operational readiness.

Based on the determination that compliance with the Code exercising frequency and stroke time trending requirements is impractical, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted provided the licensee measures the valve stroke times as discussed above.

3.3.3 Category C Valves

3.3.3.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3522, for the ADS valve actuator accumulator gas supply check valves, 41-1(2)F036E, H, K, M, and S quarterly or during cold shutdowns. The licensee has proposed full-stroke exercising these check valves during those cold shutdowns when containment is de-inerted and during refueling outages.

3.3.3.1.1 Licensee's Basis For Requesting Relief--Verification of reverse exercising requires isolating the associated instrument gas header and venting the upstream side through a test connection located inside primary containment. To verify forward exercising requires lowering the pressure in the associated ADS accumulator with the gas supply isolated, then opening the gas supply and observing that ADS accumulator pressure increases. Since installed pressure indication is not provided for the ADS accumulators, a temporary test gauge must be installed on a pressure tap located inside the primary containment. During power operation and cold shutdown, the containment atmosphere is normally inerted with nitrogen limiting access to emergencies only. In addition, high radiation levels during power operation prohibit containment entry.

Forward and reverse exercising will be verified during all refueling outages and during cold shutdowns when the primary containment is de-inerted.

3.3.3.1.2 Evaluation--These are simple check valves that do not have position indication or any other external means of determining the obturator position. It would be necessary to manually vent off the accumulators to exercise these valves open without cycling the ADS valves. The only practical method of verifying valve closure is to perform a leak test or pressure decay test, which requires isolating and venting off the supply header. It is not practical to perform either test quarterly during power operation because it would require a containment entry and the containment atmosphere is maintained oxygen deficient with a high concentration of inert gas.

During cold shutdowns the containment is often maintained inerted which makes entry impractical to permit exercising these valves to either the open or the closed position. It would be burdensome to require the licensee to de-inert the containment each cold shutdown solely to perform valve testing since this is costly and could result in a delay in reactor startup from cold shutdown. The licensee's proposal to exercise these valves both open and closed during refueling outages and those cold shutdowns when the containment is de-inerted, would provide reasonable assurance of valve operational readiness.

Based on the determination that it is impractical to full-stroke exercise these check valves quarterly or during each cold shutdown, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.3.3.2 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3522, for the inboard main steam isolation valve (MSIV) accumulator inlet check valves, 41-1(2)F024A, B, C, and D. The licensee has proposed full-stroke exercising these check valves during refueling outages and during those cold shutdowns when the containment is de-inerted.

3.3.3.2.1 Licensee's Basis For Requesting Relief--Verification of reverse exercising requires isolating the associated instrument nitrogen header, venting the upstream side of the check valve and observing accumulator pressure. These valves are located inside the primary containment and testing requires entering the containment for the installation of a temporary pressure gauge and to vent the upstream piping. During power operation and cold shutdown, the containment atmosphere is normally inerted with nitrogen limiting access to emergencies only. In addition, high radiation levels during power operation prohibit containment entry.

Reverse exercising will be verified during all refueling outages and during cold shutdowns when the primary containment is de-inerted.

3.3.3.2.2 Evaluation--These are simple check valves that do not have position indication or any other external means of determining the obturator position. These valves provide gas to keep the inboard MSIV accumulators charged. The only practical method of verifying valve closure is to perform a leak test or pressure decay test, which requires isolating and venting off the supply header and observing the pressure downstream of these valves. It is not practical to perform this testing quarterly during power operation because it would require a containment entry and the containment atmosphere is maintained oxygen deficient with a high concentration of inert gas.

During cold shutdowns the containment is often maintained inerted which makes entry to exercise these valves to the closed position impractical. It would be burdensome to require the licensee to de-inert the containment each cold shutdown solely to perform valve testing since this is costly and could result in a delay in reactor startup from cold shutdown. The licensee's proposal to exercise these valves during refueling outages and those cold shutdowns when the containment is de-inerted, would provide reasonable assurance of valve operational readiness.

Based on the determination that it is impractical to full-stroke exercise these check valves quarterly or during each cold shutdown, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.3.3.3 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3522, for the outboard MSIV accumulator inlet check valves, 41-1F029A, B, C, and D. The licensee has proposed full-stroke exercising these check valves during refueling outages.

3.3.3.3.1 Licensee's Basis For Requesting Relief--System configuration does not provide the necessary test connections to perform the required testing. Therefore, testing must be performed by disassembling mechanical connections and installing the necessary test equipment. During normal operation this method would require a reduction in power and closing the associated MSIV. In addition, these valves are located in a high temperature and high radiation area. At cold shutdown the method of testing could result in a delay in plant restart. These valves will be full-stroke exercised in the reverse direction at refueling.

3.3.3.3.2 Evaluation--These are simple check valves that do not have position indication or any other external means of determining the obturator position. These valves provide gas to keep the inboard MSIV accumulators charged. The only practical method of verifying valve closure is to perform a leak test or pressure decay test. Performing this testing requires partially disassembling the gas supply line and a significant amount of time for test equipment setup, test performance, and test equipment removal. It is impractical to verify the reverse flow closure of these valves quarterly during power operation because it could result in MSIV closure and a plant trip. This testing could be practicably performed each quarter only after system design changes. Performing this testing during cold shutdowns could result in a delay of plant startup. These delays, and the design changes necessary to enable testing quarterly during power operation, would be burdensome for the licensee due to the costs involved. The licensee's proposal to exercise these valves during refueling outages would provide reasonable assurance of valve operational readiness.

Based on the determination that compliance with the Code exercising frequency requirements is impractical, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.4 Reactor Recirculation System

3.4.1 Category A/C Valves

3.4.1.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the recirculation pump seal purge primary containment isolation check valves, 43-1(2)004A and B. The licensee has proposed full-stroke exercising these check valves closed using Appendix J, Type C, leak rate testing during refueling outages.

3.4.1.1.1 Licensee's Basis For Requesting Relief--These check valves are located inside primary containment in the reactor recirculation pump seal purge supply lines and are open during power operation. Exercising the valves to the closed position during operation would require interruption of seal purge water flow to the reactor recirculation pumps. Due to system configuration the most practical method to verify reverse flow closure of these valves is by leak testing. In order to leak test the valves, manual valves located inside the primary containment must be opened. During power operation and cold shutdown, the containment atmosphere is normally inerted with nitrogen, limiting access to emergencies only. Leak testing at power is not possible and is impractical at cold shutdown, when containment is de-inerted, by possible delaying plant startup. No part-stroke will be performed. These valves will be tested in the reverse direction at refueling during Appendix J, Type C testing.

3.4.1.1.2 Evaluation--These valves are containment isolation check valves located inside containment and are, therefore, inaccessible during reactor operation. The only method available to verify valve closure is leak rate testing which would require a containment entry. During power operation the containment atmosphere is maintained with a high concentration of inert gas which reduces the oxygen level sufficiently to make entry a personnel hazard.

Leak testing during cold shutdowns is impractical since the containment is often maintained inerted. Further, this testing would require a significant amount of time for test equipment setup, test performance, and test equipment removal and could result in a delay in the return to power. These delays, and the increased expense and manpower requirements due to testing at a cold shutdown frequency would be burdensome for the licensee due to the costs involved. Verifying the reverse flow closure capability of these valves using Appendix J, Type C, leak rate testing during refueling outages would provide reasonable assurance of operational readiness.

Based on the determination that compliance with the Code exercising requirements is impractical, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.5 Control Rod Drive - Part A

3.5.1 Category B Valves

3.5.1.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3412, for the reactor recirculation pumps seal purge water line bypass leakage vent valves, HV-46-1(2)25 and -1(2)26. The licensee has proposed full-stroke exercising these valves during cold shutdowns when the containment is de-inerted and each refueling outage.

3.5.1.1.1 Licensee's Basis For Requesting Relief--The above valves serve as the recirculation pumps seal purge water line bypass leakage vent valves. Exercising these valves during operation could result in air reaching the seal water cavity causing damage to the seal. Piping configuration does not allow a means of venting this air except by entering the containment. During operation and cold shutdown the containment is a high radiation area and is inerted with nitrogen prohibiting entry.

No part-stroke will be performed. These valves will be full-stroke exercised and stroke timed during refuelings or at cold shutdowns when containment is de-inerted.

3.5.1.1.2 Evaluation--It is impractical to exercise these valves quarterly during power operation because this testing could result in damage to the pump seals. Further, the containment is maintained inerted during power operation and during most cold shutdowns. Exercising these valves requires venting of the associated piping, which can be performed only from inside the containment. Exercising these valves quarterly during power operation would require the reactor to be shutdown and the containment de-inerted. Exercising these valves every cold shutdown would also require de-inerting of the containment. Shutting down the reactor and/or de-inerting the containment to enable testing at the Code required frequency would be burdensome for the licensee due to the costs involved.

The licensee's proposal, to full-stroke exercise these valves during cold shutdowns when the containment is de-inerted and during refueling outages would provide reasonable assurance of operational readiness and would be a reasonable alternative to the Code requirements.

Based on the determination that compliance with the Code exercising frequency requirements is impractical, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.6 Control Rod Drive Hydraulic - Part B

3.6.1 Category B Valves

3.6.1.1 Relief Request. The licensee has requested relief from the exercising frequency and method requirements and valve stroke timing requirements of Section XI, Paragraphs IWV-3412 and -3413, respectively, for the control rod drive scram valves, XV-47-1(2)-26 and -1(2)-27 (one valve pair for each of the 185 hydraulic control units). The licensee has proposed verifying the operability of these valves using control rod scram insertion time testing, per Technical Specification 4.1.3.2.

3.6.1.1.1 Licensee's Basis For Requesting Relief--These valves are located on the hydraulic control units (HCUs) for the control rod drives. The air operated valves, XV-47-1(2)-26 and -27, open on a signal from the reactor protection system to permit rapid insertion of the control rods (scram). System configuration does not permit individual testing of these valves or stroke timing of the Category B valves. However, the proper function of these valves as a unit is verified by performing a scram test on their associated control rod and verifying rod insertion times. Technical Specifications require periodic scram testing of each control rod at an interval adequate to determine that the valves and control rod are operable and not so frequent as to cause excessive wear on the system components.

The control rod scram insertion time testing required by Technical Specification 4.1.3.2 will be performed in lieu of the Section XI testing. With reactor coolant pressure ≥ 950 psig and the rod drive pumps isolated from the accumulators, maximum scram insertion times shall be demonstrated:

a. For all control rods prior to thermal power exceeding 40% of rated thermal power following core alterations or after a reactor shutdown that is greater than 120 days.

b. For specifically affected individual control rods following maintenance on or modification to the control rod or control rod drive system which could affect the scram insertion time of those specific control rods.

c. For at least 10% of the control rods, on a rotating basis, at least once per 120 days of power operation.

3.6.1.1.2 Evaluation--These valves cannot be exercised without causing the associated control rod to scram. The NRC staff position on testing individual control rod scram valves in Boiling Water Reactors is explained in Generic Letter No. 89-04, Attachment 1, Position 7. The licensee's proposal, to scram test the control rods and measure the control rod insertion times per plant Technical Specifications in lieu of the Code exercising and stroke timing requirements is in accordance with this position and provides an acceptable level of quality and safety.

Based on the determination that the licensee's proposed alternate testing provides an acceptable level of quality and safety, relief may be granted as requested.

3.6.2 Category C Valves

3.6.2.1 Relief Request. The licensee has requested relief from the exercising frequency and method requirements of Section XI, Paragraph IWV-3520, for the control rod drive scram check valves, 47-1(2)-14 (one valve for each of the 185 hydraulic control units). The licensee has proposed verifying the full-stroke capability of these check valves by performing control rod scram insertion time testing per plant Technical Specification 4.1.3.2.

3.6.2.1.1 Licensee's Basis For Requesting Relief--These valves are located on the hydraulic control units (HCUs) for the control rod drives. The air operated valves, XV-47-1(2)-26 and -27, open on a signal from the reactor protection system to permit rapid insertion of the control rods (scram). Check valve, 47-1(2)-14 is flow actuated as a result of XV-47-1(2)-27 opening. System configuration does not permit individual testing of these valves. However, the proper function of these valves as a unit is verified by performing a scram test on their associated control rod and verifying rod insertion times. Technical Specifications require periodic scram testing of each control rod at an interval adequate to determine that the valves and control rod are operable and not so frequent as to cause excessive wear on the system components.

The control rod scram insertion time testing required by Technical Specification 4.1.3.2 will be performed in lieu of the Section XI testing. With reactor coolant pressure $\geq$ 950 psig and the rod drive pumps isolated from the accumulators, maximum scram insertion times shall be demonstrated:

a. For all control rods prior to thermal power exceeding 40% of rated thermal power following core alterations or after a reactor shutdown that is greater than 120 days.

b. For specifically affected individual control rods following maintenance on or modification to the control rod or control rod drive system which could affect the scram insertion time of those specific control rods.

c. For at least 10% of the control rods, on a rotating basis, at least once per 120 days of power operation.

3.6.2.1.2 Evaluation--The 14 valve, which is located in the scram discharge line, must open to allow the control rod to scram and proper operation is verified during control rod scram testing if the associated control rod meets the scram insertion time limits defined in the Technical Specifications. The NRC staff position on testing individual control rod scram valves in Boiling Water Reactors is explained in Generic Letter No. 89-04, Attachment 1, Position 7. The licensee's proposal, to scram test the control rods and measure the control rod insertion times per plant Technical Specifications in lieu of the Code exercising and stroke timing requirements is in accordance with this position and provides an acceptable level of quality and safety.

Based on the determination that the licensee's proposed alternate testing provides an acceptable level of quality and safety, relief may be granted as requested.

3.7 Standby Liquid Control

3.7.1 Category A/C Valves

3.7.1.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the standby liquid control (SLC) injection line primary containment isolation check valves, HV-48-1(2)F006A, -1(2)F006B, and -1(2)F007. The licensee has proposed full-stroke exercising these check valves each refueling during the SLC system injection test.

3.7.1.1.1 Licensee's Basis For Requesting Relief--Verifying forward flow operability requires firing a squib valve and injecting water into the reactor coolant system (RCS) using the standby liquid control (SLC) pumps. The frequent introduction of relatively colder water into the Reactor Coolant System, associated with this type of testing, would result in an excessive number of thermal cycles to SLC piping and components. Additionally, the introduction of colder water would increase reactivity due to the colder moderator temperature.

Since the firing of a squib valve requires valve disassembly to replace internals, firing should be minimized. Therefore, forward flow testing of the check valves will be performed during SLC injection testing as required by Technical Specifications 4.1.5.d.1.

Due to system configuration the most practical method to verify reverse flow closure on 48-1(2)F007 is by leak testing. In order to leak test, temporary test equipment must be installed inside primary containment. During power operation and normally at cold shutdown, the primary containment atmosphere is inerted with nitrogen, limiting access to emergencies only. Because leak testing at power is not possible, and is impractical at cold shutdown, by possibly delaying plant startup, this valve will be tested in the reverse direction at refueling during Appendix J, Type C testing.

Forward flow operability will be verified at refueling during SLC injection testing. Reverse flow closure for 48-1(2)F007 will be verified at refueling during Appendix J, Type C testing.

3.7.1.1.2 Evaluation--Verifying the full-stroke open capability of these check valves with flow requires firing an explosive-actuated valve and could result in the injection of boron solution into the RCS using the SLC pumps. It is impractical to perform this testing quarterly during power operation because the injection of relatively cold boron solution would result in thermal cycles to SLC and RCS components, and reactivity transients that could cause a reactor shutdown. Additionally, the explosive valves must have their internals replaced after firing. Since this testing requires injecting concentrated boron solution into the reactor coolant system and replacement of explosive-actuated valve internals after testing, exercising these valves to the open position with flow during cold shutdowns could result in a delay in the return to power. System modifications would be necessary to enable the quarterly performance of this testing. The cost of these modifications and the possible costs due to delays in plant startup would be burdensome for the licensee. The licensee's proposed alternative, to full-stroke exercise these valves during SLC injection testing each refueling outage would provide reasonable assurance of operational readiness.

Check valve 48-1(2)-F007 does not have remote position indication and the only practical method of verifying valve closure is leak testing. This valve is located inside the containment and is inaccessible during power operation. Leak testing during cold shutdowns is impractical since the containment is often maintained inerted. This testing would require a significant amount of time for test equipment setup, test performance, and test equipment removal and could result in a delay in the return to power. These delays, and the increased expense and manpower requirements due to testing at a cold shutdown frequency, would be burdensome for the licensee to the costs involved. Verifying the reverse flow closure of this valve using Appendix J, Type C, leak rate testing during refueling outages would provide reasonable assurance of operational readiness.

Based on the determination that compliance with the Code required testing is impractical, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.7.2 Category C Valves

3.7.2.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the SLC inboard injection check valve, 48-1(2)027. The licensee has proposed full-stroke exercising this check valve each refueling during the SLC injection test.

3.7.2.1.1 Licensee's Basis For Requesting Relief--Verifying forward flow operability requires firing a squib valve and injecting water into the reactor coolant system using the standby liquid control pumps. The frequent introduction of relatively colder water into the reactor coolant system associated with this type of testing, would result in an excessive number of thermal cycles to SLC piping and components. Additionally, the introduction of colder water would increase reactivity due to the colder moderator temperature.

Since the firing of a squib valve requires valve disassembly to replace internals, firing should be minimized. Therefore, forward flow testing of the check valve will be performed during SLC injection testing as required by Technical Specification 4.1.5.d.1.

3.7.2.1.2 Evaluation--Verifying the full-stroke open capability of this check valve with flow requires firing an explosive-actuated valve and could result in the injection of boron solution into the RCS using the SLC pumps. It is impractical to perform this testing quarterly during power operation because the injection of relatively cold boron solution would result in thermal cycles to SLC and RCS components, and reactivity transients that could cause a reactor shutdown. Additionally, the explosive valves must have their internals replaced after firing. Since this testing requires injecting concentrated boron solution into the reactor coolant system and replacement of explosive-actuated valve internals after testing, exercising this valve to the open position with flow during cold shutdowns could result in a delay in the return to power. System modifications would be necessary to enable the quarterly performance of this testing. The cost of these modifications and the possible costs due to delays in plant startup would be burdensome for the licensee. The licensee's proposed alternative, to full-stroke exercise this valve during SLC injection testing each refueling outage, would provide reasonable assurance of operational readiness.

Based on the determination that compliance with the Code required testing is impractical, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.8 Reactor Core Isolation Cooling

3.8.1 Category C Valves

3.8.1.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the reactor core isolation cooling (RCIC) pump suction check valve from the suppression pool, 49-1(2)030. The licensee has proposed part-stroke exercising this check valve quarterly and full-stroke exercising it during refueling outages.

3.8.1.1.1 Licensee's Basis For Requesting Relief--To achieve the required flow for full exercising this check valve, the HPCI return line to the suppression pool, via HV-55-1(2)F071, shall be utilized in conjunction with the RCIC suppression pool return line. In order to establish this flow path valve interlocks must be lifted. This is not practical during power operation as the automatic isolation capabilities of HV-49-2(2)F022, which is req... to close upon RCIC initiation and low reactor water level, would be defe... In addition, HV-49-(2)F029 and F031, which are containment isolation valves, would not be able to perform their automatic isolation function. Testing during cold shutdown could delay plant startup.

This check valve will be partially stroked during quarterly pump test and full exercised during refuelings.

3.8.1.1.2 Evaluation--Due to system design, reactor core isolation cooling system flow cannot be utilized to full-stroke exercise this valve during power operation or cold shutdown. The RCIC system suction must be aligned to the suppression pool to full-stroke exercise this valve and this would result in the introduction of low quality water into the condensate storage tank and the reactor vessel. This could force a unit shutdown due to the inability to maintain reactor coolant chemistry specifications. Additionally, this testing would require defeating system interlocks and inhibiting automatic safety functions.

The flow path used to part-stroke exercise this valve quarterly is from the suppression pool through the pump minimum flow line returning to the suppression pool. The relatively small volume of degraded water can be flushed from the system and processed. However, following a full-stroke exercise test with flow, considerable effort would be required to reestablish water quality in the condensate storage system. Full-stroke exercising these valves with flow would require a significant expenditure of time and manpower and performing this testing during cold shutdowns could, therefore, result in a delay in the return to power. System modifications would be necessary to enable the performance of this testing at the Code required frequency. The cost of these modifications and the possible costs due to delays in plant startup would be burdensome for the licensee. The licensee's proposed alternative, to part-stroke exercise this valve quarterly during pump testing and full-stroke exercise it during refueling outages, would provide reasonable assurance of operational readiness.

Based on the determination that compliance with the Code required testing is impractical, that the licensee's proposed alternate testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.9 Residual Heat Removal

3.9.1 Category B Valves

3.9.1.1 Relief Request. The licensee has requested relief from the exercising frequency and stroke timing requirements of Section XI, Paragraphs IWV-3412 and -3413 respectively, for the residual heat removal service water (RHRSW) system emergency core flood isolation valve, HV-51-1(2)F073. The licensee has proposed exercising and stroke timing this valve during refueling outages.

3.9.1.1.1 Licensee's Basis For Requesting Relief--Valves HV-51-1F073, HV-51-1F075 and HV-51-1F078 provide isolation between the radioactive RHR system and non-radioactive RHRSW system. Periodic exercising of the 1F078 and 1F075 contaminates the volume between the 1F075 and 1F073 with CO^{60}, ZN^{65} and other long lived isotopes. Numerous attempts to flush the volume have been unsuccessful resulting in a substantial volume of contaminated water to rad waste and contamination releases to the spray pond through the RHRSW system when 1F073 is opened. To remain consistent with I.E. Bulletin No. 80-10 and minimize environmental and radwaste impact, testing of HV-51-1F073 will be performed at refueling A modification for an improved flush connection is being pursued; however, it is anticipated this potential for cross contamination will still exist.

Based on the above discussion for Unit 1 this same condition is anticipated to exist on Unit 2. Therefore, the required testing for HV-51-2F073 will be performed at refueling. No part-stroke will be performed. This check valve will be exercised and stroke timed at refueling.

3.9.1.1.2 Evaluation--Exercising valve HV-51-1(2)F073 results in radioactive contamination of the RHRSW system. The cross contamination is minimized by flushing the upstream piping, however, this creates large volumes of radioactive waste. The costs of handling and disposing of this radioactive waste would be burdensome for the licensee due to the costs involved. The licensee's proposed alternative, to exercise and stroke time this valve during refueling outages would provide reasonable assurance of operational readiness.

Based on the determination that compliance with the Code requirements is impractical, that the licensee's proposed alternate testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.10 Core Spray

3.10.1 Category A/C Valves

3.10.1.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the core spray injection check valve, HV-52-1(2)08. The licensee has proposed full-stroke exercising this check valve open during refueling outages using a chainfall and closed using Appendix J, Type C, and Section XI leak rate testing.

3.10.1.1.1 Licensee's Basis For Requesting Relief--The above valve is equipped with air actuators; however, these actuators are not designed to open the valves. The actuator is designed to provide spring assistance for valve closure only. Flow exercising in the forward direction can only be accomplished by injection into the vessel which is not performed. Therefore, as an alternate means of forward exercising, the valve will be manually full opened by the use of a chainfall. Forward exercising, if attempted during cold shutdown, could result in a delayed plant startup. Exercising in the reverse direction will be accomplished during Appendix J and Section XI leak rate testing. No part-stroke exercising will be performed. This check valve will be full-stroke exercised in the forward direction at refueling by the use of a chainfall. Reverse flow closure will be verified at refueling by Appendix J and Section XI leak rate testing.

3.10.1.1.2 Evaluation--This valve is a containment isolation check valve located outside the containment. IWV-3522(b) contains the test method requirements for exercising check valves using a mechanical exerciser. The licensee's proposed test method, to exercise this check valve to the open position using a chainfall, would be acceptable provided the licensee adheres to these requirements. However, the licensee has not provided a justification that demonstrates exercising this check valve to the open position quarterly or during cold shutdowns would be impractical or would result in hardship without a compensating increase in the level of quality and safety.

The only method available to verify the closure capability of this valve is by leak testing. This valve is located outside the containment, however, some of the valve test connections are located inside containment and are inaccessible during power operation. Leak testing during cold shutdowns is impractical since the containment is often maintained inerted. This testing would require a significant amount of time for test equipment setup, test performance, and test equipment removal and could result in a delay in the return to power. These delays, and the increased expense and manpower requirements due to testing at a cold shutdown frequency would be burdensome for the licensee due to the costs involved. Verifying the reverse flow closure of this valve using Appendix J, Type C, leak rate testing during refueling outages would provide reasonable assurance of valve operational readiness in the closed position.

Based on the determination that verifying the closure capability of this valve quarterly or during cold shutdowns is impractical, that the licensee's proposed alternate testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if this Code requirement was imposed, relief may be granted to verify the closure capability of this check valve during refueling outages. However, relief from the Code exercising frequency requirement for the open position should not be granted.

3.11 High Pressure Coolant Injection

3.11.1 Category C Valves

3.11.1.1 Relief Request. The licensee has requested relief from the exercising frequency and method requirements of Section XI, Paragraph IWV-3520, for the high pressure coolant injection (HPCI) pump suction from the suppression pool check valve, 55-1(2)F045. The licensee has proposed part-stroke exercising this valve quarterly and demonstrating its full-stroke open capability by disassembly during refueling outages.

3.11.1.1.1 Licensee's Basis For Requesting Relief--Full-stroke exercising of these valves in the forward direction by normal system flow paths would require injecting poor quality suppression pool water into either the reactor vessel or the condensate storage tank. Technical Specification 3.4.4 requires reactor coolant system conductivity and chloride levels to be within specified levels. Injection of poor quality water from the suppression pool into the condensate storage tank (reactor coolant makeup water) or reactor coolant system, would result in increased chloride and conductivity levels exceeding Technical Specification limits. These valves are exercised by returning flow to the suppression pool via the test return loop; however, due to the smaller line size of the test return loop, the flow rates that would be obtained would result in only a partial opening of the valves. Because no means is available to verify a full-stroke in the open direction for these valves, valve disassembly will be required. Disassembly of the valves, if attempted at cold shutdown, could result in a delayed plant startup.

These check valves will be part-stroked in the forward direction quarterly and full-stroke exercise will be verified at refueling by valve disassembly.

3.11.1.1.2 Evaluation--Due to system design, HPCI system flow cannot be utilized to full-stroke exercise this valve during power operation or cold shutdown. The HPCI system suction must be aligned to the suppression pool to full-stroke exercise this valve and this would result in the introduction of relatively low quality water into the condensate storage tank and the reactor vessel. This could force unit shutdown due to the inability to maintain reactor coolant chemistry specifications.

The Code required testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves, which would be burdensome for the licensee due to the cost involved. Further, the addition of valves and piping penetrations could result in reduced plant reliability.

The licensee has proposed verifying the full-stroke open capability of these check valves by disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The Minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

The licensee's proposed alternative, combined with a part-stroke exercise test after reassembly, would provide reasonable assurance of operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage.

Based on the determination that compliance with the Code requirements is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee performs a partial flow test of the disassembled valve before it is returned to service. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that this valve swings fully open during partial flow testing. If another method is developed to verify the full-stroke capability of this check valve, this relief request should be revised or withdrawn.

3.11.1.2 Relief Request. The licensee has requested relief from the exercising frequency and method requirements of Section XI, Paragraph IWV-3520, for the HPCI pump discharge check valves to feedwater and core spray systems, 55-1(2)058 and -1(2)059. The licensee has proposed demonstrating the full-stroke capability of these check valves by disassembly during refueling outages.

3.11.1.2.1 Licensee's Basis For Requesting Relief--Verifying forward flow operability during operation would require the injection of relatively cold water from the condensate storage tank into the reactor vessel via the HPCI pump. The introduction of relatively colder water into the Reactor Coolant System would result in an excessive number of thermal cycles to system piping and components. Additionally, the introduction of colder water would increase reactivity due to the colder moderator temperature. Full exercise, therefore, can be accomplished only by valve disassembly. Valve disassembly, if attempted at cold shutdown, could result in a delayed plant startup.

These check valves will be full-stroke exercised in the forward direction at refueling by valve disassembly.

3.11.1.2.2 Evaluation--The only flow path available to full-stroke exercise these check valves with flow is into the reactor vessel. It is impractical to perform this testing quarterly during power operation because the injection of relatively cold boron solution would result in thermal cycles to SLC and RCS components, and reactivity transients that could cause a reactor shutdown. Because steam is required to operate the HPCI pump, a full-stroke exercise test with flow could only be performed when the reactor coolant system is hot.

The Code required testing could only be performed after significant system modifications which would be burdensome for the license due to the cost involved.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The Minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely. The licensee should investigate methods of part-stroke exercising these check valves.

An interim period is necessary to give the licensee time to complete their investigation, changes to the test procedures, and any system design changes necessary to perform post-inspection valve exercising. Immediate compliance could result in an extended outage which would be a burden for the licensee due to the costs involved. The licensee's proposed alternative, while not acceptable for the long term, should provide reasonable assurance of operational readiness in the interim since the incidence of improper reassembly should be low. Therefore, based on the determination that compliance with the Code requirements is impractical, and considering the burden on the licensee if the Code requirements were imposed, interim relief may be granted for one year or until the next refueling outage, whichever is greater. In the interim, the licensee may use disassembly and inspection to verify the full-stroke operability of these check valves without a post-inspection exercise test with flow.

The NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn.

3.12 Primary Containment Instrument Gas

3.12.1 Category A/C Valves

3.12.1.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the following automatic depressurization system (ADS) accumulator nitrogen supply check valves. The licensee has proposed full-stroke exercising these check valves during refueling outages and cold shutdowns when the containment is de-inerted.

59-1(2)001	59-1(2)005A	59-1(2)005B
59-1(2)056	59-1(2)112	59-1(2)128

3.12.1.1.1 Licensee's Basis For Requesting Relief--These valves are all located inside the primary containment. Testing of these valves requires the use of test connections which are also located inside the primary containment. During power operation and cold shutdown, the containment atmosphere is normally inerted with nitrogen limiting access to emergencies only. In addition, high radiation levels during power operations prohibit containment entry.

Forward (when applicable) and reverse exercising will be verified during all refueling outages and during cold shutdowns when the primary containment is de-inerted.

3.12.1.1.2 Evaluation--The containment is maintained inerted during power operation and during most cold shutdowns. Exercising these valves would require a containment entry. It is impractical to exercise these valves quarterly during power operation because this would require the reactor to be shutdown and the containment de-inerted. Exercising these valves every cold shutdown would also require de-inerting of the containment. Shutting down the reactor and/or de-inerting the containment to enable testing at the Code required frequency would be burdensome for the licensee due to the costs involved.

The licensee's proposal, to full-stroke exercise these valves during cold shutdowns when the containment is de-inerted and during refueling outages would provide reasonable assurance of operational readiness and would be a reasonable alternative to the Code requirements.

Based on the determination that compliance with the Code exercising frequency requirements is impractical, that the licensee's proposed alternate testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.12.2 Category C Valves

3.12.2.1 Relief Request. The licensee has requested relief from the exercising frequency requirements of Section XI, Paragraph IWV-3520, for the following ADS accumulator nitrogen supply check valves quarterly. The licensee has proposed full-stroke exercising these check valves during refueling outages and cold shutdowns when the containment is de-inerted.

59-1(2)023E	59-1(2)023H	59-1(2)023K	59-1(2)023M
59-1(2)023S	59-1(2)024E	59-1(2)024H	59-1(2)024K
59-1(2)024M	59-1(2)024S	59-1(2)131E	59-1(2)131H
59-1(2)131K	59-1(2)131M	59-1(2)131S	

3.12.2.1.1 Licensee's Basis For Requesting Relief--These valves are all located inside the primary containment. Testing of these valves requires the use of test connections which are also located inside the primary containment. During power operation and cold shutdown, the containment atmosphere is normally inerted with nitrogen limiting access to emergencies only. In addition, high radiation levels during power operations prohibit containment entry.

Forward (when applicable) and reverse exercising will be verified during all refueling outages and during cold shutdowns when the primary containment is de-inerted.

3.12.2.1.2 Evaluation--The containment is maintained inerted during power operation and during most cold shutdowns. Exercising these valves would require a containment entry. It is impractical to exercise these valves quarterly during power operation because this would require the reactor to be shutdown and the containment de-inerted. Exercising these valves every cold shutdown would also require de-inerting of the containment. Shutting down the reactor and/or de-inerting the containment to enable testing at the Code required frequency would be burdensome for the licensee due to the costs involved.

The licensee's proposal, to full-stroke exercise these valves during cold shutdowns when the containment is de-inerted and during refueling outages would provide reasonable assurance of operational readiness and would be a reasonable alternative to the Code requirements.

Based on the determination that compliance with the Code exercising frequency requirements is impractical, that the licensee's proposed testing would provide a reasonable alternative to the Code requirements, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted as requested.

3.13 Control Structure Chilled Water

3.13.1 Category B Valves

3.13.1.1 Relief Request. The licensee has requested relief from the stroke timing requirements of Section XI, Paragraph IWV-3413, for the standby gas treatment access and room supply isolation valves, SV-90-045A, -045B, -047A, and -047B. The licensee has proposed exercising and fail-safe testing these valves quarterly without stroke time measurement.

3.13.1.1.1 Licensee's Basis For Requesting Relief--These valves are solenoid valves which are not provided with local or remote position indication. The only means to verify their position is by observing the performance of their associated cooler. Measuring of the valve stroke time using this indirect measurement of valve position does not provide consistent enough results to detect valve degradation.

The valves will be exercised and fail safe tested quarterly to ensure operability. Stroke time will not be measured.

3.13.1.1.2 Evaluation--These solenoid operated valves are not equipped with position indication and valve design is such that observation of valve stem position is not possible. With the current system design, precise measurement of stroke time is not possible and trending stroke times is not practical.

Significant modifications, such as valve replacement, would be necessary to enable compliance with the Code stroke timing and trending requirements. These modifications would be burdensome for the licensee due to the costs involved. However, the licensee's proposal provides no means of detecting valve degradation. The licensee should develop a method of monitoring the condition of these valves and detecting degradation. Despite the inability to obtain trendable stroke times without system modifications, it may be possible for the licensee to confirm a change in position by indirect means and verify that the stroke times are less than a reasonable maximum limit.

Requiring immediate performance of this testing would be burdensome for the licensee, therefore, an interim period is necessary to give the licensee time to investigate and implement a method to monitor for valve degradation. The licensee's proposed testing, while not adequate for the long term, does demonstrate valve operability and would provide reasonable assurance of operational readiness in the interim. Therefore, interim relief may be granted for one year or until the next refueling outage, whichever is greater, to continue the current testing while the licensee investigates acceptable alternatives.

APPENDIX A

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

APPENDIX A

IST PROGRAM ANOMALIES FOUND DURING THE REVIEW

Inconsistencies and omissions in the licensee's program noted during the course of this review are summarized below. The licensee should resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

1. In item P.2 of the working meeting minutes dated March 31, 1988, the licensee committed to remove the references in their program to the forward flow testing performed on Residual Heat Removal system check valves 51-1(2)F031A, -1(2)F031B, -1(2)F031C, and -1(2)F031D. A review of the current program indicates this change has not been made.

2. In item P.3 of the working meeting minutes dated March 31, 1988, the licensee committed to investigate a positive method of full-stroke exercising Residual Heat Removal mini-flow check valves 51-1(2)F046A, -1(2)F046B, -1(2)F046C, and -1(2)F046D. This remains an open item for the licensee.

3. In item Q.3 of the working meeting minutes dated March 31, 1988, the licensee committed to investigate a positive method of full-stroke exercising Core Spray system pump mini-flow check valves 52-1(2)F036A, -1(2)F036B, -1(2)F036C, and -1(2)F036D. This remains an open item for the licensee.

4. In pump relief request GPRR-2, the licensee requested relief from the Code instrumentation accuracy requirements for all pumps in the IST program with the exception of the safeguard piping fill, diesel fuel oil transfer, and standby liquid control pumps. Relief may be granted for those instruments that provide the same or better indication accuracy at the reference value as required by the Code. The second category of instruments addressed by this relief request do not provide the same indication accuracy at reference values as required by the Code. Additionally, the licensee did not identify each affected pump instrument, the reference value, and the full-scale

range, therefore, it is not possible to determine the available accuracies and the effect that use of these instruments would have on the licensee's ability to monitor pump hydraulic condition and detect degradation. Since neither the actual indication accuracy nor the effect that their use will have on the licensee's ability to detect pump hydraulic degradation is known, relief should not be granted for those installed instruments that do not provide the same or better indication accuracy at the reference value as required by the Code. (Reference section 2.1.2 of this report.)

5. In valve relief request GVRR-1, the licensee has requested relief from the Code leak rate testing requirements for all containment isolation valves. Where individual leakage limits can be assigned and valve leakage determined, the licensee should comply with the requirements of IWV-3426 and -3427(a). For situations where there are multiple containment isolation valves branching from a common header, ascribing all leakage through the penetration to one valve could cause the performance of baseless maintenance on operable valves. The licensee has stated that maximum leakage rates will be assigned to each valve group and if the measured leakage exceeds the assigned group limit, corrective actions will be taken as required by Paragraph IWV-3427. This test method would provide an acceptable level of quality and safety if the assigned limiting leakage rate for each valve group is conservatively established regarding the number and sizes of valves in the group. The assigned maximum group leakage rates should be based on the smallest valve in the group so that corrective actions are taken whenever the leak-tight integrity of any valve of that group is in question. For valves that may only be tested in groups, relief may be granted provided the assigned maximum group leakage rates are based on the smallest valve in the group so that corrective actions are taken whenever the leak-tight integrity of any valve of that group is in question. (Reference section 3.1.1.1 of this report.)

6. In valve relief request GVRR-4, the licensee has proposed verifying the closure capability of each set of series check valves as a unit. Relief may be granted provided both valves in the pair are declared

inoperable, disassembled, and repaired or replaced if excessive leakage is detected during testing. (Reference section 3.1.4.1 of this report.)

7. In valve relief request GVRR-5, the licensee has proposed full-stroke exercising each set of four series-parallel vacuum relief check valves as a unit. The proposed group testing gives no indication of the individual valve condition. Since two failures must occur prior to detection by group testing, repairing only one valve is not acceptable. When the group fails to permit the required forward flow, all valves in the group are suspect and should be declared inoperable until they are repaired, replaced, or individually verified capable of performing their safety function. Relief may be granted provided all valves are repaired or replaced as necessary if the opening capability of any of these valves is questionable. In response to a request for additional information from the NRC staff, the licensee stated that valve closure is verified by a temperature sensor in the upstream line that provides an alarm in the control room if reverse flow occurs. For this series-parallel arrangement, this test verifies that at least one of the parallel valve combinations is closed, but it does not provide information about the condition of the remaining valve combination. Adequate isolation valves and test taps are available to leak test each parallel valve combination to verify that each individual valve is capable of preventing reverse flow. Since the Code requirements for verifying the closure capability of each valve can be met, the licensee is expected to comply with this Code requirement. (Reference section 3.1.5.1 of this report.)

8. In valve relief request 20-VRR-1, the licensee proposed testing the diesel generator air start solenoid valves as a unit during monthly diesel testing and to alternately isolate the air headers during diesel testing every 18 months. Piping and Instrument Drawing ISI-M-20 shows manual valves that could possibly be used to isolate an air start train during diesel testing to verify operability of the other train. Relief may be granted provided the licensee assigns a maximum limiting diesel start time which is less than or equal to the

Technical Specification limit and verifies the operability of the valves in each air start train at least quarterly by isolating one air start train on an alternating basis during diesel testing.

9. In valve relief request 55-VRR-1, the licensee has proposed verifying the full-stroke open capability of the HPCI pump suction from the suppression pool check valve, 55-1(2)F045, using disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. Relief may be granted to disassemble and inspect this valve provided the licensee performs a partial flow test of the disassembled valve before it is returned to service. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn. (Reference section 3.11.1.1 of this report.)

10. In valve relief request 55-VRR-2, the licensee has proposed verifying the full-stroke open capability of the HPCI pump discharge check valves, 55-1(2)058 and -1(2)059, using disassembly and inspection. The licensee should investigate methods of part-stroke exercising these check valves. Interim relief may be granted for these valves for one year or until the next refueling outage, whichever is greater, to give the licensee time to complete their investigation, the test procedures, and any system design changes necessary to perform post-inspection part-stroke exercising. In the interim, the licensee may use disassembly and inspection to verify

the full-stroke operability of these check valves without an ensuing part-stroke exercise test with flow. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn. (Reference section 3.11.1.2 of this report.)

11. In valve relief request GVRR-6, the licensee has proposed verifying the closure capability of the below listed series sets of stay fill check valves using disassembly and inspection during system mini-outages or refueling outages. The Minutes of the Public Meeting on Generic Letter No. 89-04 state that the use of disassembly to verify closure capability may be acceptable depending on whether verification by flow or pressure measurements is practical. The Minutes of the Public Meeting on Generic Letter No. 89-04 also state that partial-stroke exercise testing with flow is expected to be performed after valve disassembly and inspection is completed, but before returning the valve to service. Relief may be granted provided the licensee part-stroke exercises the valves to the open position with flow after they have been reassembled. The licensee should actively investigate ways, other than disassembly and inspection, of verifying the closure capability of these valves. If another method is developed to verify the reverse flow closure capability of these check valves, this relief request should be revised or withdrawn. (Reference section 3.1.4.2 of this report.)

12. In valve relief request 41-VRR-2, the licensee has requested relief from the Code stroke timing requirements for ADS valves PSV-41-1(2)F013E, H, K, M, and S. To monitor for valve degradation, the licensee should assign a maximum stroke time limit to these valves that is based on previous test data and verify that they stroke within that limit during testing. The measured stroke times need not be trended or compared to previous values, but if the maximum limit is exceeded, the valve should be declared inoperable and corrective action taken in

action taken in accordance with IWV-3417(b). Relief may be granted provided the licensee adopts this provision regarding valve stroke time measurement. (Reference section 3.3.2.1 of this report.)

13. In valve relief request 52-VRR-1, the licensee has proposed exercising the core spray injection check valve, HV-52-1(2)08 to the open position during refueling outages using a chainfall. IWV-3522(b) contains the test method requirements for exercising check valves using a mechanical exerciser. The licensee's proposed test method would be acceptable provided the licensee adheres to these requirements. However, the licensee has not provided a justification that demonstrates exercising this check valve to the open position quarterly or during cold shutdowns would be impractical or would result in hardship without a compensating increase in safety or quality. Therefore, relief from the Code exercising frequency requirement for the open position should not be granted. (Reference section 3.10.1.1 of this report.)

14. In valve relief request 90-VRR-1, the licensee has requested relief from the Code stroke timing requirements for the standby gas treatment access and room supply isolation valves, SV-90-045A, -045B, -047A, and -047B. The licensee has proposed exercising and fail safe testing these valves quarterly without stroke time measurement. However, the licensee's proposal provides no means of detecting valve degradation. The licensee should develop a method of monitoring the condition of these valves and detecting degradation. Despite the inability to obtain trendable stroke times without system modifications, it may be possible for the licensee to confirm a change in position by indirect means and verify that the stroke times are less than a reasonable maximum limit. Interim relief may be granted for one year or until the next refueling outage, whichever is greater, to continue the current testing while the licensee investigates acceptable alternatives. (Reference section 3.13.1.1 of this report.)

15. In a proposed Technical Specification change dated November 17, 1989, the Philadelphia Electric Company indicated that the scram accumulator check valves are tested for closure by performing a pressure decay test

for a period of 30 seconds. However, the submittal did not indicate the allowable pressure decay over this time interval. Also, the licensee's IST program lists these valves as Category C. These valves perform the safety function of maintaining hydraulic control unit accumulator pressure above the low pressure set point when the reactor is below 600 psig and both control rod drive pumps are not in operation. These valves should be categorized A/C. Since the function of these valves is to maintain accumulator pressure, performing a pressure decay test in lieu of a leak rate test is acceptable provided the duration and permissible pressure decay demonstrates that these valves are capable of performing their safety function. The licensee should revise the categorization of these valves and provide the NRC with information describing the pressure decay acceptance criteria used in this test.

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