ATTACHMENT 1

EGG-NTA-8366

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

Docket Nos. 50-277 and 50-278

T. L. Cook
C. B. Ransom

Published October 1990

Idaho National Engineering Laboratory
EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Under DOE Contract No. DE-AC07-76ID01570
FIN No. A6812
TAC Nos. 61189 and 61190

ABSTRACT

This EG&G Idaho, Inc., report presents the results of our evaluation of the Peach Bottom Atomic Power Station, Units 2 and 3, 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)" 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 Unit.

FIN NO. A6812
B&R 920-19-05-02-0
Docket Nos. 50-277 and 50-278
TAC Nos. 61189 and 61190

CONTENTS

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) program submitted by the Philadelphia Electric Company for its Peach Bottom Atomic Power Station, Units 2 and 3.

By a letter dated June 28, 1984, Philadelphia Electric Company submitted an IST program for the Peach Bottom Atomic Power Station, Units 2 and 3. The working session with Philadelphia Electric and Peach Bottom representatives was conducted on February 22 and 23, 1988. [illegible]'s IST program dated June 29, 1988, as amended by his letter t[illegible] dated September 11, 1990, 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), 1980 Edition, through the Winter of 1981 Addenda.

This technical evaluation report (TER) does not address any IST program revisions subsequent to those noted above. Program changes involving additional or revised relief requests should be submitted to the NRC under separate cover in order to receive prompt attention, but should not be implemented prior to review and approval by the NRC. Other IST program revisions should follow the guidance in Section D of Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs."

In its IST program, Philadelphia Electric Company has requested relief from the ASME Code testing requirements for specific pumps and valves and these requests have been evaluated individually to determine if the criteria in 10 CFR 50.55a for granting relief are met for the specific pumps and valves. 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." 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 Philadelphia Electric Company bases for requesting relief from the Section XI requirements for the Peach Bottom, Units 2 and 3, pump testing program and EG&G's evaluations and conclusions regarding these requests. Section 3 presents similar information for the valve testing program.

Category A, B, and C valves that are exercised during cold shutdowns and refueling outages and meet the requirements of the ASME Code, Section XI, are discussed in Appendix A.

Appendix B contains a listing of P&IDs used for this review.

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

This TER, including all relief requests and component identification numbers, is applicable to Units 2 and 3. The Unit 3 designator has been placed in parentheses, where possible, to minimize repetition, i.e., MO-2(3)-02-53A. A zero used as a designator indicates that the component is common to both Units 2 and 3.

2. PUMP TESTING PROGRAM

The Peach Bottom Atomic Power Station IST program submitted by Philadelphia Electric 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, except those cases identified below for which specific relief from testing has been requested and as summarized in Appendix C. Each Philadelphia Electric basis for requesting relief from the pump testing requirements and the reviewer's evaluation of that request is summarized below.

2.1 <u>All Pumps in the IST Program</u>

2.1.1 <u>Vibration Measurements</u>

2.1.1.1 <u>Relief Request</u>. The licensee has requested relief from measuring vibration amplitude on all pumps in the IST program in accordance with the requirements of Section XI, Paragraph IWP-4510, and proposed to measure vibration velocity during pump tests.

2.1.1.1.1 <u>Licensee's Basis for Requesting Relief</u>--ASME Section XI requires pump vibration measurement in displacement amplitude, peak-to-peak composite, to be taken during each inservice test. Although not identified by Section XI, vibration also can be accurately measured using vibration velocity measurements. The criteria for vibration measurement are not sensitive/dependent on the pumps speed and provides an absolute value for acceptable limits on vibration. In addition, this technique is an industry accepted method which is sensitive to vibration changes that are indicative of developing mechanical problems. Velocity measurements provide an acceptable predictive tool to detect changes in the vibration that indicate a mechanical problem.

Since Section XI does not address vibration velocity measurement, methods for testing and acceptance criteria will be in accordance with ANSI/ASME OM, Part 6 - 1987/1987A.

Alternate Testing: Pump vibration measurements will be in vibration velocity (in/sec). Acceptance criteria from ANSI/ASME OM, Part 6-1987/1987A is summarized in Table 1 below.

TABLE 1. VIBRATION VELOCITY (in/sec) ACCEPTANCE CRITERIA*

	Acceptable Range	Alert Range	Required Action
Vertical and Horizontal Centrifugal Pumps ($\geq$600 RPM)	0-2.5V_r or 0-.325 in/sec	>2.5V_r-6V_r or >.325-.7 in/sec	>6V_r or >.7 in/sec

*NOTE: The most limiting of the two ranges given is applicable.

	Acceptable Range	Alert Range	Required Action
Positive Displacement Pumps	0-2.5V_r	>2.5V_r	>6V_r

V_r= Vibration Reference Value

2.1.1.1.2 Evaluation--Pump bearing degradation results in increased bearing noise at frequencies 5 to 100 times the rotational frequency of the pump. These high frequency bearing noises would not produce a significant increase in pump vibration displacement measurements and could go undetected. However, the high frequency noises would result in relatively large changes in pump vibration measurements that could permit corrective action prior to catastrophic failure of the bearing. Because of the high frequencies of the vibrations associated with the pump bearings, vibration velocity measurements are generally much better than vibration displacement measurements in monitoring the mechanical condition of pumps and detecting pump bearing degradation.

The advantages of using vibration velocity instead of displacement for monitoring the mechanical condition of pumps, except for reciprocating pumps, are widely acknowledged in the industry. The use of pump vibration velocity measurements can provide a great deal of information about pump mechanical condition that could not be obtained by using vibration displacement readings. Therefore, the licensee's proposed alternate test method should give adequate assurance of pump operational readiness and provide a reasonable alternative to the Code requirements.

Section XI does not provide allowable ranges for vibration velocities and, since the relationship between displacement and velocity is frequency dependent, a mathematical conversion of the Code displacement ranges is not appropriate. ANSI/ASME OM-6, Draft 8 or later, provides a set of allowable ranges for pump vibration velocity measurements that has been found acceptable by the NRC. The licensee has indicated that they are using the acceptance criteria specified in OM-6. This is acceptable provided the licensee complies with all the vibration measurement requirements of ANSI/ASME OM-6, which they have agreed to do.

Based on the determination that pump vibration velocity measurements provide better information to evaluate pump mechanical condition and to detect bearing degradation than the Code required displacement readings, and considering the licensee's proposal to measure pump vibration velocity in accordance with the requirements of ANSI/ASME OM-6 and to use the allowable ranges and limits specified in that document, relief may be granted from the Code requirements as requested.

2.1.2 Bearing Temperature Measurements

2.1.2.1 Relief Request. The licensee has requested relief from measuring bearing temperature annually on all pumps in the IST program in accordance with the requirements of Section XI, Paragraph IWP-3300, and proposed to measure vibration velocity to monitor bearing degradation.

2.1.2.1.1 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, the condition of a pump bearing would have to seriously degrade to cause a detectable rise of temperature on the bearing housing. Measuring vibration in velocity provides the ability to detect changes in the mechanical condition of a pump. Therefore, any degradation of a bearing would be detected before an increase of temperature on the bearing housing occurred.

Alternate Testing: Pump/bearing mechanical condition will be determined using the vibration monitoring program, i.e., measure vibration velocity. Bearing temperature will not be measured.

2.1.2.1.2 Evaluation--The annual bearing temperature measurement is an unreliable method of detecting bearing failure for the reasons discussed above and deletion of this measurement will not affect the licensee's pump monitoring program. Measurement of vibration velocity to determine pump mechanical condition is a more reliable approach than the Code required measurement of vibration amplitude and annual bearing temperatures. The licensee has described the vibration velocity monitoring program used at Peach Bottom Atomic Power Station in a separate relief request (see Item 2.1.1.1 of this report).

Based on the acceptability of the licensee's alternate testing of using vibration velocity measurements to determine pump mechanical condition, relief may be granted from the Section XI requirements to measure bearing temperature annually on all pumps in the IST program.

2.2 Standby Liquid Control Pumps

2.2.1 Flow Measurement

2.2.1.1 Relief Request. The licensee has requested relief from the flow rate instrument accuracy requirements of Section XI, Paragraph IWP-4110, for the standby liquid control pumps, 2(3)AP040 and 2(3)BP040, and proposed to calculate flow rate by measuring the rate of test tank level change per unit of time.

2.2.1.1.1 Licensee's Basis for Requesting Relief--The test circuits for these pumps are not provided with in-place flowmeters. Testing of each individual pump is accomplished by pumping boron solution from the storage tank to the test tank against a system head of 1225 PSIG. During this test, a rate of level increase in the test tank per unit of time is determined. This rate of level increase is then converted to a flow rate via a calculation.

Alternate Testing: Flow rate will be determined by a rate of test tank level change per unit of time calculation.

2.2.1.1.2 Evaluation--The standby liquid control pump test loop design does not have installed flow rate instruments and establishing flow through the instrumented path would require firing an explosive valve and injecting water with a high concentration of boron into the RCS which would result in fluctuations in reactor power and a possible shutdown. Therefore, it is impractical to directly measure the pump flow rate during pump testing. However, the flow rate can be readily obtained by measuring the level change of the test tank over time. This method of indirect measurement should provide sufficiently accurate and repeatable data to utilize in monitoring pump degradation. The licensee's proposed testing should provide reasonable assurance of pump operational readiness. System modifications would be necessary to install flow instrumentation to permit direct flow rate measurements. These modifications would provide little or no increase in the licensee's ability to determine pump condition and requiring the licensee to install instrumentation would be burdensome due to the costs involved.

Based on the determination that it is impractical to directly measure pump flow rate, the burden on the licensee if the Code requirements were imposed, and considering that the proposed alternate testing should provide sufficient information to adequately monitor the hydraulic condition of these pumps, relief may be granted from the Section XI requirements as requested.

2.3 Emergency Service Water and Emergency Service Water Booster Pumps

2.3.1 Flow Measurement

2.3.1.1 Relief Request. The licensee has requested relief from measuring flow rate on the emergency service water and emergency service water booster pumps, OAP057, OBP057, OAP163, and OBP163, in accordance with the requirements of Section XI, IWP-4600, and proposed to conduct pump shutoff head testing until modifications are performed to permit pump flow rate measurements.

2.3.1.1.1 Licensee's Basis for Requesting Relief--The test circuits for these pumps do not have a flowmeter nor do they have a suitable means of calculating pump flow rates using other means, i.e., change in tank level over a period of time, etc. Relief from measuring pump flow rates is requested until modifications to the system can be effected which will allow flow rates to be measured.

Alternate Testing: Pump flow rates will not be measured until system modifications are completed. The pumps will be run at a shutoff condition and flow capability will be checked using pump discharge pressure in accordance with Technical Specification 4.9.C.

2.3.1.1.2 Evaluation--Pump testing under no flow conditions provides only discharge pressure as an indicator of pump hydraulic performance. Measurement of pump discharge pressure at shutoff conditions provides one data point on the flat portion of the pump characteristic curve, which is of some benefit in monitoring pump hydraulic condition. However, some forms of pump degradation could leave this no flow point essentially unchanged while causing large changes when the pump is producing flow. Shutoff testing would not detect pump degradation that is manifest only after flow has been established. Since the licensee's proposed testing may not detect pump degradation, it does not provide adequate long term assurance of pump operational readiness, therefore, this testing is not acceptable as an alternative to the Code required testing.

The licensee has informed the NRC staff that system modifications will be made to permit flow rate measurements during pump testing. Requiring these modifications prior to the next Unit 2 refueling outage would impose an unreasonable hardship on the licensee even considering the increase in safety that would be obtained. The proposed testing, while not acceptable on a long term basis, should provide an indication of pump condition sufficient for the interim period until the modifications have been completed. Therefore, relief may be granted to test these pumps as proposed during the interim period, however, prior to plant start-up from the next Unit 2 refueling outage, the licensee should complete modifications that enable them to take the Code required flow rate measurements.

2.3.1.2 Relief Request. The licensee has requested relief from measuring flow rate on the emergency cooling water pump, OOP186, in accordance with the requirements of Section XI, Paragraph IWP-4600, and proposed to conduct pump shutoff head testing until modifications are performed to permit pump flow rate measurements.

2.3.1.2.1 Licensee's Basis for Requesting Relief--The test circuit for this pump does not have a flowmeter nor does it have a suitable means of calculating pump flow rate using other means (i.e., change in tank level over time, etc.). Relief from measuring pump flow rate is requested until modifications to the system can be effected which will allow flow rate to be measured.

Alternate Testing: Pump flow rate will not be measured until system modifications are completed. The pump will be run at a shutoff condition and flow capability will be checked using pump discharge pressure.

2.3.1.2.2 Evaluation--Pump testing under no flow conditions provides only discharge pressure as an indicator of pump hydraulic performance. Measurement of pump discharge pressure at shutoff conditions provides one data point on the flat portion of the pump characteristic curve, which is of some benefit in monitoring pump hydraulic condition. However, some forms of pump degradation could leave this no flow point essentially unchanged while causing large changes when the pump is producing flow. Shutoff testing would not detect pump degradation that is manifest only after flow has been established. Since the licensee's proposed testing may not detect pump degradation, it does not provide adequate long term assurance of pump operational readiness, therefore, this testing is not acceptable as an alternative to the Code requirements.

The licensee has informed the NRC staff that system modifications will be made to permit flow rate measurements during pump testing. Requiring these modifications prior to the next Unit 2 refueling outage would impose an unreasonable hardship on the licensee even considering the increase in safety that would be obtained. The proposed testing, while not acceptable on a long term basis, should provide an indication of pump condition sufficient for the interim period until the modifications are completed. Therefore, relief may be granted to test these pumps as proposed during the interim period, however, prior to plant start-up from the next Unit 2 refueling outage, the licensee should complete modifications that enable them to take the Code required flow rate measurements.

2.4 Emergency Diesel Generator Fuel Oil Transfer Pumps

2.4.1 Flow Measurement

2.4.1.1 Relief Request. The licensee has requested relief from the flow rate instrument accuracy requirements of Section XI, Paragraph IWP-4110, for the emergency diesel generator fuel oil transfer pumps, OAP060, OBP060, OCP060, and ODP060, and proposed to calculate flow rate by measuring the level increase in the day tank per unit of time.

2.4.1.1.1 Licensee's Basis for Requesting Relief--Flowmeters are not provided within the pump test circuits. Flow rate will be accomplished by timing the level increase in the fuel oil day tank while transferring fuel oil from the storage tank to the day tank. This rate of level increase is then converted to a flow rate via calculations. Testing is to be performed when the associated diesel is not running.

Alternate Testing: Flow rate will be calculated by measuring the level increase in the day tank per unit of time.

2.4.1.1.2 Evaluation--The diesel generator fuel oil transfer pump test circuit does not have installed flow rate instruments, therefore, it is impractical to measure directly pump flow rate. However, the flow rate can be readily obtained by measuring the level change of the fuel oil day tank over time. This method of indirect measurement is an acceptable alternative because the results obtained are essentially equivalent to the results obtained by direct measurements and should provide sufficiently accurate and repeatable data to use for monitoring pump degradation. A system modification would be necessary to allow direct measurement of pump flow rate and the additional information provided would have a minimal impact on the licensee's ability to detect pump hydraulic degradation. Imposing the Code requirements on the licensee would constitute a burden due to the costs involved.

Based on the determination that it is impractical to directly measure pump flow rate, the burden on the licensee if the Code requirements were imposed, and considering that the proposed alternate testing should provide sufficient information to adequately monitor the hydraulic condition of these pumps, relief may be granted from the Section XI requirements as requested.

3. VALVE TESTING PROGRAM

The Peach Bottom Atomic Power Station IST program submitted by Philadelphia Electric 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 C or where specific relief from testing has been requested, these valves are tested to the Code requirements and established NRC positions. Each Philadelphia Electric 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.

3.1 All Systems

3.1.1 Containment Isolation Valves

3.1.1.1 Relief Request. The licensee has requested relief from leak testing all primary containment isolation valves in accordance with the requirements of Section XI, Paragraphs IWV-3420 through -3425, and proposed to leak test these valves in accordance with 10 CFR 50, Appendix J.

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-2200(a) defines Category A as "valves for which seat leakage is limited to a specified maximum amount in the closed position of fulfillment of their function". Although leakage rates for containment isolation valves are not limited on an individual basis, 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 -3427. In order to prevent duplicate leakage testing of these valves, individual leakage rates will be assigned for each containment isolation valve and a maximum permissible leakage calculated for each local leak rate test. If this value is exceeded, then corrective action will be taken to restore valve leakage rates to within acceptable limits. The proposed actions will be taken in lieu of IWV-3426 and IWV-3427.

Alternate Testing: Containment isolation valves will be leak rate tested in accordance with the 10 CFR 50, Appendix J, testing program. In addition, individual leak rates will be assigned and a maximum permissible leakage criterion established for each local leak rate test.

3.1.1.1.2 Evaluation--The leak test procedures and requirements for containment isolation valves identified by 10 CFR 50, Appendix J, are essentially equivalent to those contained in Section XI, Paragraphs IWV-3421 through -3425. Appendix J, Type C, leak rate testing adequately determines the leak-tight integrity of these valves. However, the 10 CFR 50, Appendix J, leak rate testing does not require that individual valve leakage limits be defined nor is corrective action required based on individual valve leakage rates. The licensee has stated that individual leakage limits will be assigned and maximum permissible leakage calculated for each local leak rate test. The licensee further stated that if this value is exceeded, corrective action will be taken to restore valve leakage rates to within acceptable limits. Section XI is a component test Code to monitor individual component condition and degradation to access their operational readiness, therefore, these valves should be individually leak rate tested where practicable. When individual leak rate testing is impractical because of the lack of necessary test taps and/or isolation valves, testing in groups can be acceptable if the group leakage limits are conservatively set such that excessive leakage through any individual valve in the group can be detected and the appropriate corrective actions taken.

Paragraph IWV-3427(b) specifies additional requirements for increased test frequencies and repair or replacement (concerning valve sizes of six in. or larger) beyond the requirements of Paragraph IWV-3427(a). Based on the input from many utilities and review of test data at some plants, trending the leak rate information from test to test does not contribute sufficient data to utilize in predicting when a given valve would exceed its leakage limit and, therefore, the usefulness of Paragraph IWV-3427(b) does not justify the burden of complying with this requirement.

Based on the adequacy of the 10 CFR 50, Appendix J, Type C, leak rate testing and the lack of usefulness of trending the leakage of valves 6 inches and larger, relief may be granted from the Section XI leak rate requirements of Paragraphs IWV-3421 through IWV-3425 and IWV-3427(b). Based on the impracticality of individually leak rate testing certain valves, relief may be granted from testing and evaluating them in accordance with the requirements of Paragraphs IWV-3426 and IWV-3427(a), provided that the licensee leak rate tests these valves in groups and assigns maximum group leakage rate limits that are conservatively based on the smallest valve in the group so that corrective actions will be taken whenever the leak tight integrity of any of the affected valves is in question.

3.1.2 Excess Flow Check Valves

3.1.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3521, for all excess flow check valves in the IST program and proposed to functionally test them 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 ball check valve. Since the system is normally in a static condition, the valve ball 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 and 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 pressure (>500 psig) and/or high temperature (>200 F) and highly contaminated 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.

Alternate Testing: Functional testing will be performed at refueling.

3.1.2.1.2 Evaluation--These valves are excess flow check valves on instrument sensing lines that penetrate the primary containment. Their function is to close against excessive flow to perform a containment isolation function, therefore, they should be categorized A/C instead of C in the IST program. It is impractical to exercise these valves during power operation because various instrument sensing lines must be vented thus removing from service reactor instrumentation that provides reactor protection and control signals. Loss of this reactor instrumentation during power operation could result in a reactor trip. Additionally, it is impractical to exercise these valves during cold shutdown because removal of the associated instruments from service could prevent operation of systems required for decay heat removal.

It would be necessary to make substantial system modifications to permit testing these valves to the Code requirements. These modifications would be costly and could result in reduced system reliability. Requiring the licensee to make these modifications would be a hardship without a commensurate increase in the level of quality and safety.

The licensee's proposal to perform a modified leak rate test on the excess flow valves should serve as a reasonable alternative to the Code requirements and provide assurance that they can perform their safety function.

Based on the impracticality of complying with the Code requirements and since full-stroke exercising these valves during the performance of a modified leak rate test during refueling outages should provide an adequate demonstration of valve operational readiness, relief may be granted from the exercising requirements of Section XI as requested.

3.1.3 Rapid-Acting Valves

3.1.3.1 Relief Request. The licensee has requested relief from the valve stroke timing requirements of Section XI, Paragraph IWV-3417, for all rapid-acting valves in the IST program and proposed to apply a maximum stroke time of two seconds to these valves.

3.1.3.1.1 Licensee's Basis for Requesting Relief--For rapid actuating power-operated valves, the application of the above criteria (of Section XI, Paragraph IWV-3417) 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 times 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.

Alternate Testing: 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--Generic Letter No. 89-04, Attachment 1, Item 6, states in part: "Power operated valves with normal stroke times of 2 seconds or less are referred to by the staff as "rapid-acting valves." Relief may be granted from the requirements of Section XI, Paragraph IWV-3417(a) for these valves provided the licensee assigns a maximum limiting value of full-stroke time of 2 seconds to these valves and, upon exceeding this limit, declares the valve inoperable and takes corrective action in accordance with IWV-3417(b)." If the licensee takes corrective action in accordance with this Generic Letter position, their proposed alternate testing would be in compliance with the staff position and would provide an acceptable level of quality and safety.

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

3.2 Main Steam System

3.2.1 Category B/C Valves

3.2.1.1 Relief Request. The licensee has requested relief from exercising and measuring the stroke time of the main steam automatic depressurization valves, RV-2(3)-01-071A, -071B, -071C, -071G, and -071K, and proposed to full-stroke exercise them following each refueling outage.

3.2.1.1.1 Licensee's Basis for Requesting Relief--If any of these valves fail to reclose after testing, the plant would be placed in a LOCA condition. 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 openings 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 indication indicates only ADS relief valve pilot position and not the actual valve disk position. The only way possible to determine the opening of the relief valve is by acoustic 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.

Alternate Testing: Exercise during restart after refueling.

3.2.1.1.2 Evaluation--It is impractical to exercise the ADS valves during power operations because opening an ADS valve causes reactor pressure and power transients that could result in a reactor trip. Also, failure of one of these valves in the open position could result in rapid depressurization and cooldown of the reactor vessel and a reactor trip. These valves must be exercised while reactor steam pressure is available because steam pressure is the motive force. Therefore, they cannot be operated during cold shutdowns or refueling outages when steam pressure is not available. However, these valves can be exercised while going into or exiting the cold shutdown or refueling conditions. It would be burdensome to require the licensee to exercise the ADS valves at a cold shutdown frequency because frequent cycling damages the valves and increases the chance that they will fail to reclose. Further, the BWR Owner's Group Evaluation of NUREG-0737, recommends that the number of challenges to these valves be kept to a minimum.

These valves have extremely short stroke times that are dependent on steam pressure, which makes it impractical to measure them using normal methods and meaningless to trend since measurement response times and test pressure variations could mask changes in valve condition. Another factor that makes it impractical to obtain trendable stroke times for these valves is that they do not have remote valve disk position indication and have to rely on indirect indication to determine when the valve is open. This indirect indication does not yield stroke time measurements that are sufficiently repeatable to be trended in order to detect valve degradation. It would be necessary to install special test and timing equipment to obtain accurate stroke time measurements for these valves. It would be burdensome to require the licensee to install special valve timing equipment, and for the reasons stated above, it would not provide a compensating increase in the level of quality and safety.

The licensee's proposal to exercise these valves during refueling outages should demonstrate their ability to stroke to their safety function position. However, to monitor for valve degradation, the licensee should assign a maximum stroke time limit that is based on previous test data to these valves 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 actions taken in accordance with IWV-3417(b).

Based on the determination that it is impractical to exercise the ADS valves during power operations or cold shutdowns, that it would be a burden on the licensee if the Code requirements were imposed, and considering that the licensee's proposed alternate testing of the ADS valves during refueling outages should provide an adequate demonstration of valve operational readiness, relief may be granted from the Section XI requirements provided that the licensee measures the stroke times as discussed above.

3.3 Control Rod Drive Hydraulic System

3.3.1 Category B Valves

3.3.1.1 Relief Request. The licensee has requested relief from exercising and stroke timing valves CV-2(3)-03-13126AA through HC and CV-2(3)-03-13127AA through HC, control rod scram inlet and outlet, in accordance with the requirements of Section XI, Paragraphs IWV-3411 and -3413(b), and proposed to verify proper valve operation during the performance of individual control rod scram testing in accordance with plant Technical Specifications.

3.3.1.1.1 Licensee's Basis for Requesting Relief--These valves are located on the hydraulic control units whose function is to rapidly insert the control rods on a signal from the reactor protection system. The proper functioning of these valves as a unit is most practically verified by performing an actual scram test and measuring control rod insertion times.

Alternate Testing: The control rod scram insertion time testing required by Technical Specification 4.3.C will be performed in lieu of the Section XI testing.

a. After each refueling outage, and prior to synchronizing the main turbine generator initially following restart of the plant, all operable fully withdrawn insequence rods shall be scram time tested during start-up from the fully withdrawn position with the nuclear system pressure above 800 psig.

b. After exceeding 30% power, all previously untested operable control rods shall be tested, as described above, prior to exceeding 40% power.

c. Whenever such scram time measurements are made (such as when a scram occurs and the scram insertion time recorders are operable) an evaluation shall be made to provide reasonable assurance that proper control rod drive performance is being maintained.

3.3.1.1.2 Evaluation--The NRC staff position on exercising these valves and measuring their full-stroke times is contained in Generic Letter 89-04, Attachment 1, Item 7. The Generic Letter states: "... for those control rod drive system valves where testing could result in the rapid insertion of one or more control rods, the rod scram test frequency identified in the facility TS may be used as the valve testing frequency to minimize rapid reactivity transients and wear of the control rod drive mechanisms." The Generic Letter further states: "The scram inlet and outlet valves are power operated valves that full-stroke in milliseconds and are not equipped with indication for both positions, therefore, measuring their full-stroke time as required by the Code may be impractical. Verifying that the associated control rod meets the scram insertion time limits defined in the plant TS can be an acceptable alternate method of detecting degradation of these valves. Also, trending the stroke times of these valves may be impractical and unnecessary since they are indirectly stroke timed and no meaningful correlation between the scram time and valve stroke time may be obtained, and furthermore, conservative limits are placed on the control rod scram insertion times. If the above test is used to verify the operability of scram inlet and outlet valves, it should be specifically documented in the IST program."

Requiring the licensee to scram all control rods quarterly during power operations would be a hardship without a compensating increase in safety. Based on the determination that the licensee's proposed testing is in accordance with Generic Letter 89-04, Attachment 1, Item 7, and would provide reasonable assurance of operational readiness, relief may be granted as requested.

3.3.2 Category C Valves

3.3.2.1 Relief Request. The licensee has requested relief from exercising valves CHK-2(3)-03-13114AA through HC, control rod scram discharge header checks, in accordance with the requirements of Section XI, Paragraph IWV-3520, and proposed to full-stroke them during control rod scram testing.

3.3.2.1.1 Licensee's Basis for Requesting Relief--The proper functioning of these valves as a unit is most practically verified by performing an actual scram test and measuring control rod insertion times.

Alternate Testing: The control rod scram insertion time testing required by Technical Specification 4.3.C will be performed in lieu of the Section XI testing.

a. After each refueling outage, and prior to synchronizing the main turbine generator initially following restart of the plant, all operable fully withdrawn insequence rods shall be scram time tested during start-up from the fully withdrawn position with the nuclear system pressure above 800 psig.

b. After exceeding 30% power, all previously untested operable control rods shall be tested, as described above, prior to exceeding 40% power.

c. Whenever such scram time measurements are made (such as when a scram occurs and the scram insertion time recorders are operable) an evaluation shall be made to provide reasonable assurance that proper control rod drive performance is being maintained.

3.3.2.1.2 Evaluation--The NRC staff position on exercising control rod drive system valves is contained in Generic Letter 89-04, Attachment 1, Item 7. The Generic Letter states: "... for those control rod drive system valves where testing could result in the rapid insertion of one or more control rods, the rod scram test frequency identified in the facility TS may be used as the valve testing frequency to minimize rapid reactivity transients and wear of the control rod drive mechanisms. This alternate test frequency should be clearly stated and documented in the IST program."

Requiring the licensee to scram all control rods quarterly during power operations would be a hardship without a compensating increase in safety. Based on the determination that the licensee's proposed testing is in accordance with Generic Letter 89-04, Attachment 1, Item 7, and would provide reasonable assurance of operational readiness, relief may be granted as requested.

3.4 Feedwater System

3.4.1 Category A/C Valves

3.4.1.1 Relief Request. The licensee has requested relief from exercising valves CHK-2(3)-06-028A, -028B, reactor feedwater header inboard checks, -096A, and -096B, reactor feedwater header outboard checks, in accordance with the requirements of Section XI, Paragraph IWV-3520, and proposed to verify closure during refueling outages.

3.4.1.1.1 Licensee's Basis for Requesting Relief--The only method to verify reverse flow closure of these valves is 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 leak test CHK-02(3)-028A,B, manual valves located inside the primary containment must be opened. During power operation and normally at cold shutdown, the primary containment atmosphere is inerted with nitrogen, limiting access to emergencies only. In addition, during cold shutdown, the condensate system is placed in a short cycle flowpath which is used to maintain proper condensate water quality. Since valves CHK-2(3)-06-096A,B must be open to provide a flowpath for condensate cleanup, leak testing is not possible. Because leak testing at power is not possible, and is impractical at cold shutdown and could delay plant start-up, these valves will be leak tested at refueling.

Alternate Testing: Reverse flow closure will be verified during Appendix J, Type C, testing during refueling.

3.4.1.1.2 Evaluation--The safety-related function of these valves is to shut to isolate the reactor feedwater headers. It is impractical to exercise these valves to the closed position quarterly during power operation because closing them would interrupt feedwater flow and could result in a reactor trip. It is impractical to exercise these check valves closed during cold shutdowns because the only practical method to verify their reverse flow closure is a leak rate test which requires that the associated feedwater header be removed from service and drained. Some of the test connections required to perform this testing are located inside containment and are inaccessible during power operation and most cold shutdowns because the containment atmosphere is maintained with a high concentration of inert gas (inerted) and is not routinely de-inerted during cold shutdowns. Requiring the licensee to de-inert containment solely to verify the closure of these valves would be a hardship without a compensating increase in the level of quality and safety. Performing this testing could delay reactor start-up due to the length of time required to drain the header and process the water. Also, the reactor water cleanup system return flow path and the condensate system cleanup flow path are through these valves so that both systems must be removed from service to leak test these feedwater check valves. Stopping cleanup flow to leak test these valves during cold shutdowns could cause a loss of reactor coolant system chemistry control which could delay reactor start-up because the Technical Specification chemistry requirements must be met prior to start-up.

Based on the impracticality of exercising these valves closed quarterly or during cold shutdowns, the burden on the licensee if the Code requirements were imposed, and considering that the licensee's proposed alternate testing should provide an adequate demonstration of valve operational readiness, relief may be granted from the exercising requirements of Section XI as requested.

3.5 <u>Residual Heat Removal System</u>

3.5.1 <u>Category C Valves</u>

3.5.1.1 <u>Relief Request</u>. The licensee has requested relief from full-stroke exercising valves CHK-2(3)-10-019A, -019B, -019C, and -019D, residual heat removal pump minimum flow line checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to exercise them open quarterly and to verify closure by disassembly and inspection during refueling outages.

3.5.1.1.1 Licensee's Basis for Requesting Relief--Because of the 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 start-up.

Alternate Testing: Reverse flow closure will be verified at refueling by valve disassembly.

3.5.1.1.2 Evaluation--These are simple check valves without remote or other external indication of disk position. They are full-stroke exercised open with flow during quarterly testing of the RHR pumps. These valves perform a safety function in the closed position to prevent diversion of flow through an idle train. Valves CHK-2(3)-10-019A, -019B, -019C, and -019D can be exercised closed when the associated RHR loop pump is idle and the pump in the parallel path is operating, however, the system design makes it impractical to verify closure by leak testing or observing a differential pressure across the valve. It would be necessary to install isolation valves and test taps to permit leak testing these valves to verify their reverse flow closure. Requiring the licensee to make these system modifications would be burdensome due to the cost and reduced system reliability that could result from failure or mispositioning of the additional components.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The licensee has shown the impracticality of verifying the reverse flow closure of these valves by leak testing or observation of system parameters. The licensee's proposed disassembly and inspection program appears to be the only practical alternate exercising method available for these valves. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. 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. The licensee should actively pursue the use of non-intrusive diagnostic techniques such as acoustics or radiography to demonstrate that these valves close when subjected to reverse flow conditions.

The Minutes of the Public Meeting on Generic Letter 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to verify the reverse flow closure of these valves by leak testing, the burden on the licensee of making system modifications to permit leak testing, and considering that the licensee's proposal to disassemble and inspect these valves should provide a reasonable indication that they are capable of performing their safety function in the closed position, relief may be granted from the exercising requirements of the Code provided the licensee exercises the valves open after they have been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to verify the reverse flow closure capability of these valves. If another method is developed to verify the reverse flow closure capability of these valves, this relief request should be revised or withdrawn.

3.5.1.2 Relief Request. The licensee has requested relief from full-stroke exercising the following series stay-fill check valves in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure during refueling outages.

Upstream Valve	Downstream Valve	Function
CHK-2(3)-10-063	CHK-2(3)-10-064	Reactor vessel head spray line stay-fill
CHK-2(3)-10-183A	CHK-2(3)-10-184A	Residual heat removal system A stay-fill
CHK-2(3)-10-183B	CHK-2(3)-10-184B	Residual heat removal system B stay-fill

3.5.1.2.1 Licensee's Basis for Requesting Relief--The above stay-fill check valves are installed in pairs (series arrangement) with no provisions for individual valve testing. The valves function, in series as a pair, to prevent loss of RHR inventory to the stay-fill system in the event of a stay-fill system failure. Because testing these valves as a pair is preferable to valve disassembly and inspection, relief from testing individual valves is requested. In addition, Technical Specification 3.5.G requires that the discharge piping of the LPCI system be filled to prevent water hammer upon system initiation. Testing these valves during power would make the stay-fill system inoperable, requiring entry into the associated limiting condition for operation. For this reason, testing of the above pairs of valves will be performed at cold shutdowns.

Alternate Testing: Valves will be tested as a pair in the reverse direction at cold shutdown. Both valves in the pair will be considered inoperable if testing indicates the valves do not close on reverse flow.

3.5.1.2.2 Evaluation--The listed stay-fill valves are simple check valves without remote or other external indication of disk position. These valves perform a safety function in the closed position to prevent diversion of injection flow away from the reactor vessel. They can be exercised closed during quarterly RHR pump testing, however, the system design makes it impractical to verify closure by leak testing or observing a differential pressure across each valve. These valve pairs are installed in series with no test connections between the valves to permit leak testing of each valve. It would be necessary to install test taps to permit individual leak testing to verify valve reverse flow closure. Requiring the licensee to make these system modifications would be burdensome due to the cost and reduced system reliability that could result.

Only one valve in each of these stay-fill series check valve pairs is required to perform the closed safety function of preventing diversion of injection flow away from the RCS. The licensee proposed to test each series check valve combination as a pair and to declare both valves inoperable when the testing indicates that the pair does not close on reverse flow. This testing does not provide indication of the condition of each valve, however, it does provide positive indication that at least one valve in the pair is capable of performing the closed safety function. The licensee's proposed testing gives reasonable assurance of the operational readiness of each check valve pair and provides an acceptable alternative to the Code requirements. If there is an indication that the closure capability of the pair of valves is questionable, both valves must be declared inoperable and repaired or replaced before being returned to service.

Based on the determination that it is impractical to individually verify the reverse flow closure of these valves, the burden on the licensee of making system modifications to permit this testing, and considering that leak testing these stay-fill series check valves as a pair should provide reasonable indication that the pair is capable of performing its safety function in the closed position, relief may be granted from the Code requirements as requested.

3.6 <u>Standby Liquid Control System</u>

3.6.1 <u>Category A/C Valves</u>

3.6.1.1 <u>Relief Request</u>. The licensee has requested relief from exercising valve CHK-2(3)-11-016, standby liquid control injection check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to full-stroke exercise it during refueling outages.

3.6.1.1.1 <u>Licensee's Basis for Requesting Relief</u>--Verifying forward flow operability requires firing a squib valve and injecting water into the reactor coolant system using the standby liquid control pumps. Injection of borated water during operation will result in a reduction in power. Additionally, introduction of relatively colder water into the reactor coolant system will cause a thermal cycle (shock) which can result in the premature failure of system components (piping). Since the firing of squib valves requires valve disassembly to replace valve internals, firing should be minimized. Therefore, forward flow testing of this check valve will be performed during SLC injection testing as required by Technical Specification 4.4.A. Reverse flow closure of CHK-2(3)-11-016 can be accomplished only by leak testing which must be performed when a squib valve has been fired (opened) to provide a leak test flowpath. Because firing squib valves should be minimized as mentioned above, and replacing squib valve internals at cold shutdown could delay plant start-up, reverse flow closure will be verified at refueling.

Alternate Testing: Forward flow operability for CHK-2(3)-11-016 will be verified at refueling during SLC injection testing. Reverse flow closure for CHK-2(3)-11-016 will be verified at refueling during Appendix J, Type C, testing.

3.6.1.1.2 Evaluation--This check valve does not have a remote operator and cannot be exercised without passing flow through it. To exercise this valve with flow would require firing an explosive squib valve and initiating standby liquid control system flow into the RCS. It is impractical to establish standby liquid control flow into the RCS during power operation because the standby liquid control system normally contains high concentrations of boron whose injection into the RCS would cause a reduction in reactor power and possible reactor shutdown. To avoid injecting boron into the RCS, it would be necessary to remove the standby liquid control system from service and flush it prior to valve testing. The standby liquid control system cannot be removed from service during power operation due to Technical Specifications requirements. Injecting relatively cold water into the RCS would thermal shock the injection piping and nozzle and could lead to their premature failure. Testing also requires firing an explosive squib and then replacing the squib and the valve internals prior to returning the system to service.

It would be burdensome to require the licensee to perform this testing during cold shutdowns because flushing the system and replacing the explosive valve charge and internals could delay returning the reactor to power.

The licensee's proposal to full-stroke exercise this check valve by establishing standby liquid control flow into the RCS and to verify its leak tight integrity by performing an Appendix J, Type C, leak rate test during refueling outages should provide reasonable assurance of valve operational readiness.

Based on the impracticality of complying w th the Code requirements and the burden on the licensee if these requirements were imposed, and since the proposed alternate testing should provide an adequate demonstration of valve operational readiness, relief may be granted from the exercising frequency requirements of Section XI as requested.

3.6.2 Category C Valves

3.6.2.1 Relief Request. The licensee has requested relief from exercising valve CHK-2(3)-11-017, the standby liquid control injection check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to full-stroke exercise it during refueling outages.

3.6.2.1.1 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. Injection of borated water during operation will result in a reduction in power. Additionally, introduction of relatively colder water into the reactor coolant system will cause a thermal cycle (shock) which can result in the premature failure of system components (piping). Since the firing of squib valves requires valve disassembly to replace valve internals, firing should be minimized. Therefore, forward flow testing of this check valve will be performed during SLC injection testing as required by Technical Specifications 4.4.A.

Alternate Testing: Forward flow operability for CHK-2(3)-11-017 will be verified at refueling during SLC injection testing.

3.6.2.1.2 Evaluation--This check valve does not have a remote operator and cannot be exercised without passing flow through it. To exercise this valve with flow would require firing an explosive squib valve and initiating standby liquid control system flow into the RCS. It is impractical to establish standby liquid control flow into the RCS during power operation because the standby liquid control system normally contains high concentrations of boron whose injection into the RCS would cause a reduction in reactor power and possible reactor shutdown. To avoid injecting boron into the RCS, it would be necessary to remove the standby liquid control system from service and flush it prior to valve testing. The standby liquid control system cannot be removed from service during power operation due to Technical Specifications requirements. Injecting relatively cold water into the RCS would thermal shock the injection piping and nozzle and could lead to their premature failure. Testing also requires firing an explosive squib and then replacing the squib and the valve internals prior to returning the system to service.

It would be burdensome to require the licensee to perform this testing during cold shutdowns because flushing the system and replacing the explosive valve charge and internals could delay returning the reactor to power.

The licensee's proposal to full-stroke exercise this check valve by establishing standby liquid control flow into the RCS during refueling outages should provide reasonable assurance of valve operational readiness.

Based on the impracticality of complying with the Code requirements and the burden on the licensee if these requirements were imposed, and since the proposed alternate testing should provide an adequate demonstration of valve operational readiness, relief may be granted from the exercising frequency requirements of Section XI as requested.

3.7 Reactor Core Isolation Cooling System

3.7.1 Category C Valves

3.7.1.1 Relief Request. The licensee requested relief from full-stroke exercising valve CHK-2(3)-13-029, RCIC pump minimum flow line check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure capability by disassembly and inspection during refueling outages.

3.7.1.1.1 Licensee's Basis for Requesting Relief--Because of the system configuration, this valve 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 valve, if attempted at cold shutdown, could result in a delayed plant start-up.

Alternate Testing: Reverse flow closure will be verified at refueling by valve disassembly.

3.7.1.1.2 Evaluation--This is a simple check valve without remote or other external indication of disk position. It is full-stroke exercised open with flow during quarterly testing of the RCIC pump. System design makes it impractical to verify valve closure by leak testing or observing a differential pressure across the valve. It would be necessary to install an isolation valve and test taps to permit leak testing this valve to verify its reverse flow closure. Requiring the licensee to make these system modifications would be burdensome due to the cost and potential reduction in system reliability.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The licensee has shown the impracticality of verifying the reverse flow closure of this valve by leak testing or observation of system parameters. The licensee's proposed disassembly and inspection program appears to be the only practical alternate method available. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. 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. The licensee should actively pursue the use of non-intrusive diagnostic techniques such as acoustics or radiography to demonstrate that this valve closes when subjected to reverse flow conditions.

The Minutes of the Public Meeting on Generic Letter 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to verify the reverse flow closure of this valve by leak testing, the burden on the licensee of making system modifications to permit leak testing, and considering that the licensee's proposal to disassemble and inspect this valve should provide a reasonable indication that it is capable of performing its safety function in the closed position, relief may be granted from the exercising requirements of the Code provided the licensee exercises this valve open after it has been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to verify the reverse flow closure capability of this valve. If another method is developed to verify valve closure, this relief request should be revised or withdrawn.

3.7.1.2 <u>Relief Request</u>. The licensee has requested relief from exercising valve CHK-2(3)-13-040, RCIC suppression pool suction check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to part-stroke exercise it quarterly and to disassemble, inspect, and manually exercise the valve disk during refueling outages.

3.7.1.2.1 <u>Licensee's Basis for Requesting Relief</u>--Full-stroke exercising of this valve 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 3.6.B 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 could result in increased chloride and conductivity levels exceeding Tech. Spec. specified limits. This valve is partial 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 valve. Because no means are available to verify a full-stroke in the open direction for this valve, valve disassembly will be required. Disassembly of the valve, if attempted at cold shutdown, could result in a delayed plant start-up.

Alternate Testing: Valve will be part-stroked in the forward direction quarterly. Full-stroke exercise will be verified at refueling by valve disassembly.

3.7.1.2.2 Evaluation--Due to system design, it is impractical to full-stroke exercise this valve during power operation. The only full flow paths through this valve take a suction from the suppression pool and discharge into either the reactor vessel or the condensate storage tank. The introduction of relatively low quality suppression pool water directly into the reactor vessel or into the condensate storage tank and, from there, into the reactor vessel, could force a unit shutdown due to the inability to maintain reactor coolant chemistry specifications. Also, following this test, considerable effort would be required to re-establish water quality conditions in the RCS and condensate storage system. Extensive system modifications, such as installing a full flow test loop, would be necessary to full-stroke exercise this valve quarterly. It would be burdensome for the licensee to make such modifications because of the cost involved and possible reduced system reliability due to failures that could divert injection flow away from the reactor vessel.

It is impractical to full-stroke exercise this valve during cold shutdowns because steam is not available to power the turbine driven RCIC pump. Performing this testing going into or coming out of cold shutdown is not practical because it would degrade the quality of RCS and condensate system water. This would necessitate flushing and cleanup to restore water chemistry specifications prior to restart, which would be burdensome since it could delay plant start-up from cold shutdown.

The licensee will part-stroke exercise this valve quarterly during power operation. The flow path used for this part-stroke exercise is from the suppression pool through the pump minimum flow line back into the suppression pool. This flow path involves smaller diameter piping which will not permit passage of maximum required accident condition flow rate. The licensee's proposal to part-stroke exercise this valve quarterly and to partially disassemble, inspect, and manually exercise the valve disk during refueling outages should give reasonable assurance of valve operational readiness provided the licensee performs a partial flow test of the valve after each disassembly and inspection procedure.

Based on the impracticality of full-stroke exercising this valve quarterly or during cold shutdowns, the burden on the licensee if the Code requirements were imposed, and considering the licensee's proposed alternate testing, relief may be granted from the Section XI requirements provided the licensee performs a partial flow test of this valve prior to returning it to service following the disassembly and inspection procedure. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing.

3.7.1.3 Relief Request. The licensee has requested relief from exercising valve AO-2(3)-13-022, the RCIC injection testable check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to part-stroke exercise this valve during cold shutdowns and to full-stroke exercise it during refueling outages.

3.7.1.3.1 Licensee's Basis for Requesting Relief--Testable check valve AO-2(3)-13-022 cannot be exercised during operation without first equalizing pressure across the valve, i.e., high differential pressure exists between the feedwater system and RCIC. The equalizing valves for AO-2(3)-13-022 are manually operated and are located in the steam tunnel. During operation the steam tunnel is a high temperature and high radiation area thereby limiting access to emergencies only. Full-stroke exercising using the RCIC pump cannot be accomplished because that would require injection of relatively cold water from the condensate storage tank into the feedwater system. Introduction of relatively cold water into the feedwater system will cause a thermal cycle (shock) which could result in the premature failure of system components (piping). Additionally, full-stroke exercising is not possible utilizing the air operator currently mounted on the valve because the operator moves the disk approximately 30% of its full travel. Full-stroking therefore, can be accomplished only by valve disassembly. Valve disassembly, if attempted at cold shutdown, could result in a delayed plant start-up.

Alternate Testing: Partial-stroking, in the forward direction, will be performed during cold shutdown by utilizing the air operator. Full-stroke exercising in the forward direction will be accomplished at refueling by valve disassembly.

3.7.1.3.2 Evaluation--This testable check valve cannot be exercised during power operation utilizing the test operator because the operator is not capable of moving the valve disk when high differential pressures are present and the pressure cannot be equalized because the equalizing valves are located in the steam tunnel and are inaccessible during power operation. Also, the test operator on this check valve is only capable of mechanically stroking the valve disk to approximately 30% of full travel. The only non-intrusive method available to full-stroke exercise this valve is to pass the maximum required accident flow rate through it. The only available flow path through this valve is into the feedwater header and then into the reactor vessel. It is impractical to pump the relatively cold condensate storage tank water into the feedwater header and reactor vessel during power operations because it would thermal shock the piping and could result in its premature failure. This flow test cannot be performed during cold shutdowns when the temperature difference would be at acceptable levels, because reactor steam would not be available to power the turbine driven pump. Extensive system modifications, such as installing a full flow test loop, would be necessary to full-stroke exercise this valve quarterly. It would be burdensome for the licensee to make such modifications because of the cost involved and possible reduced system reliability due to failures that could divert injection flow away from the reactor vessel.

Valve disassembly, inspection, and manual exercise of the disk each refueling outage should provide a reasonable indication of valve condition and operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. 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. The licensee should actively pursue the use of non-intrusive diagnostic techniques, such as acoustics, ultrasonics, and radiography, to demonstrate that this valve opens sufficiently to pass maximum required accident condition flow during a partial flow test at a refueling outage frequency.

The Minutes of the Public Meeting on Generic Letter 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to full-stroke exercise this valve with flow, the burden on the licensee of making system modifications to permit full-stroke exercising, and considering that the licensee's proposal to disassemble and inspect this valve should provide reasonable indication that it is capable of performing its safety function, relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises this valve open with flow after it has been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to verify the full-stroke capability of this valve. If another method is developed to verify the full-stroke capability of this valve, this relief request should be revised or withdrawn.

3.7.1.4 Relief Request. The licensee has requested relief from exercising valves VRV-2(3)-13-139A, -139B, -139C, and -139D, RCIC turbine exhaust line vacuum breaker checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify an operable flow path quarterly.

3.7.1.4.1 Licensee's Basis for Requesting Relief--These check valves function as vacuum relief valves, are installed in series-parallel, and were not provided with air operators to facilitate testing (exercising). The piping configuration in the reactor core isolation cooling system does not allow for individual testing of these valves. Since a series-parallel arrangement was used, there are multiple combinations of flowpaths 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.

Alternate Testing: These vacuum relief valves will be tested quarterly, in the forward direction, as a unit.

3.7.1.4.2 Evaluation--Due to the system design, these simple check valves cannot be individually verified to exercise open or closed because they are not equipped with test operators, test connections, or position indication. However, due to the valve arrangement, cross-connected series-parallel, no single valve failure can prevent flow in the forward direction or allow flow in the reverse direction. Because of this design feature, the licensee's proposal to verify valve operational readiness as a unit, i.e., an operable forward flow path through the four valve group, should provide reasonable assurance of the groups ability to perform its safety function in the open position. A system modification would be required to permit individual valve testing. It would be burdensome for the licensee to make such modifications because of the cost involved and possible reduced system reliability.

These valves also perform a function in the closed position to prevent steam from being introduced directly into the torus airspace. Due to the series-parallel arrangement and the lack of test connections, these valves cannot be individually verified in the closed position. However, the reverse flow closure of the group can be verified by monitoring a high temperature alarm installed upstream of the valve assembly that would indicate steam leakage past these valves during turbine operation. This closure verification can be performed during the quarterly pump test.

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 maximum required forward flow or allows passage of excessive reverse 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 functions.

Based on the impracticality of individually verifying operational readiness of these vacuum breaker check valves, the burden on the licensee if these Code requirements were imposed, and considering that testing these valves as a unit should provide reasonable assurance of the units ability to perform its safety function to permit forward flow and block reverse flow, relief may be granted from the exercising requirements of Section XI provided that the licensee verifies valve reverse flow closure during quarterly pump testing. Also, if either the forward flow or reverse flow closure capability of this group becomes questionable, all valves in the group must be declared inoperable and be repaired, replaced, or individually verified operable.

3.8 Core Spray System

3.8.1 Category A/C Valves

3.8.1.1 Relief Request. The licensee has requested relief from exercising valves AO-2(3)-14-013A and -013B, core spray injection testable checks, in accordance with the requirements of Section XI, Paragraph

IWV-3521, and proposed to part-stroke exercise them during cold shutdowns and to disassemble, inspect, and manually exercise the valve disks during refueling outages.

3.8.1.1.1 Licensee's Basis for Requesting Relief--Testable check valves AO-2(3)-14-013A,B are closed during operation and function as both primary containment isolation valves and reactor coolant system pressure isolation valves. During operation, these valves protect the core spray system from reactor coolant system pressure. The valves are located inside primary containment which is not accessible during operation since it is inerted with nitrogen and is a high radiation area. Because these valves are required to be operable for primary containment isolation per Technical Specifications and are inaccessible during operation, failure in the open position during testing would require a plant shutdown to repair the valves. Additionally, full-stroke exercising is not possible at cold shutdown utilizing the air operator currently mounted on the valve because the operator moves the disc approximately 30% of its full travel. Full-stroking can be accomplished only by valve disassembly. Valve disassembly, if attempted at cold shutdown, could result in a delayed plant start-up.

Alternate Testing: Partial-stroking, in the forward and reverse direction, will be performed during cold shutdown by utilizing the air operator. Full-stroke exercising in the forward direction will be accomplished at refueling by valve disassembly. Reverse flow closure will be verified at refueling by Appendix J and Section XI leak rate testing.

3.8.1.1.2 Evaluation--These testable check valves cannot be exercised during power operation utilizing the test operators because the operators are not capable of moving the valve disks when high differential pressures are present and the pressures cannot be equalized because the equalizing valves are inaccessible during power operation. Also, the test operators are only capable of mechanically stroking the valve disks to approximately 30% of full travel. Full-stroke exercising these valves open with flow would require establishing maximum required accident flow rate through them or verifying that they open sufficiently to allow its passage. The only available flow path through these valves is into the reactor vessel. This flow path cannot be utilized during power operation because the core spray pumps do not develop sufficient discharge pressure to overcome RCS pressure. Also, it is impractical to pump relatively cold suppression pool or condensate storage tank water into the reactor vessel during power operations because it could thermal shock the nozzles and could result in their premature failure. Extensive system modifications, such as installing a full flow test loop, would be necessary to full-stroke exercise these valves quarterly. It would be burdensome for the licensee to make such modifications because of the cost involved and possible reduced system reliability due to failures that could divert injection flow away from the reactor vessel.

The proposal to disassemble, inspect, and manually exercise the valves each refueling outage in accordance with the provisions of Generic Letter 89-04, Attachment 1, Position 2, should verify valve condition and operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. The licensee should actively pursue the use of non-intrusive diagnostic techniques, such as acoustics, ultrasonics, and radiography, to demonstrate that these valves open sufficiently to pass maximum required accident condition flow during a partial flow test at a refueling outage frequency.

The Minutes of the Public Meeting on Generic Letter 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to full-stroke exercise these valves with flow, the burden on the licensee of making system modifications to permit full-stroke exercising, and considering that the licensee's proposal to disassemble and inspect these valves should provide a reasonable indication that they are capable of performing their safety function, relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises these valves open with flow after they have been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to verify the full-stroke capability of these valves. If another method is developed to verify the full-stroke capability of these valves, this relief request should be revised or withdrawn.

3.8.2 Category C Valves

3.8.2.1 Relief Request. The licensee has requested relief from full-stroke exercising valves CHK-2(3)-14-066A, -066B, -066C, and -066D, core spray pump minimum flow line checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to exercise them open quarterly and to verify closure by valve disassembly and inspection during refueling outages.

3.8.2.1.1 Licensee's Basis for Requesting Relief--Because of the 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 start-up.

Alternate Testing: Reverse flow closure will be verified at refueling by valve disassembly.

3.8.2.1.2 Evaluation--These are simple check valves without remote or other external indication of disk position. They are full-stroke exercised open with flow during quarterly testing of the core spray pumps. These valves perform a safety function in the closed position to prevent diversion of flow through an idle train. Valves CHK-2(3)-14-066A, -066B, -066C, and -066D can be exercised closed when the associated core spray loop pump is idle and the pump in the parallel path is operating, however, the system design makes it impractical to verify closure by leak testing or observing a differential pressure across the valve. It would be necessary to install isolation valves and test taps to permit leak testing these valves to verify their reverse flow closure. Requiring the licensee to make these system modifications would be burdensome due to the cost and reduced system reliability that would result from failure or mispositioning of the additional components.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The licensee has shown the impracticality of verifying the reverse flow closure of these valves by leak testing or observation of system parameters. The licensee's proposed disassembly and inspection program appears to be the only practical alternate exercising method available. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. 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. The licensee should actively pursue the use of non-intrusive diagnostic techniques such as acoustics or radiography to demonstrate that these valves close when subjected to reverse flow conditions.

The Minutes of the Public Meeting on Generic Letter 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to verify the reverse flow closure of these valves by leak testing, the burden on the licensee of making system modifications to permit leak testing, and considering that the licensee's proposal to disassemble and inspect these valves should provide a reasonable indication that they are capable of performing their safety function in the closed position, relief may be granted from the exercising requirements of the Code provided the licensee exercises the valves open with flow after they have been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to verify the reverse flow closure capability of these valves. If another method is developed to verify the reverse flow closure capability of these valves, this relief request should be revised or withdrawn.

3.8.2.2 Relief Request. The licensee has requested relief from full-stroke exercising the core spray stay-fill check valves in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure by disassembly during refueling outages. The valves are:

CHK-2-14-21541	CHK-3-14-31541
CHK-2-14-21577A	CHK-3-14-31577A
CHK-2-14-21577B	CHK-3-14-31577B
CHK-2-14-29036A	CHK-3-14-39036A
CHK-2-14-29036B	CHK-3-14-39036B
CHK-2-14-29051A	CHK-3-14-39051A
CHK-2-14-29051B	CHK-3-14-39051B
CHK-2(3)-14-023A	CHK-2(3)-14-023B
CHK-2(3)-14-023C	CHK-2(3)-14-023D

3.8.2.2.1 Licensee's Basis for Requesting Relief--Because of the 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 start-up.

Alternate Testing: Reverse flow closure will be verified at refueling by valve disassembly.

3.8.2.2.2 Evaluation--These valves are simple check valves without remote or other external indication of disk position. They perform a safety function in the closed position to prevent diversion of core spray flow away from the reactor vessel. They can be exercised closed during quarterly core spray pump testing, however, the system design makes it impractical to verify closure by leak testing or observing a differential pressure across each valve. These valve pairs are in a series arrangement with no test connections between the valves to permit individual leak testing. It would be necessary to install test taps to permit individual valve leak testing to verify their reverse flow closure. Requiring the licensee to make these system modifications would be burdensome due to the cost.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The licensee has shown the impracticality of verifying the reverse flow closure of these individual valves by leak testing, therefore, disassembly and inspection during refueling outages may be acceptable since it provides an indication of valve condition. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. For these stay-fill series check valve pairs, as an alternative to verifying each valve's closure capability, the NRC has found acceptable verifying by positive means (such as leak testing) that at least one of the series valves is closed once every three months or at a reduced frequency if quarterly testing is impractical. If there is an indication that the closure capability of the pair of valves is questionable, then both valves must be declared inoperable and repaired or replaced before being returned to service. If this test method is utilized, both series check valves must be included in the IST program.

The Minutes of the Public Meeting on Generic Letter 39-04 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to individually verify the reverse flow closure of these valves by leak testing, the burden on the licensee of making system modifications to permit individual leak testing, and considering that the licensee's proposed alternative provides indication of valve condition and should give reasonable assurance of the valve's capability to perform its safety function in the closed position, relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises these valves with flow prior to returning them to service after reassembly.

3.9 High Pressure Coolant Injection System

3.9.1 Category C Valves

3.9.1.1 Relief Request. The licensee has requested relief from full-stroke exercising valve CHK-2(3)-23-062, HPCI pump minimum flow line check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure by disassembly and inspection during refueling outages.

3.9.1.1.1 Licensee's Basis for Requesting Relief--Because of the system configuration, this valve 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 valve, if attempted at cold shutdown, could result in a delayed plant start-up.

Alternate Testing: Reverse flow closure will be verified at refueling by valve disassembly.

3.9.1.1.2 Evaluation--This is a simple check valve without remote or other external indication of disk position. It is full-stroke exercised open with flow during quarterly testing of the HPCI pump. System design makes it impractical to verify valve closure by leak testing or observing a differential pressure across the valve. It would be necessary to install an isolation valve and test taps to permit leak testing this valve to verify its reverse flow closure. Requiring the licensee to make these system modifications would be burdensome due to the cost and potential reduction in system reliability.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The licensee has shown the impracticality of verifying the reverse flow closure of this valve by leak testing or observation of system parameters. The licensee's proposed disassembly and inspection program appears to be the only practical alternate exercising method available. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. 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. The licensee should actively pursue the use of non-intrusive diagnostic techniques such as acoustics or radiography to demonstrate that this valve closes when subjected to reverse flow conditions.

The Minutes of the Public Meeting on Generic Letter 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to verify the reverse flow closure of this valve by leak testing, the burden on the licensee of making system modifications to permit leak testing, and considering that the licensee's proposal to disassemble and inspect this valve should provide a reasonable indication that it is capable of performing its safety function in the closed position, relief may be granted from the exercising requirements of the Code provided the licensee exercises this valve open with flow after it has been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to verify the reverse flow closure capability of this valve. If another method is developed to verify valve closure, this relief request should be revised or withdrawn.

3.9.1.2 Relief Request. The licensee has requested relief from exercising val CHK-2(3)-23-061, HPCI suppression pool suction check, in accordance the requirements of Section XI, Paragraph IWV-3521, and proposed to roke exercise it quarterly and to disassemble, inspect, and manually exercise the valve disk during refueling outages.

3.9.1.2.1 Licensee's Basis for Requesting Relief--Full-stroke exercising of this valve 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 3.6.B 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 could result in increased chloride and conductivity levels exceeding Tech. Spec. specified limits. This valve is partial 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 valve. Because no means are available to verify a full-stroke in the open direction for this valve, valve disassembly will be required. Disassembly of the valve, if attempted at cold shutdown, could result in a delayed plant start-up.

Alternate Testing: Valve will be part-stroked in the forward direction quarterly. Full-stroke exercise will be verified at refueling by valve disassembly.

3.9.1.2.2 Evaluation--Due to system design, it is impractical to full-stroke exercise this valve during power operation. The only full flow paths through this valve take a suction from the suppression pool and discharge into either the reactor vessel or the condensate storage tank. The introduction of relatively low quality suppression pool water directly into the reactor vessel or into the condensate storage tank and, from there, into the reactor vessel, could force a unit shutdown due to the inability to maintain reactor coolant chemistry specifications. Also, following this test, considerable effort would be required to re-establish water quality conditions in the RCS and condensate storage system. Extensive system modifications, such as installing a full flow test loop, would be necessary to full-stroke exercise this valve quarterly. It would be burdensome for the licensee to make such modifications because of the cost involved and possible reduced system reliability due to failures that could divert injection flow away from the reactor vessel.

It is impractical to full-stroke exercise this valve during cold shutdowns because steam is not available to power the turbine driven HPCI pump. Performing this testing going into or coming out of cold shutdown is not practical because it would degrade the quality of RCS and condensate system water. This would necessitate flushing and cleanup to restore water chemistry specifications prior to restart, which would be burdensome since it could delay plant start-up from cold shutdown.

The licensee will part-stroke exercise this valve quarterly during power operation. The flow path used for this part-stroke exercise is from the suppression pool through the pump test return loop back into the suppression pool. This flow path involves smaller diameter piping which will not permit passage of maximum required accident condition flow rate. The licensee's proposal to part-stroke exercise this valve quarterly and to partially disassemble, inspect, and manually exercise the valve disk during refueling outages should give reasonable assurance of valve operational readiness provided the licensee performs a partial flow test of the valve after each disassembly and inspection procedure.

Based on the impracticality of full-stroke exercising this valve quarterly or during cold shutdowns, the burden on the licensee if the Code requirements were imposed, and considering the licensee's proposed alternate testing, relief may be granted from the Section XI requirements provided the licensee performs a partial flow test of this valve prior to returning it to service following the disassembly and inspection procedure. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing.

3.9.1.3 Relief Request. The licensee has requested relief from exercising valve AO-2(3)-23-018, HPCI injection testable check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to part-stroke exercise this valve during cold shutdowns and to disassemble, inspect, and manually exercise the valve disk during refueling outages.

3.9.1.3.1 Licensee's Basis for Requesting Relief--Testable check valve AO-2(3)-23-018 cannot be exercised during operation without first equalizing pressure across the valve, i.e., high differential pressure exists between the feedwater system and HPCI. The equalizing valves for AO-2(3)-23-018 are manually operated and are located in the steam tunnel. During operation the steam tunnel is a high temperature and high radiation area thereby limiting access to emergencies only. Full-stroke exercising using the HPCI pump cannot be accomplished because that would require injection of relatively cold water from the condensate storage tank into the feedwater system. Introduction of relatively cold water into the feedwater system will cause a thermal cycle (shock) which could result in the premature failure of system components (piping). Additionally, full-stroke exercising is not possible utilizing the air operator currently mounted on the valve because the operator moves the disk approximately 30% of its full travel. Full-stroking therefore, can be accomplished only by valve disassembly. Valve disassembly, if attempted at cold shutdown, could result in a delayed plant start-up.

Alternate Testing: Partial-stroking, in the forward direction, will be performed during cold shutdown by utilizing the air operator. Full-stroke exercising in the forward direction will be accomplished at refueling by valve disassembly.

3.9.1.3.2 Evaluation--This testable check valve cannot be exercised during power operation utilizing the test operator because the operator is not capable of moving the valve disk when high differential pressures are present and the pressure cannot be equalized because the equalizing valves are located in the steam tunnel and are inaccessible during power operation. Also, the test operator on this check valve is only capable of mechanically stroking the valve disk to approximately 30% of full travel. The only non-intrusive method available to full-stroke exercise this valve is to pass the maximum required accident flow rate through it. The only available flow path through this valve is into the feedwater header and then into the reactor vessel. It is impractical to pump the relatively cold condensate storage tank water into the feedwater header and reactor vessel during power operations because it would thermal shock the piping and could result in its premature failure. This flow test cannot be performed during cold shutdowns when the temperature difference would be at acceptable levels, because reactor steam would not be available to power the turbine driven pump. Extensive system modifications, such as installing a full flow test loop, would be necessary to full-stroke exercise this valve quarterly. It would be burdensome for the licensee to make such modifications because of the cost involved and possible reduced system reliability due to failures that could divert injection flow away from the reactor vessel.

Valve disassembly, inspection, and manual exercise of the disk each refueling outage should provide an indication of valve condition and operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. The licensee should actively pursue the use of non-intrusive diagnostic techniques, such as acoustics, ultrasonics, and radiography, to demonstrate that this valve opens sufficiently to pass maximum required accident condition flow during a partial flow test at a refueling outage frequency.

The Minutes of the Public Meeting on Generic Letter 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. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to full-stroke exercise this valve with flow, the burden on the licensee of making system modifications to permit full-stroke exercising, and considering that the licensee's proposal to disassemble and inspect this valve should provide reasonable indication that it is capable of performing its safety function, relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises this valve open with flow after it has been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to verify the full-stroke capability of this valve. If another method is developed to verify the full-stroke capability of this valve, this relief request should be revised or withdrawn.

3.9.1.4 Relief Request. The licensee has requested relief from exercising valves VRV-2(3)-23-140A, -140B, -140C, and -140D, HPCI turbine exhaust line vacuum breaker checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify an operable flow path quarterly.

3.9.1.4.1 Licensee's Basis for Requesting Relief--These check valves function as vacuum relief valves, are installed in series-parallel, and were not provided with air operators to facilitate testing (exercising). The piping configuration in the high pressure coolant injection system does not allow for individual testing of these valves. Since a series-parallel arrangement was used, there are multiple combinations of flowpaths 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.

Alternate Testing: These vacuum relief valves will be tested quarterly, in the forward direction, as a unit.

3.9.1.4.2 Evaluation--Due to the system design, these simple check valves cannot be individually verified to exercise open or closed because they are not equipped with test operators, test connections, or position indication. However, due to the valve arrangement, cross-connected series-parallel, no single valve failure can prevent flow in the forward direction or allow flow in the reverse direction. Because of this design feature, the licensee's proposal to verify valve operational readiness as a unit, i.e., an operable forward flow path through the four valve group, should provide reasonable assurance of the groups ability to perform its safety function in the open position. A system modification would be required to permit individual valve testing. It would be burdensome for the licensee to make such modifications because of the cost involved and possible reduced system reliability.

These valves also perform a function in the closed position to prevent steam from being introduced directly into the torus airspace. Due to the series-parallel arrangement and the lack of test connections, these valves cannot be individually verified in the closed position. However, the reverse flow closure of the group can be verified by monitoring a high temperature alarm installed upstream of the valve assembly that would indicate steam leakage past these valves during turbine operation. This closure verification can be performed during the quarterly pump test.

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 maximum required forward flow or allows passage of excessive reverse 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 functions.

Based on the impracticality of individually verifying operational readiness of these vacuum breaker check valves, the burden on the licensee if these Code requirements were imposed, and considering that testing these valves as a unit should provide reasonable assurance of the units ability to perform its safety function to permit forward flow and block reverse flow, relief may be granted from the exercising requirements of Section XI provided that the licensee verifies valve reverse flow closure during quarterly pump testing. Also, if either the forward flow or reverse flow closure capability of this group becomes questionable, all valves in the group must be declared inoperable and be repaired, replaced, or individually verified operable.

3.10 Diesel Generator Air Start System

3.10.1 Category B Valves

3.10.1.1 Relief Request. The licensee has requested relief from measuring the stroke time of valves AO-0-50-7231A, -7231B, -7231C, -7231D, -7232A, -7232B, -7232C, -7232D, SV-0-50-7235A, -7235B, -7235C, and -7235D, emergency diesel generator air start, in accordance with the requirements of Section XI, Paragraph IWV-3413(a), and proposed to measure diesel generator start time to monitor valve degradation.

3.10.1.1.1 Licensee's Basis for Requesting Relief--These valves are non-ASME and were supplied as part of the diesel generator skid. 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 instead.

Alternate Testing: In lieu of the individual valve stroke time testing required by IWV-3413, failure of the emergency diesel generator to start within 10 seconds will be evaluated to determine if the cause can be attributed to the associated starting air valves. NOTE: Start is defined as the diesel accelerating to 200 rpm in response to a start signal. Alternate isolation of air headers will verify individual performance for valves 7231 and 7232.

3.10.1.1.2 Evaluation--These valves are totally enclosed and have no externally visible indication of valve position. It is impractical to measure the stroke times of these valves because there is no way to determine when a valve receives a signal to open or when it reaches the open position. These valves are rapid-acting valves which normally stroke almost instantly and when they do not operate promptly, they most commonly fail to operate at all. Valve full-stroke times cannot be measured unless significant system modifications are made to permit this testing. It would be burdensome for the licensee to make such modifications because of the time and expense involved and the limited amount of additional information that would be provided.

These valves function to admit starting air to the diesel generators, therefore, valve opening can be indirectly verified by monitoring the diesel generator start times to insure that the diesel starts within the Technical Specification limit. Measuring the diesel start times gives an indication of possible valve degradation since any significant change in valve stroke time would result in longer diesel generator start times. The licensee's proposed testing of measuring diesel generator start times while alternately isolating the starting air headers should provide indication of proper valve operation and allow detection of degradation, thereby giving reasonable assurance of valve operational readiness.

Based on the determination that it is impractical to comply with the Code required testing method and considering the adequacy of the licensee's proposed alternate testing, relief may be granted from the Code requirements as requested.

3.11 Instrument Nitrogen System

3.11.1 Category A/C Valves

3.11.1.1 Relief Request. The licensee has requested relief from exercising valves CHK-2-51-23261 and -3-51-33261, drywell/torus vacuum breakers nitrogen supply checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure (their safety position) during leak testing each refueling outage.

3.11.1.1.1 Licensee's Basis for Requesting Relief--The only method to verify reverse flow closure of these valves is by leak testing. Since these valves have a primary function of containment isolation, they are leak tested during Appendix J, Type C, testing at refueling. In order to leak test the valves, a manual valve located inside the torus must be closed. During power operation and cold shutdown, the containment atmosphere is normally inerted with nitrogen, limiting access to emergencies only. Because testing cannot be accomplished at power and leak testing at cold shutdown could delay plant start-up, these valves will be leak tested during refueling.

Alternate Testing: Reverse flow closure will be verified during Appendix J, Type C, testing during refueling.

3.11.1.1.2 Evaluation--These valves are simple check valves that are not equipped with position indication. The only practical non-intrusive method of verifying the reverse flow closure of these valves is to leak test them. It is impractical to leak test these valves quarterly during power operations because, although the valves are located outside containment, some of the isolation valves and test connections necessary for leak testing are inaccessible since they are located inside containment. The containment atmosphere is always inerted with nitrogen gas during power operation and access is limited to emergencies due to the personnel safety hazards involved. Containment is not routinely de-inerted during plant cold shutdowns. It would be burdensome to require the licensee to perform this testing during cold shutdowns due to the costs involved and the possibility of delaying restart because of the time involved with purging the inert atmosphere and then reestablishing it.

These valves are subjected to an Appendix J, Type C, leak rate test during refueling outages which should adequately demonstrate their ability to perform their safety function in the closed position.

Based on the impracticality of full-stroke exercising these valves quarterly and during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and considering that the proposed alternate testing should provide an adequate demonstration of valve operational readiness, relief may be granted from the exercising requirements of Section XI as requested.

3.11.2 <u>Category C Valves</u>

3.11.2.1 <u>Relief Request</u>. The licensee has requested relief from exercising valves CHK-2(3)-51-257A, -257B, -257C, -257G, and -257K, main steam safety/relief and automatic depressurization system accumulator nitrogen supply checks, in accordance with Section XI, Paragraph IWV-3521, and proposed to full-stroke exercise them during those cold shutdowns when the drywell is de-inerted and during refueling outages.

3.11.2.1.1 <u>Licensee's Basis for Requesting Relief</u>--Verification of reverse exercising requires isolating the associated instrument nitrogen header and venting the upstream side through a test connection located inside the primary containment. To verify forward exercising requires lowering the pressure in the associated ADS accumulator with the nitrogen supply isolated, then opening the nitrogen supply and observing that ADS accumulator pressure increases. Since installed pressure indication is not provided for the ADS accumulators, a test gauge must be installed on a test connection 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.

Alternate Testing: Forward and reverse exercising will be verified during all refue' ng outages and during cold shutdowns when the primary containment is de-inerted.

3.11.2.1.2 Evaluation--CHK-2(3)-51-257A, -257B, -257C, -257G, and -257K are simple check valves that are not equipped with position indication. The only practical non-intrusive method of verifying the reverse flow closure of these valves is to perform an accumulator pressure decay test. It is impractical to leak test these valves quarterly during power operations because some of the isolation valves and test connections necessary for leak testing are inaccessible since they are located inside containment. The containment atmosphere is always inerted with nitrogen gas during power operation and access is limited to emergencies due to the personnel safety hazards involved. It would be burdensome to require the licensee to perform this testing during cold shutdowns because containment is not routinely de-inerted during cold shutdowns and de-inerting is costly and time consuming. Further, de-inerting containment solely to perform this testing could possibly delay restart from cold shutdowns.

The licensee's proposal to exercise these valves open and verify their reverse flow closure during all refueling outages and those cold shutdowns when the primary containment is de-inerted should provide an adequate indication of valve operational readiness.

Based on the impracticality of full-stroke exercising these valves quarterly and during all cold shutdowns, the burden on the licensee if these Code requirements were imposed, and considering that the proposed alternate testing should provide an adequate demonstration of valve operational readiness, relief may be granted from the exercising requirements of Section XI as requested.

3.11.2.2 Relief Request. The licensee has requested relief from verifying closure of the main steam safety/relief and automatic depressurization system accumulator nitrogen supply checks in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure during cold shutdowns when the drywell is de-inerted and during refueling outages. The valves are:

CHK-2-51-23205A	CHK-3-51-33205A
CHK-2-51-23205B	CHK-3-51-33205B
CHK-2-51-23205C	CHK-3-51-33205C
CHK-2-51-23205G	CHK-3-51-33205G
CHK-2-51-23205K	CHK-3-51-33205K
CHK-2(3)-51-082A	CHK-2(3)-51-082B
CHK-2(3)-51-082C	CHK-2(3)-51-082D

3.11.2.2.1 Licensee's Basis for Requesting Relief--Verification of reverse exercising requires isolating the associated instrument nitrogen header and venting the upstream side of the check valve while pressure is applied to the downstream side of the valve. These valves are located inside the primary containment and testing requires entering the 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.

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

3.11.2.2.2 Evaluation--These are simple check valves that are not equipped with position indication. The only practical non-intrusive method of verifying the reverse flow closure of these valves is to perform an accumulator pressure decay test. It is impractical to leak test these valves quarterly during power operations because some of the isolation valves and test connections necessary for this testing are inaccessible since they are located inside containment. The containment atmosphere is always inerted with nitrogen gas during power operation and access is limited to emergencies due to the personnel safety hazards involved. It would be burdensome to require the licensee to perform this testing during cold shutdowns because containment is not routinely de-inerted during cold shutdowns and de-inerting is costly and time consuming. Further, de-inerting containment solely to perform this testing could possibly delay restart from cold shutdowns.

The licensee's proposal to verify the reverse flow closure of these valves during all refueling outages and those cold shutdowns when primary containment is de-inerted should provide reasonable assurance of valve operational readiness.

Based on the impracticality of full-stroke exercising these valves quarterly and during all cold shutdowns, the burden on the licensee if these Code requirements were imposed, and considering that the proposed alternate testing should provide an adequate demonstration of valve operational readiness, relief may be granted from the exercising requirements of Section XI as requested.

APPENDIX A

VALVES TESTED DURING COLD SHUTDOWNS

APPENDIX A

VALVES TESTED DURING COLD SHUTDOWNS

The following are Category A, B, and C valves that meet the exercising requirements of the ASME Code, Section XI, and are not full-stroke exercised every three months during plant operation. These valves are specifically identified by the owner in accordance with Paragraphs IWV-3412 and -3522 and are full-stroke exercised during cold shutdowns and refueling outages. The reviewer has evaluated all valves in this Appendix and agrees with the licensee that full-stroke exercising these valves during power operation is not practical due to the valve type, location, or system design. These valves either cannot or should not be full-stroke exercised during power operation. These valves are listed below and grouped according to the system in which they are located.

1. MAIN STEAM SYSTEM

1.1 Category A Valves

It is impractical to exercise valves AO-2(3)-01-080A, -080B, -080C, -080D, inboard main steam isolations, AO-2(3)-01-086A, -086B, -086C, and -086D, outboard main steam isolations, quarterly during power operation. This testing would require a reduction in power and would place the plant in an abnormal operating condition with one main steam line isolated to the turbine. In addition, recent industry information indicates that closing these valves with high steam flow in the line may be a contributing factor in seat degradation. Seat degradation is not acceptable on these valves since they are required for primary containment isolation. These valves will be partial-stroke exercised quarterly and full-stroke exercised, stroke timed, and fail-safe tested during cold shutdowns and refueling outages.

It is impractical to exercise valves MO-2(3)-01-074, main steam line drain header inboard isolation, and MO-2(3)-01-077, main steam line drain header outboard isolation, quarterly during power operation. These valves are normally closed which is their required safety position for primary containment isolation, i.e., all valves receive a containment isolation signal. Valves MO-2(3)-01-074 are located in the drywell and valves MO-2(3)-01-077 are located in the steam tunnel. The drywell and steam tunnel are both high radiation areas during operation and access to these areas is limited to emergencies only. In addition, the drywell is inerted with nitrogen and the steam tunnel is a high temperature area which results in limited occupation times for plant personnel. Failure in the open position during testing would compromise primary containment isolation. The operating circuitry of these valves permits only full-stroke operation, therefore, they will be full-stroke exercised and stroke timed during cold shutdowns and refueling outages.

2. REACTOR RECIRCULATION SYSTEM

2.1 Category B Valves

It is impractical to exercise MO-2(3)-02-53A and -53B, reactor recirculation pump discharge valves, because that would require a reduction in power and interrupting flow in one recirculation loop. Additionally, if these valves failed in the closed position during testing, the plant would be forced to operate at a reduced power level until the plant could be shut down for repairs. The operating circuitry of these valves permits only full-stroke operation, therefore, they will be full-stroke exercised and stroke timed during cold shutdowns and refueling outages.

3. CONTROL ROD DRIVE HYDRAULIC SYSTEM

3.1 Category C Valves

Valves CHK-2(3)-03-13115AA through HC, accumulator charging header checks, cannot be exercised during power operation. Verification of reverse flow closure requires securing the control rod drive pumps, depressurizing the header, and monitoring the individual accumulator pressure and alarm to verify that the valves have closed on reverse flow. Securing the control rod drive pumps and depressurizing the header would render the control rods inoperable resulting in a loss of control rod reactivity control. This would be in direct conflict with the objective of Technical Specification 3.3 which is to assure the ability of the control rod system to control reactivity. Partial-stroke testing requires the same conditions as full-stroke testing. Depressurizing the header and monitoring the individual accumulator pressure and alarms to verify that the valves have closed on reverse flow will be performed during cold shutdowns and refueling outages.

4. FEEDWATER SYSTEM

4.1 Category A Valves

Valves MO-2(3)-06-038A and -038B, feedwater recirculation isolations, cannot be exercised during power operation because they are interlocked shut when reactor pressure is greater than 600 psig. These valves are open during startup and shutdown only and cannot be opened when reactor pressure is greater than 600 psig. They perform a safety function only (containment isolation) in the closed direction. The operating circuitry of these valves permits only full-stroke operation, therefore, they will be full-stroke exercised and stroke timed during cold shutdowns and refueling outages.

5. CONTAINMENT ATMOSPHERIC CONTROL SYSTEM

5.1 Category A Valves

The following valves perform a containment isolation function and cannot be exercised quarterly during power operation because they are administratively blocked closed which is their required safety position for primary containment isolation. Failure of these valves in the open position during testing would result in a compromise of primary containment isolation capability. These valves are operated just prior to start-up and shutdown for inerting/de-inerting purposes. The operating circuitry permits only full-stroke operation, therefore, they will be full-stroke exercised, stroke timed, and fail-safe tested during cold shutdowns and refueling outages. The valves are:

AO-2(3)-09-2505	AO-2(3)-09-2519
AO-2(3)-09-2506	AO-2(3)-09-2520
AO-2(3)-09-2507	AO-2(3)-09-2521A
AO-2(3)-09-2511	AO-2(3)-09-2521B
AO-2(3)-09-2512	

6. RESIDUAL HEAT REMOVAL SYSTEM

6.1 Category A/C Valves

Valves AO-2(3)-10-046A and -046B, residual heat removal injection testable checks, cannot be exercised during power operation. These valves are closed during operation and function as both primary containment isolation valves and reactor coolant system pressure isolation valves. During operation, these valves protect the RHR system from reactor coolant system pressure. The valves are located inside primary containment which is not accessible during operation since it is inerted with nitrogen and is a high radiation area. In addition, because these valves are required to be operable for primary containment isolation per Technical Specifications and are inaccessible during operation, failure in the open position during testing would require a plant shutdown to repair them.

Partial-stroke exercising results in the same situation as full-stroke exercising, therefore, these testable check valves will be full-stroke exercised during cold shutdowns and refueling outages.

6.2 Category A Valves

Valves MO-2(3)-10-017 and -018, residual heat removal shutdown cooling suctions, cannot be exercised during power operation because these valves are interlocked to prevent operation when reactor coolant system pressure is $>$75 psig. Because reactor coolant system pressure during power operation is $>$75 psig, these valves cannot be exercised. Partial-stroke exercising cannot be performed for the same reason. These valves will be full-stroke exercised and stroke timed during cold shutdowns and refueling outages.

7. REACTOR BUILDING CLOSED COOLING WATER SYSTEM

7.1 Category A Valves

Valves MO-2-34-2373, -3-34-3373, reactor recirculation pump cooling water supply, -2-34-2374, and -3-34-3374, reactor recirculation pump cooling water return, cannot be exercised during power operation. This testing would cause a loss of cooling water flow to the recirculation pump seal and motor oil coolers. The failure of any one of these valves to reopen after stroking would result in a complete loss of cooling to the associated recirculation pump, which could cause damage to the pump and motor. A damaged pump or motor, necessitating shutdown of the pump, would require a reduction in reactor power in accordance with Technical Specification 3.6.F.4. The operating circuitry of these valves permits only full-stroke operation, therefore, they will be full-stroke exercised and stroke timed during cold shutdowns and refueling outages.

8. INSTRUMENT AIR SYSTEM

8.1 Category C Valves

Valves CHK-2(3)-35-087A, -087B, -087C, and -087D, outboard main steam isolation valve accumulator air supply checks, cannot be exercised during power operation. Reverse exercising verification requires isolating and venting the associated instrument air supply header and observing the accumulator pressure. Since pressure indication is not provided for the accumulators, a test gauge must be installed on a test connection which is located inside the steam tunnel. The steam tunnel is a high radiation and high temperature area during power operation and access is limited to emergencies only. Reverse flow closure of these valves will be verified during cold shutdowns and refueling outages.

9. CHILLED WATER (DRYWELL COOLING) SYSTEM

9.1 Category A Valves

Valves MO-2-44-2200A, -2-44-2201A, -3-44-3200A, -3-44-3201A, drywell chilled water supply, -2-44-2200B, -2-44-2201B, -3-44-3200B, and -3-44-3201B, drywell chilled water return, cannot be exercised during power operation because that could result in a trip of the drywell chillers due to a low flow condition. These chillers supply chilled water to the reactor recirculation motor coolers and the drywell fan coolers and, if tripped, require 30 minutes for restart. Interrupting chilled water flow to the recirculation motor coolers, due to a chiller trip, creates the possibility of overheating and damage to the motors which would result in taking the recirculation pump out of service. Removing a recirculation pump from service would require a reduction in power. Interrupting chill water flow to the drywell fan coolers, due to a chiller trip, could result in an increase in drywell temperatures which would cause an increase in drywell pressure. Normal operating drywell pressure is .50 to .75 psig with a reactor protection system trip setpoint of 2.0 PSIG as per Technical Specifications (Table 3.2.A). Therefore, an increase in temperature could result in a reactor scram.

The operating circuitry of these valves permits only full-stroke operation, therefore, they will be full-stroke exercised and stroke timed during cold shutdowns and refueling outages.

10. STANDBY GAS TREATMENT SYSTEM

10.1 Category B Valves

The following reactor building ventilation supply and exhaust valves should not be exercised during power operation. In order to test the valves, it would be necessary to remove the associated supply fan from service. This would cause a high temperature condition in the steam tunnel room which is cooled by the reactor building ventilation system. If temperatures get high enough, the reactor would scram. In addition, loss of secondary containment integrity would be a violation of Technical Specification 3.7.C.1.

After a supply fan is taken out of service, approximately 20 to 30 minutes would be required to reduce the temperature to an acceptable level in the steam tunnel rooms. The operating circuitry of these valves permits only full-stroke operation, therefore, they will be full-stroke exercised, fail-safe tested, and stroke timed during cold shutdowns and refueling outages. The valves are:

AO-2-49-20452	AO-2-49-20463	AO-3-49-30459
AO-2-49-20453	AO-2-49-20464	AO-3-49-30460
AO-2-49-20457	AO-2-49-20467	AO-3-49-30461
AO-2-49-20458	AO-2-49-20468	AO-3-49-30462
AO-2-49-20459	AO-3-49-30452	AO-3-49-30463
AO-2-49-20460	AO-3-49-30453	AO-3-49-30464
AO-2-49-20461	AO-3-49-30457	AO-3-49-30467
AO-2-49-20462	AO-3-49-30458	AO-3-49-30468

11. INSTRUMENT NITROGEN SYSTEM

11.1 Category A/C Valves

Valves CHK-2-51-23202A, -23202B, -3-51-33202A, and -33202B, primary containment instrument nitrogen supply checks, cannot be exercised during power operation. Exercising these valves during power operation interrupts instrument nitrogen supply to several important valves inside containment, such as main steam relief valves power operated mode (non-ADS function), the ADS accumulators, and the MSIVs. This could compromise the ability of the main steam relief valves (non-ADS function) to operate in the power operated relief mode. In addition, isolation of nitrogen to the ADS accumulators could also compromise the ability of the ADS valves to function in the ECCS mode. Loss of instrument nitrogen could also cause the MSIVs to close, increasing the potential for a reactor scram. Reverse flow closure of these valves will be verified during cold shutdowns and refueling outages.

APPENDIX B

P&ID AND DRAWING LIST

APPENDIX B
P&ID AND DRAWING LIST

The P&IDs and Drawings listed below were used during course of this review.

System	P&ID or Drawing		Rev.
Main Steam	M-351	Sh. 1	26
		Sh. 2	26
		Sh. 3	26
		Sh. 4	26
Reactor Recirculation	ISI-M-351		
Control Rod Hydraulic	ISI-M-356		29
	ISI-M-357		
Nuclear Boiler Instrumentation			
Feedwater	M-351	Sh. 1	26
		Sh. 2	26
		Sh. 3	26
		Sh. 4	26
Traversing Incore Probe			
Containment Atmosphere Control	M-367	Sh. 1	29
		Sh. 2	29
		Sh. 3	29
Residual Heat Removal	M-361	Sh. 1	27
Standby Liquid Control	M-358	Sh. 1	15
Reactor Water Cleanup	ISI-M-354		
Reactor Core Isolation Cooling	ISI-M-359		
	M-360	Sh. 1	25
		Sh. 2	25
Core Spray	ISI-M-362		
	M-362	Sh. 1	31
Radwaste	M-368		19
	M-369		18
High Pressure Coolant Injection	M-365	Sh. 1	28
		Sh. 2	28
	M-366	Sh. 1	23
		Sh. 4	23

System	P&ID or Drawing		Rev.
High Pressure Service Water	M-315	Sh. 1	22
		Sh. 2	22
		Sh. 3	22
		Sh. 4	22
	ISI-M-330		
Emergency Service Water	M-315	Sh. 1	22
		Sh. 2	22
		Sh. 3	22
		Sh. 4	22
Reactor Building Closed Cooling Water	M-316	Sh. 1	21
		Sh. 2	21
		Sh. 3	21
		Sh. 4	21
		Sh. 2	26
		Sh. 3	26
		Sh. 4	26
Service Air			
Chilled Water (Drywell Cooling)	M-327	Sh. 1	28
		Sh. 2	28
		Sh. 3	28
		Sh. 4	28
Emergency Cooling Water	ISI-M-330		
Standby Gas Treatment	M-391	18	
Emergency Diesel Generators	M-377	Sh. 1	3
		Sh. 4	3
Instrument Nitrogen	M-367	Sh. 1	29
		Sh. 2	29
		Sh. 3	29
	M-333	Sh. 1	22
		Sh. 2	22
	M-351	Sh. 1	26
		Sh. 2	26
		Sh. 3	26
		Sh. 4	26
Containment Atmosphere Dilution	M-372	Sh. 1	26
		Sh. 2	26
Primary Containment Leak Testing			

APPENDIX C

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

APPENDIX C

IST PROGRAM ANOMALIES IDENTIFIED 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. The licensee should categorize all excess flow check valves A/C instead of C. (See Item 3.1.2.1)

2. The licensee stated at the working meeting that the main steam safety/relief valve tailpipe vacuum breakers would be included in the IST program and a relief request would be provided proposing to manually exercise the valve disks during cold shutdowns when the drywell is de-inerted and during refueling outages. The licensee has instead proposed to test these vacuum breaker check valves in accordance with the requirements of ANSI/ASME OM-1-1981 which states that vacuum breaker devices are to be tested at least once each ten year interval. This proposal is not in agreement with Section XI, Paragraph IWV-3522(b), which states, in part, "except that for vacuum breaker valves the exerciser force or torque delivered to the disk may be equivalent to the desired functional pressure differential force. The disk movement shall be sufficient to prove that the disk moves freely off the seat." This exercising test is required to be performed at the quarterly test frequency stated in Paragraph IWV-3521 with reference to Paragraph IWV-3522. Since the vacuum breakers in question are simple check valves with no external means of operation or required differential pressure setpoint, they should be exercised in accordance with the requirements of Section XI in order to demonstrate valve operational readiness. These valves are inaccessible during power operation because they are located inside the drywell and the drywell atmosphere is inerted with nitrogen gas. They are also inaccessible during most cold shutdowns because the drywell is not de-inerted, therefore, they cannot be exercised each cold shutdown in accordance with the applicable requirements of Section XI.

The licensee should provide a relief request to perform exercise testing during those cold shutdowns when the drywell is de-inerted and during refueling outages. The valves are:

VRV-2-01-8096A	VRV-2-01-8096G
VRV-2-01-8096B	VRV-2-01-8096H
VRV-2-01-8096C	VRV-2-01-8096J
VRV-2-01-8096D	VRV-2-01-8096K
VRV-2-01-8096E	VRV-2-01-8096L
VRV-2-01-8096F	
VRV-3-01-9096A	VRV-3-01-9096G
VRV-3-01-9096B	VRV-3-01-9096H
VRV-3-01-9096C	VRV-3-01-9096J
VRV-3-01-9096D	VRV-3-01-9096K
VRV-3-01-9096E	VRV-3-01-9096L
VRV-3-01-9096F	

3. The licensee has incorrectly identified the reactor building ventilation supply and exhaust valves listed in Cold Shutdown Test Justification 49-VCS-1 as Category A valves. These valves should be Category B because they are not leak rate tested. The licensee should correct this error.

4. The system modifications to allow flow measurements during testing of the emergency service water, emergency service water booster, and emergency cooling water pumps, OAP057, OBP057, OAP163, OBP163, and OOP186, should be completed as soon as practicable but no later than the 1991 refueling outage. (See Items 2.3.1.1 and 2.3.1.2)

5. The licensee has identified check valve disassembly as the alternate testing to verify the full-stroke open capability for the valves addressed in relief requests 13-VRR-2, 13-VRR-3, 14-VRR-2, 23-VRR-2, and 23-VRR-3 (see Items 3.7.1.2, 3.7.1.3, 3.8.1.1, 3.9.1.2, and 3.9.1.3). When valve disassembly is used as an alternative to Code testing, the valve internals should be visually inspected for worn or corroded parts and the valve disk should be manually exercised per Generic Letter 89-04, Attachment 1, Position 2. Further, the licensee

should perform a partial flow test of each valve prior to returning it to service following the disassembly and inspection procedure.

The NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not a test and not equivalent to the exercising produced by fluid flow. This procedure has some risk which may make its routine use as a substitute for testing undesirable when some method of testing is possible. 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. The licensee should actively pursue the use of alternate testing methods to full-stroke exercise these valves, such as using non-intrusive diagnostic techniques to demonstrate whether they swing fully open during partial flow testing or closed when flow is ceased. If another method is developed to verify the full-stroke capability of the listed valves, the affected relief request should be revised or withdrawn.

6. The licensee has identified check valve disassembly as the alternate testing to verify the reverse flow closure capability for the valves addressed in relief requests 10-VRR-1, 13-VRR-1, 14-VRR-1, and 23-VRR-1 (see Items 3.5.1.1, 3.7.1.1, 3.8.2.1, and 3.9.1.1). When valve disassembly is used as an alternative to Code testing, the valve internals should be visually inspected for worn or corroded parts and the valve disk should be manually exercised per Generic Letter 89-04, Attachment 1, Position 2. Further, the licensee should perform a partial flow test of each valve prior to returning it to service following the disassembly and inspection procedure.

The NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not a test and not equivalent to the exercising produced by fluid flow. This procedure has some risk which may make its routine use as a substitute for testing undesirable when some method of testing is possible. 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. The licensee should actively pursue the use of alternate testing methods to verify the reverse flow closure of these valves, such as using non-intrusive diagnostic techniques to demonstrate whether they swing fully closed upon cessation or reversal of flow. If another method is developed to verify the reverse flow closure capability of the listed valves, the affected relief request should be revised or withdrawn.

7. The licensee's proposed alternate testing in relief request GVRR-1 for leak rate testing containment isolation valves may not be conservative and may, therefore, permit excessive leakage through certain individual valves without requiring corrective actions. Although individual leakage rates will be assigned for each containment isolation valve, it appears that the corrective actions will be based on leakage limits calculated for each local leak rate test. Each containment isolation valve should be individually leak rate tested if practicable. When valves can only practically be tested in groups, the group limit should be set such that excessive leakage through any individual valve, even the smallest, is detected and appropriate corrective actions taken (see Item 3.1.1.1).

8. The licensee has identified check valve disassembly as the alternate testing to verify the reverse flow closure capability for the keep fill valves addressed in relief requests 14-VRR-1, and 14-VRR-3. The NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not a test and not equivalent to the exercising produced by fluid flow. This procedure has some risk which may make its routine use as a substitute for testing undesirable when some method of testing is possible. The licensee is encouraged to investigate methods of verifying the reverse flow closure of these check valves other than disassembly and inspection. For these keep fill series check valve pairs, the NRC has found acceptable verifying by positive means (such as leak testing) that at least one of the series valves is closed once every three months. No additional testing

needs to be performed unless there is an indication that the closure capability of the pair of valves is questionable, then both valves must be declared inoperable and repaired or replaced before being returned to service (see Item 3.8.2.2).

9. The licensee has proposed to test the series-parallel check valves that serve as vacuum breakers for the HPCI/RCIC turbine exhaust lines as units by verifying a forward flow path through each group, refer to relief request GVRR-4. These valves also perform a safety function in the closed position to prevent steam from being directly introduced into the torus airspace. In a telephone conversation, the licensee recognized the closed safety function of these valves; this change should be reflected in future IST program submittals. Also, the licensee should verify the reverse flow closure of these valves as a unit during quarterly HPCI/RCIC pump testing. If the forward flow capability or reverse flow closure capability of the valve group is questionable, the licensee should declare all valves in the group inoperable and replace, repair, or verify the operational readiness of each valve prior to placing it back into service (see Items 3.7.1.4 and 3.9.1.4).

10. The licensee has requested relief from exercising and measuring the stroke time of the main steam automatic depressurization valves, RV-2(3)-01-071A, -071B, -071C, -071G, and -071K. The licensee proposed to exercise these valves during refueling outages which should demonstrate their ability to stroke to their safety function position. However, the proposed alternate testing does not adequately monitor for degradation of these valves. Therefore, the licensee should assign a maximum stroke time limit that is based on previous test data to these valves 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 actions taken in accordance with IWV-3417(b) (see Item 3.2.1.1).