EGG-NTA-7492
March 1987

INFORMAL REPORT

Idaho National Engineering Laboratory

Managed by the U.S. Department of Energy

TECHNICAL EVALUATION REPORT, PUMP AND VALVE INSERVICE TESTING PROGRAM, SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

C. B. Ransom
T. L. Cook

EG&G Idaho

Work performed under DOE Contract No. DE-AC07-76ID01570

Prepared for the

U.S. NUCLEAR REGULATORY COMMISSION

EGG-NTA-7492

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

Docket No. 50-400

C. B. Ransom
T. L. Cook

Published March 1987

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. DOE-AC07-76ID01570
FIN No. A6812

ABSTRACT

This EG&G Idaho, Inc., report presents the results of our evaluation of the Shearon Harris Nuclear Power Plant, Unit 1, Inservice Testing Program for pumps and valves whose function is safety related.

FOREWORD

This report is supplied as part of the "Review of Pump and Valve Inservice Testing Programs for Operating Plants (III)" Program being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of PWR Licensing A, by EG&G Idaho, Inc., NRR and I&E Support.

The U.S. Nuclear Regulatory Commission funded the work under the authorization B&R 20-19-10-11-2, FIN No. A6812.

Docket No. 50-400

CONTENTS

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) program submitted by Carolina Power and Light Company for its Shearon Harris Nuclear Power Plant, Unit 1.

The working session with Carolina Power and Light Company representatives was conducted on August 5 and 6, 1986. The licensee's IST program, Revision 3 dated September 16, 1986, as amended by the changes identified in the A.B. Cutter to H.R. Denton letter dated December 31, 1986, and the A.B. Cutter to U.S. NRC letter dated March 20, 1987, was reviewed to verify compliance of proposed tests of pumps and valves whose function is safety-related with the requirements of the ASME Boiler and Pressure Vessel Code (the Code), Section XI, 1983 Edition through Summer 1983 Addenda. Any IST program revisions subsequent to those noted above are not addressed in this technical evaluation report (TER). The NRC staff position is that required program changes, such as additional relief requests or the deletion of any components from the IST Program, 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.

In their IST program, Carolina Power and Light 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 required testing is indeed impractical for the specified pumps or valves. This review was performed utilizing the acceptance criteria of the Standard Review Plan, Section 3.9.6, and the Draft Regulatory Guide and Value/Impact Statement titled "Identification of Valves for Inclusion in Inservice Testing Programs". The IST Program testing requirements apply only to component testing (i.e., pumps and valves) and are not intended to provide the basis to change the licensee's current Technical Specifications for system test requirements.

Section 2 of this report presents the Carolina Power and Light Company bases for requesting relief from the Section XI requirements for the Shearon Harris Nuclear Power Plant pump testing program and the EG&G reviewer's evaluations and conclusions regarding these requests. Similar information is presented in Section 3 for the valve testing program.

The NRC staff's positions and guidelines concerning inservice testing requirements are provided in Appendix A.

Category A, B, and C valves that meet the requirements of the ASME Code, Section XI, and are not exercised quarterly are addressed in Appendix B.

A listing of P&IDs and Figures used for this review is contained in Appendix C.

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

2. PUMP TESTING PROGRAM

The Shearon Harris Nuclear Power Plant, Unit 1, IST program submitted by Carolina Power and Light Company was examined to verify that all pumps that are included in the program are subjected to the periodic tests required by the ASME Code, Section XI, except for those pumps identified below for which specific relief from testing has been requested and as summarized in Appendix D. Each Carolina Power and Light Company basis for requesting relief from the pump testing requirements and the reviewer's evaluation of that request are summarized below.

2.1 Various Safety-Related Pumps

2.1.1 Pump Bearing Temperature Measurements

2.1.1.1 Relief Request. The licensee has requested relief from the bearing temperature measurement requirements of Section XI, Paragraph IWP-3100, for the chilled water recirculation, chilled condenser water, safety injection, charging, component cooling water, spent fuel pool cooling, and emergency service water intake screen wash pumps and proposed to measure pump differential pressure, flow, and vibration to determine pump performance.

2.1.1.1.1 Licensee's Basis for Requesting Relief--These pumps have no installed instrumentation to measure bearing temperature. Measurement of temperature of the pump bearing housing would not be indicative of actual bearing temperature because of temperature gradients caused by operation of space coolers, pump location, pumped fluid, etc. The once a year measurement will not provide significant information about pump condition. The long pump running time required to achieve temperature stability could result in unnecessary wear on the pumps and result in increased pump maintenance and repair. Deletion of this measurement will not have significant effect on the pump monitoring program, since other required test parameters are being measured. Pump differential pressure, flow and vibration will be used to monitor pump performance.

2.1.1.1.2 Evaluation--The reviewer agrees that a yearly measurement of pump bearing temperature for these pumps is not a meaningful test for detecting pump bearing degradation because there are several factors such as the temperature of the working fluid, the ambient temperature, and the lubricant temperature that would affect the measured bearing temperature and mask any bearing condition change short of a catastrophic bearing failure. Measuring pump vibration quarterly gives a much more accurate indication of pump bearing condition than the temperature measurement and the vibration measurement is not substantially affected by any system parameter or other factor that could mask problems or result in erroneous indications of bearing degradation.

2.1.1.1.3 Conclusion--The reviewer concludes that the yearly bearing temperature measurement is not a meaningful test for these pumps and that the licensee's proposed alternate testing of using pump vibration measurements to determine pump mechanical condition and to detect pump bearing degradation is acceptable, therefore, relief should be granted from the Section XI requirement of annually measuring bearing temperature for these pumps.

2.2 Auxiliary Feedwater Pumps

2.2.1 Pump Bearing Temperature Measurements

2.2.1.1 Relief Request. The licensee has requested relief from the bearing temperature measurement requirements of Section XI, Paragraph IWP-3100, for the auxiliary feedwater pumps and proposed to measure pump differential pressure, flow, and vibration to evaluate pump condition.

2.2.1.1.1 Licensee's Basis for Requesting Relief--Quarterly pump testing is performed using a pump recirculation line back to the pump suction. In this mode of operation the temperature of the pumped fluid is constantly increasing and operation is limited to a maximum of one hour. IWP-3500(b) requires the pumps be operated until bearing temperature stability is achieved, but for no less than thirty minutes. Since the pumped fluid temperature is constantly increasing, bearing temperature will not reach stability in one hour. In addition, good operating procedure will limit operation of the pumps in this mode to as short a time as possible to preclude pump degradation. When the pumps are full flow tested at cold shutdown or refueling the length of operation is dictated by plant operating conditions and it cannot be guaranteed that plant condition will allow operation of each pump until bearing temperature stabilizes without significant impact on normal plant operations. Pump differential pressure, flow and vibration measurements will be used to evaluate pump performance.

2.2.1.1.2 Evaluation--The reviewer agrees that a yearly measurement of pump bearing temperature for the auxiliary feedwater pumps is not a meaningful test because the temperature of the pumped fluid would not stabilize sufficiently in the time that the pumps can be operated for testing to provide a measurement that would reflect bearing condition or allow the detection of bearing degradation. Bearing temperature measurements are affected by the working fluid temperature and ambient temperature to such an extent that these parameters would mask anything but an imminent bearing failure, which makes yearly temperature trending a meaningless test for these pumps.

2.2.1.1.3 Conclusion--The reviewer concludes that measuring pump vibration to detect mechanical condition and measuring differential pressure and flow to detect pump hydraulic condition would provide sufficient information during the quarterly pump test to assess pump operability and to detect degradation. The reviewer concludes that the yearly bearing temperature measurement is not a meaningful test and the licensee's proposed testing is acceptable, therefore, relief should be granted from the Section XI requirement of yearly measuring bearing temperature for the auxiliary feedwater pumps.

2.3 Emergency Service Water Pumps

2.3.1 Pump Vibration Measurements

2.3.1.1 Relief Request. The licensee has requested relief from the vibration measurement requirements of Section XI, Paragraph IWP-3100, for the emergency service water pumps and proposed to measure vibration on the pump motor upper bearing.

2.3.1.1.1 Licensee's Basis for Requesting Relief--The emergency service water pumps are submerged in a pit which makes them inaccessible for measuring vibration amplitude at the pump bearings. These pumps have a shaft which is approximately 70 feet long separating pump and motor.

In their letter dated December 31, 1986, the licensee indicated that vibration measurements would be taken on these pumps. These measurements will be taken at the pump motor upper bearing because this is the accessible location that is most representative of the pump mechanical condition.

2.3.1.1.2 Evaluation--The reviewer agrees that the emergency service water pumps are submerged and are inaccessible for direct measurement of vibration at the pump bearings. The pump shaft is enclosed such that the shaft bearings are not accessible for vibration measurements. The only pump element that is accessible for vibration measurements is the driving motor. Vibration measurements taken at the pump motor upper bearing in the radial direction are generally more indicative of the pump bearing and shaft bearing condition than measurements taken elsewhere on the pump motor.

2.3.1.1.3 Conclusion--The reviewer concludes that the proposed alternate testing of measuring vibration on the upper motor bearing in the radial direction will give the best indication of the mechanical condition of the emergency service water pumps that can reasonably be obtained for these pumps in their existing configuration. This proposed testing should provide reasonable indication of the mechanical condition of the pumps and, therefore, is acceptable. On this basis, relief should be granted from the Section XI vibration measurement requirements for these pumps.

2.4 Diesel Generator Fuel Oil Transfer Pumps

2.4.1 Flow Measurement Accuracy Requirements

2.4.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraphs IWP-3210 and -4110, and proposed to evaluate the diesel generator fuel oil transfer pumps hydraulic condition by calculating the flow rate using the time required to change the day tank level a measured amount which will be used in conjunction with the measured pump differential pressure.

2.4.1.1.1 Licensee's Basis for Requesting Relief--There are no system design provisions for direct flow measurements. Flow rate will be calculated from measured change in day tank level during pump operation. This method is not accurate enough to comply with the allowable ranges of test quantities of Table IWP-3100-2.

2.4.1.1.2 Evaluation--There are no installed instruments on the diesel generator fuel oil transfer system that allow a direct measurement of the flowrate when testing these pumps quarterly. The pump flowrate can be calculated by measuring the change in day tank level or volume and the pump operation time that was required to make that change. This method does yield a value for pump flowrate that can be used to evaluate pump hydraulic condition, however, it does not yield results that meet the instrument accuracy requirements of IWP-4110; also these calculated flowrates are sufficiently inaccurate to make the usage of the allowable ranges of Table IWP-3100-2 impractical. A plant modification to install flow instrumentation to test these pumps may improve the licensee's ability to detect pump degradation over the proposed testing, however, it is the reviewer's opinion that the improvement would not be significant and would not warrant making the plant modifications.

2.4.1.1.3 Conclusion--The reviewer concludes that direct flow readings would provide a more accurate indication than the calculated flowrate, however, the increase in ability to monitor pump condition and degradation would be minimal and would not warrant making the necessary plant modifications. The calculated flowrate should be sufficient to determine pump hydraulic condition, therefore, the licensee's proposal is considered to be acceptable and relief should be granted from the Code requirements. The licensee should provide reduced range limits for these pumps as specified in Section XI, Paragraph IWP-3210.

2.4.2 Pump Bearing Temperature Measurements

2.4.2.1 Relief Request. The licensee has requested relief from the bearing temperature measurement requirements of Section XI, Paragraph IWP-3100, for the diesel fuel oil transfer pumps and proposed to measure pump bearing vibration to evaluate the condition of the pump bearing.

2.4.2.1.1 Licensee's Basis for Requesting Relief--The diesel fuel oil pump running time is dictated by interlock circuitry and administrative limits corresponding to allowable day tank levels. The interlocks, which control automatic transfer pump operation, limit operation of the pumps below minimum allowable or above maximum allowable tank levels. Operation of the pumps with tank levels above maximum allowable is precluded by administrative controls and alarms. The time required to fill the tank from minimum level to maximum level is less than thirty minutes. Bearing condition will be evaluated by pump bearing vibration measurements.

2.4.2.1.2 Evaluation--The reviewer agrees that a yearly measurement of pump bearing temperature for the diesel fuel oil transfer pumps is not a meaningful test because the pumps cannot be operated for a long enough time due to interlocks, alarms, and administrative limits, to allow the bearing temperatures to stabilize sufficiently to provide temperature measurements that would be of value in determining pump bearing condition. Bearing temperature measurements are affected by the working fluid temperature and the ambient temperature to such an extent that it would mask any degradation short of an imminent bearing failure, which makes yearly temperature trending a useless test for these pumps.

2.4.2.1.3 Conclusion--The reviewer concludes that the yearly bearing temperature measurement is not a meaningful test for the diesel fuel oil transfer pumps and that the licensee's proposed alternate testing of using pump vibration measurements to determine pump mechanical condition is acceptable, therefore, relief should be granted from the Section XI requirement of yearly measuring bearing temperature for these pumps.

2.5 High Head Safety Injection/Charging Pumps

2.5.1 Flow Measurement Allowable Range Limits

2.5.1.1 Relief Request. The licensee has requested relief from the allowable range requirements of Section XI, Paragraph IWP-3210 and Table 3100-2, and proposed to make a study to establish appropriate acceptable ranges based on the installed flow measuring instruments.

2.5.1.1.1 Licensee's Basis for Requesting Relief--Pump flow rate is determined by summing the measured flow rates from four branch line flow indicators. Because of the combined errors associated with summing four separate measurements, using the table specified ranges could result in false indications of pump performance. A study is being prepared to establish appropriate acceptable ranges based on the installed flow measuring instruments.

2.5.1.1.2 Evaluation--Section XI, Paragraph IWP-3210 states that if the ranges of Table IWP-3100-2 cannot be met, the owner shall specify in the record of tests the reduced range limits to allow the pump to fulfill its function. The reviewer, therefore, agrees that if it is shown that summing the outputs of four separate flow indicators results in flow values that routinely exceed the acceptable ranges of Table IWP-3100-2 when the charging pumps are known to be in good operating condition, then the licensee should specify reduced range limits for these pumps as provided for in the Code.

2.5.1.1.3 Conclusion--The reviewer concludes that the licensee's proposal to perform a study to determine if the Code supplied ranges of Table IWP-3100-2 can be met and, if they can not, to specify appropriate alternate ranges, is acceptable. Interim relief should be granted from meeting the allowable ranges of Table IWP-3100-2 until the study is complete; at that time relief should not be necessary, for the licensee should be complying with the Code supplied ranges or they should be using appropriate owner supplied ranges to evaluate these pumps. The licensee should complete this study and have the owner specified ranges, if appropriate, in place by the end of the first refueling outage.

2.6 Boric Acid Transfer Pumps

2.6.1 Quarterly Flow Measurement

2.6.1.1 Relief Request. The licensee has requested relief from the flow measurement requirements of Section XI, Paragraph IWP-3100, for the boric acid transfer pumps and proposed to determine pump hydraulic condition by quarterly measuring inlet and differential pressures while running the pumps in a recirculation flow path through the minimum flow lines and to measure flow, inlet pressure, and outlet pressure while pumping to the chemical and volume control system when borating on the way to cold shutdown.

2.6.1.1.1 Licensee's Basis for Requesting Relief--There are no system design provisions for measurement of flow rate in the flow path used for quarterly pump testing. To utilize the system flowmeter would require a test flow path which would transfer highly concentrated boric acid from the boric acid tank to the CVCS. The addition of large amounts of concentrated boric acid during power operations would result in undesirable reactor power transients and possibly in a plant shutdown. The pumps will be run quarterly using the pump minimum flow line and both inlet and differential pressure will be measured.

The licensee indicated in their letter dated December 31, 1986, that a full flow pump test will be performed by establishing flow into the CVCS on the way to cold shutdowns.

2.6.1.1.2 Evaluation--The reviewer agrees with the licensee that the only flow path that allows measurement of boric acid transfer pump flowrate is the path that establishes flow to the suction of the charging pumps which should not be used during power operations because it results in the addition of high concentrations of boric acid to the RCS which causes power fluctuations and could lead to a plant shutdown. These pumps are operated in a recirculation flow path during power operations and pump inlet and differential pressures are measured, but there are no flow measurement capabilities in that flow path. Lack of installed instrumentation is not a generally acceptable justification for not performing Code required measurements, however, in this situation where the licensee is measuring pump inlet and differential pressures in a fixed resistance recirculation flow path quarterly and measuring those parameters plus pump flowrate when entering cold shutdowns, the reviewer believes that sufficient information will be available to determine pump hydraulic condition and detect degradation and that the cost of making a plant modification to install the necessary flow measurement instrumentation to allow measurement of pump flowrate quarterly is not justified by the marginal increase in ability to monitor pump condition that this would afford.

2.6.1.1.3 Conclusion--The reviewer concludes that the proposed testing will provide sufficient information to determine the hydraulic condition of the boric acid transfer pumps and to detect pump degradation and, therefore, is acceptable. The addition of instrumentation to allow the measurement of pump flowrate quarterly would result in a marginal increase in the licensee's ability to monitor pump hydraulic condition, however, the increase would be small and the reviewer concludes that it does not warrant the cost of the requisite plant modifications. On this bases, relief should be granted from the Code requirement to measure boric acid transfer pump flowrates during the quarterly pump tests.

2.6.2 Temperature Measurement and Observation of Lubricant Level

2.6.2.1 Relief Request. The licensee has requested relief from the temperature measurement and lubricant level observation requirements of

Section XI, Paragraph IWP-3100, for the boric acid transfer pumps and proposed to determine pump mechanical condition by quarterly measuring pump vibration while running the pumps in a recirculation flow path through the minimum flow recirculation lines.

2.6.2.1.1 Licensee's Basis for Requesting Relief--These pumps are Model GVHS-10K made by the Chempump Division of the Crane Company. This type of pump has no bearings in the pump and is an integral unit with the motor. The pump bolts directly onto the integral motor end housing flange, such that the motor bearings are completely enclosed. The motor bearings are cooled and lubricated by diverting a portion of pump flow through the motor and back to the pump suction. Since the motor bearings are cooled and lubricated by the process fluid, the lubricant level cannot be observed and the bearing temperature measurement would not be indicative of the pump mechanical condition.

The licensee indicated in their letter dated December 31, 1986, that vibration measurements will be taken on these pumps to determine their mechanical condition.

2.6.2.1.2 Evaluation--The reviewer agrees with the licensee that the boric acid transfer pumps are constructed in such a manner that the motor bearings are cooled and lubricated by the process fluid. The bearing lubrication is provided by an internal recirculation of water from the impeller back to the pump suction, therefore, the lubricant level or pressure is a meaningless parameter for these pumps. The motor bearings are inaccessible for temperature measurements and since they are cooled by the process fluid, the temperature would be influenced by the fluid temperature and would not provide an indication of bearing condition unless a catastrophic failure was imminent. A quarterly vibration measurement would provide a much better indication of pump mechanical condition and degradation than would a yearly measurement of the bearing temperature for these pumps.

2.6.2.1.3 Conclusion--The reviewer concludes that the proposed testing will provide sufficient information to determine the mechanical condition of the boric acid transfer pumps and to detect pump degradation and, therefore, is acceptable. A yearly measurement of the motor bearing temperature would yield meaningless information which would not result in an increase in the licensee's ability to monitor pump mechanical condition, therefore, relief should be granted from the Code requirement to measure boric acid transfer pump bearing temperatures and observe pump lubricant levels or pressures.

2.7 Emergency Service Water and Component Cooling Water Pumps

2.7.1 Establishing Reference Values For Pump Flow or Differential Pressure

2.7.1.1 Relief Request. The licensee has requested relief from the inservice test procedure requirements of Section XI, Paragraph IWP-3100, for the emergency service water and the component cooling water pumps and proposed to measure the Code required parameters with the pumps operating in the as-found condition and to use a pump curve with identified bands to determine if flow and differential pressure are in the acceptable range.

2.7.1.1.1 Licensee's Basis for Requesting Relief--These systems do not have an installed pump test line and system operating conditions will not allow adjusting system resistance without significant impact on plant operations. These are variable resistance systems that experience a wide swing in loads and configuration. Depending on plant operating conditions and climatic conditions the cooling requirements can range from minimum cooling loads to 100 percent and many of the loads are automatically placed in operation in response to local temperature requirements. Because of these normal operating requirements it is not possible to specify a particular flow path that can be repeated for each pump test.

Pump testing will be performed with the system in the as-found operating configuration and the test results compared with a curve of reference values which establishes the relationship between flow and differential pressure in a band around the design point.

2.7.1.1.2 Evaluation--The nature and design of these systems prevent the licensee from varying system resistance to establish a reference pump flowrate or differential pressure. Plant and ambient conditions may vary significantly from one test to another which will affect the heat loads, the heat exchanger efficiencies, and the cooler efficiencies, which in turn affects the flowrates to the various cooled components. With these conditions, it is impractical to establish a reference flow or differential pressure and doing so could result in equipment damage. Using the as found conditions and comparing pump flowrate to differential pressure on the pump curve should give a good indication of pump hydraulic condition and allow the detection of pump degradation.

2.7.1.1.3 Conclusion--The reviewer concludes that the licensee's proposed testing provides sufficient information to monitor and evaluate pump condition and to detect pump degradation and is, therefore, acceptable. On this basis, relief should be granted from the Code requirement of establishing a reference pump flowrate or differential pressure.

2.8 Emergency Service Water Intake Screen Wash Pumps

2.8.1 Establishing Reference Values For Pump Flow or Differential Pressure

2.8.1.1 Relief Request. The licensee has requested relief from the inservice test procedure requirements of Section XI, Paragraph IWP-3100, for the emergency service water screen wash pumps and proposed to measure the Code required parameters with the pumps operating in the as-found condition and to use a pump curve with identified bands to determine if flow and differential pressure are in the acceptable range.

2.8.1.1.1 Licensee's Basis for Requesting Relief--These pumps provide flow to back-flush the traveling screens. The pump flowrate is a function of the traveling screen velocity and the amount of screen clogging during pump operations. Under these operating conditions the pump flowrate will vary constantly during pump operation, therefore, it is not possible to establish a repeatable set of pump test conditions.

The licensee indicated in their letter dated December 31, 1986, that they would test these pumps by measuring flowrate, using an ultrasonic flow instrument, and pump differential pressure and compare these values to the pump curve to determine pump hydraulic condition.

2.8.1.1.2 Evaluation--The design of this system prevents the licensee from varying system resistance to establish a reference pump flowrate or differential pressure. Plant conditions may vary significantly from one test to another which will affect the flowrate to the emergency service water intake screens. With these conditions, it is impractical to establish a reference flow or differential pressure and doing so could result in equipment damage. Using the as found conditions and comparing pump flowrate and differential pressure to the pump curve should give a good indication of pump hydraulic condition and allow the detection of pump degradation.

2.8.1.1.3 Conclusion--The reviewer concludes that the licensee's proposed testing provides sufficient information to monitor and evaluate pump condition and to detect pump degradation and is, therefore, acceptable. On this basis, relief should be granted from the Code requirement of establishing a reference pump flowrate or differential pressure.

3. VALVE TESTING PROGRAM

The Shearon Harris Nuclear Power Plant Unit 1 IST Program submitted by Carolina Power and Light Company was examined to verify that all valves included in the program are subjected to the periodic tests required by the ASME Code, Section XI, and the NRC positions and guidelines. The reviewer found that, except as noted in Appendix D or where specific relief from testing has been requested, these valves are tested to the Code requirements and the NRC positions and guidelines summarized in Appendix A of this report. Each Carolina Power and Light Company basis for requesting relief from the valve testing requirements and the reviewer's evaluation of that request is summarized below and grouped according to system and valve category.

3.1 Verify Reverse Flow Closure for Check Valves Inside Containment

3.1.1 Category AC Valves

3.1.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraphs IWV-3411 and -3521, for the following Category AC valves that are located inside containment, and proposed to verify reverse flow closure of these valves by performing a leak test during each refueling outage.

System	Valve	System	Valve
Service Water	1SW-233	Instrument Air	1IA-220
Demineralized Water	1DW-65	Fire Protection	1FP-349
Service Air	1SA-82	Fire Protection	1FP-357
Reactor Coolant	1RC-164	Safety Injection	1SI-182
Chemical and Volume Control	1CS-344	Safety Injection	1SI-290
Chemical and Volume Control	1CS-385	Component Cooling Water	1CC-211
Chemical and Volume Control	1CS-426	Component Cooling Water	1CC-250
Chemical and Volume Control	1CS-471	Component Cooling Water	1CC-298
Chemical and Volume Control	1CS-477		

3.1.1.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing. These valves will be verified closed during Appendix J, Type C leak rate testing at refueling.

3.1.1.1.2 Evaluation--The reviewer agrees that, due to plant design, the only method available to verify valve closure is leak testing. These valves are located inside primary containment and are not equipped with position indication.

3.1.1.1.3 Conclusion--The reviewer concludes that relief should be granted from the exercising interval requirements of Section XI for these valves. The proposed alternate testing of verifying valve closure during the performance of leak rate testing during reactor refueling outages should give reasonable assurance of valve operability as required by the Code and, therefore, is acceptable.

3.2 Main Steam System

3.2.1 Category B Valves

3.2.1.1 Relief Request. The licensee has requested relief from the stroke time measurement requirements of Section XI, Paragraphs IWV-3413 and -3417, for 1MS-T, the auxiliary feedwater turbine steam trip and throttle valve, and 1MS-G, the auxiliary feedwater turbine governor valve, and proposed to verify operability of these valves by observing their operation during the quarterly turbine testing.

3.2.1.1.1 Licensee's Basis for Requesting Relief--The purpose of these valves is to regulate steam flow to the AFW steam driven turbine. Operability is adequately demonstrated by proper turbine operation. Valve position is steam line pressure and turbine speed dependent and therefore will not repeatedly throttle to the same position. During turbine operation these valves move in response to control signals.

In their letter dated March 20, 1987, the licensee stated that valve 1MS-T, the turbine trip and throttle valve, will be full-stroke exercised and have its stroke time measured quarterly during power operations. They also provided the additional justification that the governor valve is hydraulically operated, drawing the hydraulic fluid from the AFW pump. The AFW pump must be running for the governor valve to operate. The governor valve controller senses steam line pressure and turbine speed and automatically adjusts over a limited travel range to maintain AFW pump speed constant. Full-stroking of the governor valve (independent of the speed control function) while the pump is running can lead to overspeed of the pump.

3.2.1.1.2 Evaluation--Since the turbine trip and throttle valve, 1MS-T, is being tested to the Code requirements, relief is not required for 1MS-T. The reviewer agrees that 1MS-G, the turbine governor valve, does not have controls that permit it to be cycled from the fully closed to the fully open position, and the turbine must be in operation in order to provide hydraulic pressure to operate this valve. During turbine operation, this valve is designed to modulate to control turbine speed and will change position in response to changes in steam pressure and turbine speed, therefore, any exercising performed would only be a partial-stroke and measurement of a partial-stroke time would not provide any meaningful information to assess valve condition. Forcing this valve fully open when the turbine is running, to provide hydraulic pressure for the valve operator, could cause a turbine overspeed which could result in damage to the turbine or the pump, therefore, it is not practical to fully open this valve in order to measure its full-stroke time. Observing the proper operation of this valve during the quarterly pump tests should demonstrate that it can perform its safety related function.

3.2.1.1.3 Conclusion--The reviewer concludes that it is not practical to full-stroke exercise 1MS-G for stroke time measurements. The licensee's proposed alternate test for this valve should provide reasonable assurance of valve operability as required by the Code, therefore, relief should be granted from the stroke time measurement requirements of Section XI for 1MS-G. Relief is not required for 1MS-T because it is being tested in accordance with the Code. The licensee should delete 1MS-T from the relief request and add the additional justifications for 1MS-G.

3.2.2 Category C Valves

3.2.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1MS-71 and 73, the main steam to auxiliary feedwater pump turbine check valves, and proposed to partial-stroke exercise these valves quarterly and to disassemble these valves and manually exercise them using a sampling program during refueling outages.

3.2.2.1.1 Licensee's Basis for Requesting Relief--The only possible method to verify forward flow operability is by running the auxiliary feedwater pump turbine at full flow conditions. The quarterly pump test is performed with flow through a minimum flow line which is not a full flow test. These check valves are also safety-related to prevent cross-flow between the main steam lines when the upstream motor operated valves are open (both motor operated valves open on initiation of auxiliary feedwater). To verify reverse flow closure would require blanking (the turbine stop valve is not a leak tight valve) the turbine line, injecting fluid into the line and monitoring upstream of the valves for evidence of gross leakage. Upstream of these valves are the main steam lines and steam generators. Because of the long time to perform this test and the large volume of waste water involved, it is not a practical test method.

Both valves will be partial flow exercised in the forward direction quarterly during auxiliary feedwater pump testing and one of the check valves will be disassembled at refueling and visually inspected. Alternate valves will be inspected at each refueling, unless the inspected valve fails to pass inspection. If either valve fails to pass inspection the other valve will also be disassembled and inspected.

3.2.2.1.2 Evaluation--The reviewer agrees that these valves cannot be full-stroke exercised with flow quarterly during power operations because establishing design accident steam flow through these valves would require that full auxiliary feedwater flow be established, and the only flow path that could handle the necessary auxiliary feedwater flow is into the steam generators which could result in thermal shock to the feedwater piping and nozzles. During shutdown periods when thermal shock is not likely to occur, steam is not available to drive the auxiliary feedwater pump turbine. The normal method to verify reverse flow closure of check valves is to perform a leak test on the valves, however, due to the design of this system, leak testing these valves would require the installation of blank flanges and filling a substantial portion of the steam supply header with liquid, which is not considered to be practical. The licensee's proposal to disassemble, inspect, and manually full-stroke exercise these valves on a sampling basis during refueling outages would verify that the valve disks will move freely and that the valves are not degraded.

3.2.2.1.3 Conclusion--The reviewer concludes that partial-stroke exercising these valves open quarterly during the pump test, and verifying the valve's ability to full-stroke open and to close to restrict reverse flow by disassembly at refueling outages using a sample disassembly inspection program as explained in Appendix A, Item 11, is acceptable and, therefore, relief should be granted from the Section XI exercising requirements for 1MS-71 and 73. The proposed alternate testing should give reasonable assurance of the ability of these valves to perform their safety function in both the open and closed positions as required by the Code.

3.3 Containment HVAC System

3.3.1 Category AC Valves

3.3.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraphs IWV-3400 and -3500, for 1CB-3 and 7, the containment vacuum relief isolation check valves, and 1CM-7, the hydrogen purge makeup isolation valve, and proposed to full-stroke exercise these valves open manually during each refueling outage and verify valve closure by visual observation of the valve disks and seats during refueling outages.

3.3.1.1.1 Licensee's Basis for Requesting Relief--These are inside containment simple check valves and do not have position verification capability. To verify forward flow operability using system fluid would require injecting large quantities of air into the containment and would result in a containment overpressurization condition. The only practical method to verify forward flow operability is by mechanically exercising the valve disk through a complete cycle by hand and measuring the torque required to open the valve using a spring scale. Entry into containment during cold shutdown is limited by plant procedures to perform only necessary repair and maintenance work. In cases of short shutdowns caused by problems external to the containment there may be no entry made into the containment. The method used to verify reverse flow closure is to visually observe that the valve disk closes against the seat during refueling.

3.3.1.1.2 Evaluation--The reviewer agrees that since these valves are located inside containment and have no remote position indication, the only methods available to verify valve closure are leak testing and visual observation that the valve disk will properly engage the valve seat. These valves will be visually observed to close during reactor refueling outages. To full-stroke exercise these valves open with flow would require establishing design accident flowrates into the primary containment which could result in an overpressurization of the containment, therefore, an alternate means should be used to full-stroke exercise these valves. The licensee proposed to manually exercise these valves open during refueling outages. The Code allows for the use of a mechanical exerciser (Paragraph IWV-3522) to exercise a check valve when flow through the valve is not used. A containment entry is required to manually exercise these valves and, therefore, they cannot be exercised quarterly during power operations or during cold shutdowns of short duration when the containment is not opened. These valves should be exercised during cold shutdowns when the containment is opened and during refueling outages.

3.3.1.1.3 Conclusion--The reviewer concludes that relief should be granted from the exercising interval requirements of Section XI for valves 1CB-3, 1CB-7 and 1CM-7 and that the proposed alternate testing of verifying valve closure by visual observation of the valve internals during refueling outages and verifying a full-stroke exercise open of these valves by manually exercising them open utilizing a spring gage to measure torque during cold shutdowns when the containment is opened and during refueling outages should give a reasonable assurance of valve operability required by the Code and, therefore, is acceptable.

3.4 Auxiliary Feedwater System

3.4.1 Category C Valves

3.4.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1AF-54, 73, and 92, the check valves in the motor driven auxiliary feedwater supply to the steam generators, and proposed to full-stroke exercise these valves during cold shutdowns and verify their reverse flow closure by using an acoustical detection technique.

3.4.1.1.1 Licensee's Basis for Requesting Relief--The only way to verify forward flow operability is by operating the motor driven auxiliary feedwater pumps and injecting relatively cold condensate water directly into the hot steam generators. The introduction of cold water into the hot steam generators during normal operation would result in large thermal shock to the feedwater nozzles and could cause cracking of the nozzles. In addition, to test the auxiliary feedwater during normal operation would require starting the auxiliary feedwater pump and securing the normal feedwater system flow, which would have an adverse effect on steam generator water level control and could cause a forced plant shutdown.

Each flow path from the auxiliary feedwater pumps to the feedwater lines includes two check valves in series. Each two check valve set functions to prevent reverse flow from the feedwater line back through to the suction of the auxiliary feedwater pumps. Each line is continuously monitored and alarmed by temperature sensors, which will give an indication if both series valves fail to close.

In their letter dated December 31, 1986, the licensee indicated that these valves will be full-stroke exercised on a cold shutdown frequency as the plant is being taken to the cold shutdown condition. An acoustic detection technique will be used to verify each individual valve in the closed position.

3.4.1.1.2 Evaluation--The reviewer agrees that the only flow path to exercise these check valves with flow would result in the injection of relatively cold condensate storage tank water into the feedwater lines and steam generators. If this flow path were used to exercise these valves quarterly during power operations it could result in thermal shock to the feedwater piping and nozzles which could lead to their premature failure. Therefore, valves 1AF-54, 73, and 92 should not be exercised quarterly during power operations but should be full-stroke exercised on a cold shutdown frequency. Leak testing two series check valves as a pair can only demonstrate that at least one of the two valves is closed but does not verify that the individual valves can perform their safety function in the closed position as required by the Code. An acoustic detection technique was proposed in order to provide an indication that the individual check valve disks come in contact with the valve seats. This method may indicate metallic contact within the valve but may not provide a positive indication of valve closure. The licensee has not provided the NRC staff with sufficient details about this proposed testing method for the reviewer to make a determination if this acoustic detection can provide a reasonable assurance of valve closure.

3.4.1.1.3 Conclusion--The reviewer concludes that these valves should not be exercised quarterly during power operations because of thermal shock considerations. Full-stroke exercising these valves open with flow at cold shutdowns as the plant is being taken to the cold shutdown condition, should provide a reasonable assurance of the ability of these valves to perform their safety function in the open position. The licensee's proposed test to verify reverse flow closure of 1AF-54, 73,and 92 has not been described in sufficient detail for a determination to be made if it can provide a reasonable assurance of individual valve closure, therefore, relief should not be granted from the

Code requirement to verify closure of these valves. The licensee should test these valves by some method that provides a positive indication of the closure of each individual valve.

3.4.1.2 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1AF-65, 84, and 103, the check valves that isolate the auxiliary feedwater lines from the main feedwater headers, and proposed to verify reverse flow closure of these valves by performing a sample disassembly program on a refueling outage frequency.

3.4.1.2.1 Licensee's Basis for Requesting Relief--The system has no design provision for verification of reverse flow closure. The only possible test method involves pressurizing the downstream section of pipe and monitoring an upstream tap for evidence of gross leakage. This method involves filling and draining large segments of the system. Because of the time involved, ALARA considerations and large amounts of wastes, it is not practical to perform testing except at refueling. The only alternative testing is to disassemble and visually inspect each valve.

3.4.1.2.2 Evaluation--The reviewer agrees that the system design does not permit verification of reverse flow closure of these valves during power operations because the system configuration is such that to perform a leak test would require isolation of the normal feedwater flow through this line which could result in steam generator level fluctuations and possibly in a reactor trip. Leak testing these valves during cold shutdowns is not practical because there are no isolation valves between 1AF-65, 84, and 103 and the associated steam generators and no test connections are available between these valves and the upstream isolation valves, therefore, to leak test these check valves it would require depressurizing and draining portions of the main feedwater header and pressurizing the steam generators and portions of the main steam headers. The NRC staff position is that valve disassembly and inspection is an acceptable alternate method to verify valve closure and the appropriate frequency for this testing is during reactor refueling outages as explained in Appendix A, Item 11, of this report.

3.4.1.2.3 Conclusion--The reviewer concludes that relief should be granted from the Section XI requirement to verify reverse flow closure of valves 1AF-65, 84, and 103 quarterly during power operations and during cold shutdowns. The Licensee's proposal to verify reverse flow closure of these check valves by sample disassembly and inspection during refueling outages should provide a reasonable assurance of the ability of these valves to perform their safety-related function and, therefore, is acceptable.

3.4.1.3 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraphs IWV-3520, for 1AF-117, 136, 142 and 148, check valves in the turbine driven auxiliary feedwater supply to the steam generators, and proposed to full-stroke exercise these valves during cold shutdowns and verify their reverse flow closure by use of an acoustic detection technique.

3.4.1.3.1 Licensee's Basis for Requesting Relief--The only way to verify forward flow operability is by operating the motor driven auxiliary feedwater pumps and injecting relatively cold condensate water directly into the hot steam generators. The introduction of cold water into the hot steam generators during normal operation would result in large thermal shock to the feedwater nozzles and could cause cracking of the nozzles. In addition, to test the auxiliary feedwater during normal operation would require starting the auxiliary feedwater pumps and securing the normal feedwater system flow, which would have an adverse effect on steam generator water level control and could cause a forced plant shutdown.

Each flow path from the turbine driven auxiliary feedwater pump to the feedwater lines includes two check valves in series. Each two check valve set functions to prevent reverse flow from the feedwater line back to the auxiliary feedwater pump. The common line is continuously monitored and alarmed by temperature sensors which will give an indication if both series valves fail to close.

In their letter to the NRC dated December 31, 1986, the licensee stated that these valves will be full-stroke exercised on a cold shutdown frequency. An acoustic detection technique will be used to verify each individual valve in the closed position.

3.4.1.3.2 Evaluation--The reviewer agrees that the only flow path to exercise these check valves with flow would result in the injection of relatively cold condensate storage tank water into the feedwater lines and steam generators. If this flow path were used to exercise these valves quarterly during power operations it could result in thermal shocking the feedwater piping and nozzles which could lead to their premature failure. Therefore, valves 1AF-117, 136, 142 and 148 should not be exercised quarterly during power operations but should be full-stroke exercised on a cold shutdown frequency. Leak testing two series check valves as a pair can only demonstrate that at least one of the two valves is closed but does not verify that the individual valves can perform their safety function in the closed position as required by the Code. An acoustic detection technique was proposed in order to provide an indication that the individual check valve disks come in contact with the valve seats. This method may indicate metallic contact within the valve but may not provide a positive indication of valve closure. The licensee has not provided the NRC staff with sufficient details about this proposed testing method for the reviewer to make a determination if acoustic detection can provide reasonable assurance of valve closure.

3.4.1.3.3 Conclusion--The reviewer concludes that these valves should not be exercised quarterly during power operations because of thermal shock considerations. Full-stroke exercising these valves open with flow at cold shutdowns should provide reasonable assurance of the ability of these valves to perform their safety function in the open position. The licensee's proposed test to verify reverse flow closure of 1AF-117, 136, 142 and 148 has not been described in sufficient detail for a determination to be made that it can provide reasonable assurance of individual valve closure, therefore, relief should not be granted from the Code requirement to verify closure of these valves. The licensee should test these valves by some method that provides a positive indication of the closure of each individual valve.

3.5 Condensate System

3.5.1 Category C Valves

3.5.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1CE-36, 46, and 56, the check valves in the lines from the condensate storage tank to the auxiliary feedwater pump suctions, and proposed to partial-stroke exercise these valves open quarterly, full-stroke exercise them open on a cold shutdown frequency, and to verify reverse flow closure of these valves by disassembling and inspecting them on a sampling basis during refueling outages.

3.5.1.1.1 Licensee's Basis for Requesting Relief--These valves are in the line from the condensate storage tank to the auxiliary feedwater pump inlet and are upstream from the cross-tie with the service water system. In this location the valves prevent back-flow from the service water system into the condensate storage tank. The only possible method to verify reverse flow closure would be by monitoring for a increase in tank level. This technique is not possible in this case because of the volume of the tank and the normal level changes which occur during normal operation. The only way to verify full forward operability is by operating the auxiliary feedwater pumps and injecting relatively cold condensate water directly into the hot steam generators. The introduction of cold water into the steam generators during normal operation would result in large thermal shock to the feedwater nozzles and could cause cracking of the nozzles. In addition, to test the auxiliary feedwater during normal operation would require starting the auxiliary feedwater pumps and securing the normal feedwater system flow, which would have an adverse effect on steam generator water level control and could cause a forced plant shutdown. These valves will be partial-stroke exercised during quarterly pump testing with flow through the small pump recirculation lines and back to the condensate storage tank. These valves will be full-stroke exercised on a cold shutdown frequency, either when going into cold shutdown or during the shutdown when the steam generator water level has been reduced sufficiently to allow full flow.

One valve will be disassembled and visually inspected at refueling and alternate valves will be done during subsequent refuelings. Only one valve will be inspected at a refueling unless it fails to pass inspection. Failure to pass inspection will initiate disassembly and inspection of the other two valves.

3.5.1.1.2 Evaluation--The reviewer agrees that these valves cannot be full-stroke exercised quarterly during power operations because the only full flow path through these valves results in injecting relatively cold water into the feed header and steam generators which could thermal shock the feedwater piping and nozzles and cause premature failure of these components. These valves can be partial-stroke exercised quarterly and full-stroke exercised open on a cold shutdown frequency. A valve disassembly and inspection can verify that the valve disks will move to the valve seats and that the valve internals are in good condition.

Appendix A, Item 11, states that in order to group valves together in a sample disassembly program the valves should be of the same manufacturer, size, model, materials of construction, and have the same service conditions. Valves 1CE-36, 46, and 56 meet these criteria except for valve size with 1CE-36 and 46 being 6 inch valves and 1CE-56 being an 8 inch valve. Since all other factors are identical for these valves, the reviewer feels that even with the size disparity, these valves should be allowed to be grouped together because any failure mechanisms should be common for all three valves.

Revision 3 of the licensee's IST program, dated September 16, 1986, indicates that 1CE-56, the suction check valve for the turbine driven auxiliary feedwater pump, cannot be full-stroke exercised during cold shutdowns, however, the licensee stated in their letter dated March 20, 1987, that 1CE-56 will be full-stroke exercised on the way to cold shutdowns when the turbine driven auxiliary feedwater pump is being tested. The licensee should modify the appropriate relief request to more accurately indicate the testing to be performed on this valve.

3.5.1.1.3 Conclusion--The reviewer concludes that a partial-stroke exercise during the quarterly pump test and full-stroke exercise on a cold shutdown frequency would provide reasonable assurance that these valves can perform their safety function in the open position. The reviewer also concludes that valve disassembly and inspection on a sampling basis during refueling outages, as explained in Appendix A Item 11, should provide reasonable assurance of the ability of these valves to perform their safety-related function in the closed position. On this basis, the licensee's proposed alternate testing is acceptable, therefore, relief should be granted from the exercising requirements of Section XI for valves 1CE-36,46, and 56.

3.6 Containment Spray System

3.6.1 Category AC Valves

3.6.1.1. Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraphs IWV-3410 and -3520, for 1CT-53 and 91, the containment spray header check valves inside containment, and proposed to verify the open function of these valves by disassembling, inspecting, and manually exercising the valve disks during refueling outages on a sampling basis and verifying valve closure by leak rate testing in conjunction with the Appendix J, Type C testing at refueling outages.

3.6.1.1.1 Licensee's Basis for Requesting Relief--Since there is no test recirculation line the only way to verify forward flow operability would be by using the pumps and injecting a large quantity of water into the containment. Spraying the containment would result in extensive damage to safety-related equipment located inside containment. Using air as a test medium is not practical since large segments of the system would have to be drained and high pressure air pumped into the system through a small test connection. The amount of air that could be injected using this method would be insufficient to verify full stroke opening and could result in an overpressurization of the containment structure. The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

One of the valves will be disassembled and visually inspected at refueling. Valve inspections will alternate with subsequent refuelings. Failure to pass inspection will initiate disassembly and inspection of the other valve. Reverse flow closure will be verified during Appendix J, Type C, valve leak testing at refueling.

3.6.1.1.2 Evaluation--The reviewer agrees that, due to system design, the only method available to exercise these containment spray header check valves with flow would establish spray flow into the containment which could result in damage to both safety-related and non-safety-related equipment inside containment and require extensive cleanup. Valve disassembly, inspection, and manual full-stroke exercising to verify freedom of movement of the valve disk is an acceptable alternate testing method and is the only method currently available to the licensee to verify the forward flow ability of these valves. The reverse flow closure of these valves can be verified by leak testing which will be performed in conjunction with Appendix J, Type C, leak rate testing at refueling outages.

3.6.1.1.3 Conclusion--The reviewer concludes that relief should be granted from the Section XI exercising interval requirements for valves 1CT-53 and 91 because their open function is verified by valve disassembly, inspection, and manual exercise on a sampling basis at refueling outages in accordance with the guidelines of Appendix A, Item 11; also, the reverse flow closure is verified by the Appendix J, Type C, leak rate test at refueling outages. The reviewer concludes that this proposed alternate testing will give a reasonable assurance of valve operability as required by the Code and, therefore, is acceptable.

3.7 Instrument Air System

3.7.1 Category C Valves

3.7.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1IA-784, 785, 786, 787, 788, and 789, the instrument air supply check valves to the accumulators for the air operated valves inside containment, and proposed to verify valve closure by disassembly and inspection of one of the upstream and one of the downstream check valves during each refueling outage.

3.7.1.1.1 Licensee's Basis for Requesting Relief--Each fill line to the accumulators contains two simple check valves in series and there are no system provisions for individual valve closure verification. Only one automatic actuating valve is required to isolate the non-classed instrument air system from the accumulators. The two valves function as a single unit and if either of them close proper operation of the accumulators is assured. To verify reverse flow closure of the unit requires isolating and depressurization of a large segment of the Instrument Air System for an extended length of time. Loss of instrument air during operation would cause loss of instrumentation needed for normal operations. Because of the time required to perform testing, performing verification at cold shutdown could cause delays in returning the plant to normal operations. These valves will be tested to verify reverse flow closure at refueling when the instrument air system can be taken out of service.

3.7.1.1.2 Evaluation--The reviewer agrees that isolating instrument air to verify valve reverse flow closure during plant operation is not practical because this would cause a loss of instrument air to plant equipment that is required for normal plant operations, which could lead to a plant trip. The current system configuration does not provide a means to individually verify the reverse flow closure capability of these series check valves. Although the licensee proposed to test each pair of series valves together as a single check valve in Revision 1 of their IST program, when informed that each valve must be individually verified to close, the licensee proposed to verify the reverse flow closure capability of these valves by using a sampling disassembly and inspection program with the upstream valves forming one group and the downstream valves forming a second group. This proposal was made in the A. B. Cutter to H. R. Denton letter dated December 31, 1986, but the staff has not received a revised relief request for these valves. The reviewer agrees that a disassembly and inspection of these valves would provide an indication that the valve disk moves freely to the seat and that the valve internals are free from wear and corrosion and are in good mechanical condition, therefore, this testing method would provide a reasonable assurance of the reverse flow closure capability of these check valves. The licensee has proposed to disassemble these valves as described in the NRC staff's positions and guidelines for sample disassembly and inspection of check valves in Appendix A, Item 11.

3.7.1.1.3 Conclusion--The reviewer concludes that relief should be granted from the Section XI testing interval requirements for valves 1IA-784, 785, 786, 787, 788, and 789 because verifying the reverse flow closure of these valves quarterly could result in a plant shutdown and the only practical method of verifying closure involves valve disassembly which is performed during reactor refueling outages in accordance with the NRC staff's positions on this topic as explained in Appendix A, Item 11. The reviewer concludes that the licensee's proposed testing of sample disassembly should provide a reasonable assurance of the reverse flow closure capability of these check valves and is, therefore, acceptable.

3.8 Chemical and Volume Control System

3.8.1 Category A Valves

3.8.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3410, for 1CS-341, 382, 423, 470 and 472, the reactor coolant pump seal water flow containment isolation valves, and proposed to exercise and measure the full-stroke time at cold shutdowns when the reactor coolant system is open to the atmosphere and during refueling outages.

3.8.1.1.1 Licensee's Basis for Requesting Relief--Exercising these valves during normal operation or at cold shutdown results in a loss of normal seal water to the RCS Pump Seals. If seal water is terminated, Reactor Coolant is forced from the high pressure RCS into the seals. Reactor Coolant normally contains a high particulate matter concentration which is carried with RCS inleakage and contaminates the seals. Westinghouse has studied this problem (see Westinghouse Document NSD TB-7515, 1978) and recommends that seal flow be maintained at cold shutdown as well as during normal operations.

These valves will be exercised and timed during those cold shutdowns when the reactor coolant system is open, vented, and drained to the top of the vessel flange and at refueling when the RCS pressure is low enough to minimize particulate intrusion into the seals.

3.8.1.1.2 Evaluation--The reviewer agrees that exercising these normally open valves closed would interrupt seal water flow to the reactor coolant pump seals and loss of seal water flow during power operation could result in damage to the reactor coolant pump seals and possible seal failure. A failed reactor coolant pump seal could result in leakage of reactor coolant from the reactor coolant system. Exercising these valves during cold shutdowns would secure reactor coolant pump seal flow and if the reactor coolant system were pressurized, the higher pressure in the reactor coolant system could cause flow across the pump seals which could introduce particulate suspended in the coolant into the pump seals which could accelerate seal wear and result in premature seal failure. Testing these valves during refueling outages and those cold shutdowns when the reactor coolant system is vented or opened to the atmosphere would not result in damage to the pump seals since there would be insufficient differential pressure across the seals to result in the flow of suspended particulate into the seals.

3.8.1.1.3 Conclusion--The reviewer concludes that relief should be granted from the Section XI exercising frequency requirements for valves 1CS-341, 382, 423, 470, and 472 and that these valves should be tested at refueling outages and those cold shutdowns when the reactor coolant system is vented or open to the atmosphere. This testing interval should give reasonable assurance of valve operability as required by the Code and, therefore, is acceptable.

3.8.3 Category C Valves

3.8.3.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1CS-178, 192, and 206, the charging pump discharge line check valves, and proposed to partial-stroke exercise these valves quarterly and full-stroke them open during each refueling outage.

3.8.3.1.1 Licensee's Basis for Requesting Relief--These charging pump discharge check valves cannot be verified for full flow operability quarterly. Normal operating charging flow is automatically controlled by downstream flow control valve (1CS-231) in response to RCS operating conditions. To inject full flow into the RCS during normal operation would result in undesirable RCS boron concentrations and system pressure, temperature and level transients. Full-stroke exercising these valves at cold shutdown would result in RCS pressure and level transients due to limitations on letdown capability. These valves will be partial-stroke exercised quarterly and verification of full forward flow operability performed at refueling.

3.8.3.1.2 Evaluation--The reviewer agrees that the only full flow path through these valves is into the reactor coolant system and establishing design accident flow through these valves to full-stroke exercise them quarterly during power operation could result in disturbances to reactor coolant system temperature and pressure control, loss of pressurizer level control, and fluctuations in the reactivity control, which could lead to a reactor trip. Establishing design accident flow through these valves into the reactor coolant system during cold shutdowns would add inventory since the high head injection flowrate is much higher than maximum letdown flow, therefore, the reactor coolant system inventory and pressure would rise which could result in a low-temperature overpressurization of the RCS. These valves can be partial-stroke exercised quarterly during power operation utilizing the normal charging flow path and full-stroke exercised during refueling outages when an adequate expansion volume is available to accommodate full high head injection flowrate.

3.8.3.1.3 <u>Conclusion</u>--The reviewer concludes that relief should be granted from the Section XI exercising interval requirements for valves 1CS-178, 192, and 206. Partial-stroke exercising these valves quarterly and full-stroke exercising them during refueling outages should provide reasonable assurance of valve operability as required by the Code and, therefore, is acceptable.

3.9 Safety Injection System

3.9.1 Category A Valves

3.9.1.1 <u>Relief Request</u>. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3410, for 1SI-52, 86, and 107, the isolation valves in the safety injection lines to the reactor coolant system hot legs, and proposed to full-stroke exercise and measure the stroke times for these valves during refueling outages.

3.9.1.1.1 <u>Licensee's Basis for Requesting Relief</u>--Exercising these valves during normal operation would result in injecting charging water flow directly into the RCS. This diverted charging water bypasses the regenerative heat exchanger which could cause thermal shocking to RCS piping and could also cause an overtemperature condition in the normal CVCS letdown line. At cold shutdown one charging pump is running (Technical Specification 3.5.3 states that a maximum of one charging pump shall be operating when RCS temperature is less than or equal to 335 degrees F). This pump is supplying both reactor coolant pump seals and required charging water. Seal water flow is maintained during cold shutdown to preclude damage to the pump seals, thus if these valves were exercised at cold shutdown charging water would be injected into the RCS and a cold overpressurization of the RCS could result. These valves will be exercised and timed at refueling outages.

3.9.1.1.2 <u>Evaluation</u>--The reviewer agrees that exercising these valves open during power operations would result in flow through the injection flow path into the RCS hot legs, the injected water would not flow through the regenerative heat exchanger and would, therefore, be relatively cold and cause thermal shock to the piping and nozzles which could result in premature component failure. Opening these valves would also increase the charging flow into the RCS and could cause temperature, pressure, and pressurizer level control disturbances which could result in a reactor trip. These valves should not be exercised during cold shutdowns when a charging pump is running and the RCS is not vented or open to atmosphere, because this would result in an increased flow into the RCS when there is not an adequate expansion volume which could cause a low-temperature overpressurization of the RCS. A charging pump is maintained in operation during most cold shutdowns to provide makeup flow and flow to the reactor coolant pump seals. The RCS is very seldom vented or open to the atmosphere during cold shutdowns, therefore, there would be very few cold shutdowns when conditions would allow exercising these valves.

3.9.1.1.3 <u>Conclusion</u>--The reviewer concludes that conditions will exist during refueling outages that permit exercising and stroke time measurement for 1ST-52, 86, and 107 which will demonstrate the operability of these valves and allow for the detection of any degradation. This testing should provide reasonable assurance of valve operability as required by the Code, therefore, relief should be granted from the Section XI testing interval requirements for these valves.

3.9.2 <u>Category AC Valves</u>

3.9.2.1 <u>Relief Request</u>. The licensee has requested relief from the exercising requirements of Section XI, Paragraphs IWV-3410 and -3520, for 1SI-249, 250, 251, 252, 253, and 254, the accumulator discharge check valves, and proposed to partial-stroke exercise these valves at cold shutdowns and to disassemble, inspect, and manually exercise the valve disks during refueling outages on a sampling basis.

3.9.2.1.1 <u>Licensee's Basis for Requesting Relief</u>--The accumulator tanks are isolated from the RCS by these normally closed check valves. Each accumulator is charged with a nitrogen blanket at approximately 650 psig, which is insufficient to inject into the RCS during normal operation. To exercise these valves to their full open position at cold shutdown would inject approximately 925 cubic feet of high boron content water into the RCS, which could cause a cold overpressurization of the RCS. Dumping the full accumulator inventory into the RCS at refueling could flush large amounts of crud into the RCS and cleanup systems. High particulates in the RCS at refueling reduces visibility for refueling operations and generates large amounts of contaminated wastes, which could lengthen the outage and increase personnel exposures.

Partial forward flow operability will be verified at cold shutdown by performing an accumulator partial dump test. In addition one valve will be disassembled and visually inspected at refueling. Valve inspections will alternate with subsequent refuelings. Failure of a valve to pass inspection will either initiate inspection of the remaining valves or initiate verification of the remaining valves by accumulator injection into the RCS.

3.9.2.1.2 Evaluation--The reviewer agrees that these valves cannot be exercised during power operations because accumulator pressure cannot overcome reactor coolant system pressure. Exercising these valves during cold shutdowns could result in a low-temperature overpressurization of the reactor coolant system. Full-stroke exercising these valves during refueling outages when the reactor vessel head is removed to provide an adequate expansion volume could damage reactor vessel internal components and stir up crud and particulates in the reactor vessel due to excessive flow rates. These valves are partial-stroke exercised during cold shutdowns by performing a partial accumulator dump test at reduced pressures. Disassembling, inspecting, and manually full-stroke exercising the valve disks on a sampling basis during refueling outages would verify that the valve disks will move freely and will perform their safety-related function and that they are not degraded.

3.9.2.1.3 Conclusion--The reviewer concludes that partial-stroke exercising 1SI-249, 250, 251, 252, 253, and 254 open during cold shutdowns and disassembling, inspecting, and manually exercising them in accordance with the guidelines of Appendix A, Item 11 of this report is an acceptable alternate testing method. This testing should provide reasonable assurance of the ability of these valves to perform their safety function, therefore, relief should be granted from the Section XI exercising interval requirements for these valves.

3.9.3 Category C Valves

3.9.3.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for the following check valves in the safety injection lines to the reactor coolant system and proposed to full-stroke exercise these valves during refueling outages when the reactor vessel head is removed to provide an adequate expansion volume for the required flow.

1SI-8	1SI-72	1SI-104	1SI-127	1SI-138
1SI-9	1SI-73	1SI-105	1SI-128	
1SI-10	1SI-74	1SI-106	1SI-129	

3.9.3.1.1 Licensee's Basis for Requesting Relief--Verification of forward flow operability can only be performed by injecting charging water into the RCS. The charging pumps have insufficient head to overcome normal RCS operating pressure for a full flow test. Partial testing using the charging pumps would inject CVCS water which has bypassed the regenerative heat exchanger and could result in thermal shocking to the RCS piping. Forward flow verification at cold shutdown could result in a cold overpressurization of the RCS. These valves will be tested by verifying forward flow operability at refueling when the reactor vessel head is removed and full charging pump flow can be injected into the RCS.

3.9.3.1.2 Evaluation--The reviewer agrees that when the reactor coolant system is at normal operating pressures, design accident injection flowrate cannot be established through these valves because the only full flow path is into the reactor coolant system, therefore, these valves cannot be full-stroke exercised quarterly during power operations. Partial-stroke exercising these valves during power operations would inject relatively cold water into the RCS which could thermal shock the injection piping and nozzles and cause premature failure of these system components. Also, establishing injection flow into the RCS could cause reactivity, temperature, pressure, and pressurizer level control transients which could result in a reactor trip. These valves should not be exercised during cold shutdowns where the RCS is not vented or open to the atmosphere because injecting into the RCS when there is not an adequate expansion volume could result in low-temperature overpressurization of the RCS. These valves can be full-stroke exercised during refueling outages when the reactor vessel head has been removed.

3.9.3.1.3 Conclusion--The reviewer concludes that relief should be granted from the Section XI exercising interval requirements for these valves. Full-stroke exercising these valves during refueling outages when the vessel head is removed should provide reasonable assurance of valve operability as required by the Code and, therefore, is acceptable.

3.10 Component Cooling Water System

3.10.1 Category A Valves

3.10.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3410, for 1CC-208, 249, 251, 297, and 299, the containment isolation valves for the component cooling water supply and return for the reactor coolant pumps, and proposed to exercise these valves during those cold shutdowns when the RCS drops below 200 degrees F and all reactor coolant pumps are stopped and during refueling outages.

3.10.1.1.1 Licensee's Basis for Requesting Relief--These are the containment isolation and block valves in the RCP thermal barrier and bearing oil coolers lines. A loss of cooling water for more than a few minutes could result in extensive damage to the reactor coolant pumps. Westinghouse Document 1B5710-100-07A states that cooling water must be provided to the pumps at all times when the RCS temperature is above 200 degrees F. Because of local temperature variations in the RCS at RCS temperatures near 200 degrees F, at least one RCP may be kept in operation during short duration cold shutdowns where the RCS temperature is maintained near 200 degrees F. It is felt that under these conditions stopping cooling water to the operating pump could contribute to pump degradation and require pump repair.

3.10.1.1.2 Evaluation--The reviewer agrees that exercising these valves would isolate cooling water flow to the reactor coolant pumps which could damage the pumps if they are operating, thereby, causing their premature failure. Pump failure during power operations would result in a plant trip, therefore, it is not practical to exercise these valves quarterly during power operations. Occasionally system conditions do not permit securing all reactor coolant pumps during cold shutdowns, therefore, it is not practical to exercise these valves during those cold shutdowns when the RCS temperature remains above 200 degrees F and one or more reactor coolant pump remains in operation, because that testing could damage the pump and require repairs that could delay plant startup. Exercising these valves during each cold shutdown when conditions allow all reactor coolant pumps to be stopped and during refueling outages should demonstrate proper operability of these valves.

3.10.1.1.3 Conclusion--The reviewer concludes that relief should be granted from the exercising frequency requirements of the Code for valves 1CC-208, 249, 251, 297, and 299 because it is not practical to test these valves quarterly and the licensee's proposal to exercise these valves and measure their full-stroke times during cold shutdowns when all reactor coolant pumps may be stopped and during refueling outages, should provide an indication of valve condition and degradation as required by the Code and, therefore, is acceptable.

3.10.2 Category B Valves

3.10.2.1 Relief Request--The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3410, for 1CC-207, an isolation valve in the component cooling water supply to the reactor coolant pumps, and proposed to exercise this valve during those cold shutdowns when the RCS temperature drops below 200 degrees F and all reactor coolant pumps are stopped and during refueling outages.

3.10.2.1.1 Licensee's Basis for Requesting Relief--This is a block valve in the RCP thermal barrier and bearing oil coolers supply line. A loss of cooling water for more than a few minutes could result in extensive damage to the reactor coolant pumps. Westinghouse Document 1B5710-100-07A states that cooling water must be provided to the pumps at all times when the RCS temperature is above 200 degrees F. Because of local temperature variations in the RCS at RCS temperatures near 200 degrees F, at least one RCP may be kept in operation during short duration cold shutdowns where the RCS temperature is maintained near 200 degrees F. It is felt that under these conditions stopping cooling water to the operating pump could contribute to pump degradation and require pump repairs.

3.10.2.1.2 Evaluation--The reviewer agrees that exercising this valve would isolate cooling water flow to the reactor coolant pumps which could damage the reactor coolant pumps if they are operating, thereby, causing their premature failure. Pump failure during power operations would result in a plant trip, therefore, it is not practical to exercise this valve quarterly during power operations. Occasionally system conditions do no permit securing all reactor coolant pumps during cold shutdowns, therefore, it is not practical to exercise this valve during those cold shutdowns when the RCS temperature remains above 200 degrees F and one or more reactor coolant pumps remain in operation, because that testing could damage the pump and require repairs that could delay plant startup. Exercising this valve during each cold shutdown when conditions allow all reactor coolant pumps to be stopped and during refueling outages should demonstrate the operability of this valve.

3.10.2.1.3 Conclusion--The reviewer concludes that relief should be granted from the exercising frequency requirements of the Code for valve 1CC-207 because it is not practical to test this valve quarterly and the licensee's proposal to exercise this valve and measure its full-stroke times during cold shutdowns when all reactor coolant pumps may be stopped and during refueling outages, should provide an indication of valve condition and degradation as required by the Code and, therefore, is acceptable.

3.10.3 Category C Valves

3.10.3.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1CC-216, 227, and 238, the component cooling water to reactor coolant pump check valves, and proposed to disassemble and inspect these valves on a sampling basis during refueling outages.

3.10.3.1.1 Licensee's Basis for Requesting Relief--The Westinghouse RCS pumps must have cooling water to the bearing oil coolers and thermal barriers at all times when the RCS temperature is above 200 degrees F, and there are no installed taps or position indicators that could be used to verify reverse flow closure. Any possible test involves verification of these and associated upstream non-safety-related check valves as a single unit. To verify reverse flow closure at cold shutdown would involve draining large segments of the system and providing an alternate source of pressurized water inside the containment which may not be accessible during cold shutdowns. Also, this test would involve waste processing of the water removed for testing and of the water used for testing. This type of testing would involve an excessive amount of time and personnel and could cause delays in plant startup.

One valve will be disassembled and visually inspected at refueling and alternate valves will be done during subsequent refuelings. Only one valve will be inspected at a refueling unless it fails to pass inspection. Failure to pass inspection will initiate disassembly and inspection of the other two valves.

3.10.3.1.2 Evaluation--The reviewer agrees that securing cooling flow to the reactor coolant pump bearing oil coolers and thermal barriers during power operations or anytime the RCS temperature is above 200 degrees F could result in damage to the reactor coolant pumps and cause premature failure. Due to system design, there is no practical method of verifying closure of these valves during cold shutdowns. The draining and refilling of portions of the system to test these valves during cold shutdowns could delay plant startup. Disassembling, inspecting, and manually assuring that the valve disk will move freely to the valve seat can show that a valve can perform its safety function and that it is not degraded. The licensee proposes to disassemble and inspect these valves on a sampling basis during refueling outages.

3.10.3.1.3 Conclusion--The reviewer concludes that relief should be granted from the Section XI exercising interval requirements for valves 1CC-216, 227, and 238. Valve disassembly, inspection, and manual exercising in accordance with the guidelines of Appendix A, Item 11 of this report should provide reasonable assurance of valve operability as required by the Code and, therefore, is acceptable.

3.10.3.2 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 1CC-118 and 119, series check valves in the sample return line to the component cooling water system, and proposed to make a system modification that will permit individually verifying reverse flow closure of these valves or removing the internals of one valve so a leak test can verify closure of the remaining valve.

3.10.3.2.1 Licensee's Basis for Requesting Relief--These are series check valves in the sample return line to the component cooling water (CCW) system. Only one check valve is required to isolate the non-classed sampling system from the CCW. If either valve closes on flow reversal, the system requirements are satisfied. The second valve has been installed as a backup to the safety-related valve as an operating convenience. The current system design only permits a leak test of both valves as a pair which does not verify closure of each individual valve.

In their letter dated December 31, 1986, the licensee indicated that a plant modification will be made to either allow verifying closure of the individual valves by installing a test tap between them, or removing the internals of one valve so the remaining valve can be verified to close.

3.10.3.2.2 Evaluation--The reviewer agrees that the current system design does not facilitate verification of reverse flow closure of valves 1CC-118 and 119. Valve disassembly, inspection, and manual exercising would be the only method to verify individual valve closure with the current system configuration. There is no test tap between these valves, therefore, they can only be leak tested as a pair, which can only determine that at least one of the two valves is closed, but provides no information about which valve is closed or about the condition of the other valve. The installation of a test tap between these valves would permit each valve to be leak tested to verify closure, which would meet the Code requirement of a positive indication that these valves will stroke to the position required to perform their safety-related function. The licensee has stated that only one check valve is required to perform the safety function in the closed position, therefore, removing the internals of one valve so the remaining valve can be leak tested, will also allow the licensee to meet the Section XI testing requirements.

3.10.3.2.3 Conclusion--The reviewer concludes that the licensee's proposal to make system modifications in order to allow the Section XI testing to be performed is acceptable. The only test that can verify individual valve closure prior to making one of the proposed modifications is a valve disassembly and inspection which is performed during refueling outages. Therefore, the licensee should disassemble and inspect these valves on a refueling outage frequency until a modification is made that permits the Code required testing to be performed.

APPENDIX A
NRC STAFF POSITIONS AND GUIDELINES

APPENDIX A

NRC STAFF POSITIONS AND GUIDELINES

1. FULL-STROKE EXERCISING OF CHECK VALVES

The NRC staff's position is that check valves whose safety function is to open are expected to be full-stroke exercised open. Since the disk position is not always observable, the staff position is that verification of the maximum flow rate through the check valve identified in any of the plant's safety analyses would be an adequate demonstration of the full-stroke requirement. Any flow rate less than this will be considered partial-stroke exercising unless it can be shown that the check valve's disk position at the lower flow rate would permit maximum required flow through the valve. It is the NRC staff position that this reduced flow rate method of demonstrating full-stroke capability is the only test that requires measurement of the differential pressure across the valve.

2. VALVES IDENTIFIED FOR COLD SHUTDOWN EXERCISING

The Code permits valves to be exercised during cold shutdowns when exercising is not practical during plant operation and these valves are specifically identified by the licensee and are full-stroke exercised during cold shutdowns, therefore, the licensee is meeting the requirements of the ASME Code. Since the licensee is meeting the requirements of the ASME Code, it is not necessary to grant relief; however, during our review of the licensee's IST program, we have verified that it is not practical to exercise these valves during power operations and that we agree with the licensee's basis.

It should be noted the NRC differentiates, for valve testing purposes, between the cold shutdown mode and the refueling mode. That is, for valves identified for testing during cold shutdowns, it is expected that the tests will be performed both during cold shutdowns and each refueling outage. However, when relief is granted to perform tests on a refueling outage frequency, testing is expected only during each refueling outage. In addition, for extended outages, tests being performed are expected to be maintained as closely as practical to the Code-specified frequencies.

3. CONDITIONS FOR VALVE TESTING DURING COLD SHUTDOWNS

Cold shutdown testing of valves identified by the licensee is acceptable when the following conditions are met:

1. The licensee is to commence testing as soon as the cold shutdown condition is achieved, but no later than 48 hours after shutdown, and continue until the testing has been completed or the plant is ready to return to power.

2. Completion of all valve testing is not a prerequisite to return to power.

3. Any testing not completed during one cold shutdown should be performed during any subsequent cold shutdowns starting from the last test performed at the previous cold shutdown.

4. For planned cold shutdowns, where ample time is available and testing all of the valves identified for the cold shutdown test frequency in the IST program will be accomplished, exceptions to the 48 hours may be taken.

4. CATEGORY A VALVE LEAK TEST REQUIREMENTS FOR CONTAINMENT ISOLATION VALVES

All containment isolation valves (CIVs) that are Appendix J, Type C, leak tested should be included in the IST program as Category A or A/C valves. The NRC has concluded that the applicable leak test procedures and requirements for containment isolation valves are determined by 10 CFR 50, Appendix J. Relief from Paragraphs IWV-3421 through -3425 (1983 Edition through Summer 1983 Addenda) for containment isolation valves presents no safety problem since the intent of these paragraphs is met by the Appendix J requirements, however, the licensee must comply with the

Analysis of Leakage Rates and Corrective Action requirements of Paragraphs IWV-3426 and -3427. Based on the considerations discussed above, the NRC staff has concluded that the alternate testing proposed will give reasonable assurance of valve leak-tight integrity as required by the Code.

5. APPLICATION OF APPENDIX J TESTING TO THE IST PROGRAM

The Appendix J review of this plant is completely separate from the IST program review. However, the determinations made by the Appendix J review are directly applicable to the IST program. The NRC staff's position is that if any changes are made to the Appendix J program, the licensee should amend their IST program accordingly.

6. SAFETY-RELATED VALVES

The review was limited to valves whose functions is safety-related. Valves whose function is safety-related are defined as those valves that are needed to mitigate the consequences of an accident and/or to shutdown the reactor to the cold shutdown condition and to maintain the reactor in a cold shutdown condition. Valves in this category would typically include certain ASME Code Class 1, 2, and 3 valves and could include some non-Code class valves. It should be noted that the licensee may have included valves whose function is not safety-related in their IST program as a decision on their part to expand the scope of their program.

7. ACTIVE VALVES

The NRC staff position is that active valves are those for which changing position may be required to shutdown a reactor to the cold shutdown condition or in mitigating the consequences of an accident. Included are valves which respond automatically to an accident signal, such as safety injection, and valves which may be optionally utilized but are subject to plant operator actions, such as service water supply to the steam generators and valves utilized to establish long term recirculation following a LOCA.

8. RAPID-ACTING POWER OPERATED VALVES

The NRC staff has identified rapid-acting power operated valves as those which stroke in 2 seconds or less. Relief from the trending requirements of Section XI [Paragraph IWV-3417(a), 1983 Edition through Summer 1983 Addenda] presents no safety concerns for these valves since variations in stroke time will be affected by slight variations in the response time of the personnel performing the tests. However, the staff does require that the licensee assign a maximum limiting stroke time of 2 seconds to those valves in order to obtain this Code relief.

9. VALVES WHICH PERFORM A PRESSURE BOUNDARY ISOLATION FUNCTION

The following valves have been identified by the licensee as pressure boundary isolation valves (PIVs) and have been categorized accordingly. These valves are individually leak rate tested by the licensee in accordance with Shearon Harris Technical Specification Surveillance Requirements 4.4.6.2.2.

Valve	Function	Category
1SI-249	Accumulator discharge check	A/C
1SI-251	Accumulator discharge check	A/C
1SI-253	Accumulator discharge check	A/C
1SI-250	Accumulator second discharge check	A/C
1SI-252	Accumulator second discharge check	A/C
1SI-254	Accumulator second discharge check	A/C
1RH-1	Residual heat removal pump suction isol.	A
1RH-2	Residual heat removal pump suction isol.	A
1RH-39	Residual heat removal pump suction isol.	A
1RH-40	Residual heat removal pump suction isol.	A
1SI-134	Safety injection header check	A/C
1SI-135	Safety injection header check	A/C

Valve	Function	Category
1SI-346	Safety injection header check	A/C
1SI-347	Safety injection header check	A/C
1SI-356	Safety injection header check	A/C
1SI-357	Safety injection header check	A/C
1SI-358	Safety injection header check	A/C
1SI-359	Hot leg injection isolation valve	A

10. PRESSURIZER POWER OPERATED RELIEF VALVES

The NRC has adopted the position that the pressurizer power operated relief valves should be included in the IST program as Category B valves and be tested to the requirements of Section XI. However, since the PORVs have shown a high probability of sticking open and are not needed for overpressure protection during power operation, the NRC has concluded that quarterly exercising during power operation should not be performed.

The PORVs function during reactor startup and shutdown is to protect the reactor vessel and coolant system from low-temperature overpressurization conditions and should be exercised prior to initiation of system conditions for which vessel protection is needed.

The following test schedule is recommended:

1. Full-stroke exercising should be performed at <u>each</u>[a] cold shutdown or, as a minimum, once each refueling cycle.

2. Stroke timing should be performed at <u>each</u> cold shutdown or, as a minimum, once each refueling cycle.

a. The staff position described in Section 3 of Appendix A regarding cold shutdown testing is not applicable to the PORVs; however, in the case of frequent cold shutdowns, testing of the PORVs is not required more often than each three months.

3. Fail-safe actuation testing should be performed at <u>each</u> cold shutdown.

4. The PORV block valves should be included in the IST program and tested quarterly to provide protection against a small break LOCA should a PORV fail open.

The licensee has included the PORVs and the associated block valves in the IST program and is testing them in accordance with the above guidelines.

11. CHECK VALVE SAMPLING DISASSEMBLY/INSPECTION PROGRAM

The NRC staff has concluded that a valve sampling disassembly/inspection utilizing a manual full-stroke exercise of the valve disk is an acceptable method to verify a check valve's full-stroke capability. This program involves grouping similar valves together and testing one valve in each group during each refueling outage. The sampling technique requires that each valve in the group be of the same design (manufacturer, size, model number and materials of construction) and have the same service conditions. Additionally, at each disassembly it must be verified that the disassembled valve is capable of full-stroking and the its internals are structurally sound (no loose or corroded parts).

A different valve of each group is required to be disassembled, inspected and manually full-stroke exercised at each refueling outage, until the entire group has been tested. If it is found that the disassembled valve's full-stroke capability is in question, the remainder of the valves in that group must also be disassembled, inspected and manually full-stroke exercised during the same outage.

APPENDIX B

VALVES TESTED DURING COLD SHUTDOWNS

APPENDIX B

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. All valves in this Appendix have been reviewed and the reviewer agrees with the licensee that testing these valves during power operation is not practical due to the valve type, location, or system design. These valves 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. CONTAINMENT HVAC SYSTEM

1.1 Category A Valves

Valves 1CP-1, 4, 7, and 10, the containment building purge and vent containment isolation valves, cannot be exercised during power operations because the valves are sealed closed and required to remain closed and sealed closed during plant operating modes 1, 2, 3, and 4 by plant Technical Specification 3.6.1.7. These valves will be exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

2. MAIN STEAM SYSTEM

2.1 Category B Valves

Valves 1MS-58, 60, and 62, the steam generator atmospheric dump valves, cannot be exercised during power operations because opening these valves at power would dump steam to the atmosphere which would increase steam flow, increase reactor power, and decrease steam line pressure, thereby, resulting in a plant transient which could lead to a plant trip.

These valves will be exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

1MS-80, 82, and 84, the main steam isolation valves, cannot be full-stroke exercised during power operations because closing one of these valves would isolate the steam supply from one of the three steam generators to the main turbine resulting in a severe pressure and power transient which could cause a plant trip. These valves will be partial-stroke exercised quarterly during power operations and will be full-stroke exercised, have their stroke times measured, and be fail-safe tested during cold shutdowns and refueling outages.

3. FEEDWATER SYSTEM

3.1 Category B Valves

1FW-159, 217, and 277, the main feedwater header isolation valves, cannot be full-stroke exercised during power operations because closing one of these valves would isolate all feedwater flow to a steam generator, except for the small amount of flow through the auxiliary feedwater header, resulting in a loss of steam generator water level control which could cause a plant trip. These valves will be partial-stroke exercised quarterly during power operations and will be full-stroke exercised, have their stroke times measured, and be fail-safe tested during cold shutdowns and refueling outages.

3.2 Category C Valves

1FW-158, 216, and 276, the main feedwater header check valves, cannot be exercised during power operations because to verify reverse flow closure of these valves would require isolation of the appropriate main feedwater header and initiating auxiliary feedwater flow into the steam generator which would result in loss of steam generator water level control and cause thermal shock to the feedwater nozzles. Loss of level control could result in a plant trip and thermal shock could result in premature equipment failure. These valves will be exercised closed during cold shutdowns and refueling outages.

4. AUXILIARY FEEDWATER

4.1 Category B Valves

1AF-64, 81, and 102, the main feedwater to auxiliary feedwater header isolation valves, cannot be exercised during power operation because during operation approximately eighteen percent of the main feedwater flow into the steam generators passes through these valves and closing the valves would cause steam generator level control transients which could result in a plant trip. These valves will be exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

1AF-19 and 34, the auxiliary feedwater pump discharge pressure control valves, cannot be exercised quarterly during power operations. These control valves modulate to control pressure in order to prevent pump runout and they are interlocked with the associated pump such that the pump must be operating in order to test the valve; also, due to technical specification restrictions, the downstream isolation valves cannot remain closed for extended periods, therefore, testing 1AF-19 and 34 could result in establishing auxiliary feedwater flow into the steam generators which could thermal shock feedwater piping and nozzles and result in premature failure of these components. These valves will be exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

1AF-49, 50, 51, 129, 130 and 131, the auxiliary feedwater pump discharge flow control valves, cannot be exercised quarterly during power operations. These control valves modulate to control flow to the individual steam generators in order to prevent excessive flow to a faulted train that would starve the other trains and prevent their receiving sufficient auxiliary feedwater flow, and these valves are interlocked with the associated pumps such that the pumps must be operating in order to test the valves. Also, due to technical specification restrictions, the downstream isolation valves cannot remain closed for extended periods, therefore, testing these valves could result in establishing auxiliary feedwater flow into the steam generators which could thermal shock feedwater piping and nozzles and result in premature failure of these components. These valves will be exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

4.2 Category C Valves

1AF-16 and 31, the motor driven auxiliary feedwater pump discharge check valves, cannot be exercised quarterly during power operations because the only flow path through these valves is into the steam generators and injecting relatively cold condensate storage tank water into the hot feedwater piping and steam generators would thermal shock the feedwater piping and nozzles which could cause premature failure of those components. These valves will be full-stroke exercised on a cold shutdown frequency and during refueling outages.

5. INSTRUMENT AIR SYSTEM

5.1 Category A Valves

1IA-216, the isolation valve for the instrument air supply to equipment inside containment, cannot be exercised during power operations because instrument air supplies many components inside containment which are necessary for normal plant operation and loss of air pressure to these components could result in operating transients and a possible forced plant shutdown. This valve will be exercised, fail-safe tested, and have its stroke time measured during cold shutdowns and refueling outages.

6. REACTOR COOLANT SYSTEM

6.1 Category B Valves

1RC-114, 116, and 118, the pressurizer power operated relief valves, will be exercised during cold shutdowns. This exercising frequency is consistent with the NRC guidelines explained in Appendix A, Section 10 of this report.

7. CHEMICAL AND VOLUME CONTROL SYSTEM

7.1 Category A Valves

1CS-11 and 238, the letdown line and normal charging line containment isolation valves, cannot be exercised during power operations because closing these valves would isolate letdown flow or charging flow which would cause pressurizer level control transients which could result in a reactor trip. Closing 1CS-238 would stop charging flow to the regenerative heat exchanger which could result in high letdown temperatures and restarting this flow could thermal shock the regenerative heat exchanger and result in premature failure. These valves will be exercised and their stroke times measured during cold shutdowns and refueling outages.

7.2 Category B Valves

1CS-231 and 235, the normal charging line isolation valves, cannot be exercised during power operations because closing either of these valves would isolate normal charging flow which could cause a loss of pressurizer water level control resulting in a plant trip. Stopping charging flow would also affect letdown temperature and restarting flow could thermal shock the regenerative heat exchanger which could result in premature failure. Failure of one of these valves in the closed position during testing would also cause a loss of control of RCS boron concentration. These valves will be exercised and have stroke times measured during cold shutdowns and refueling outages.

1CS-165, 166, 291, and 292, isolation valves in the charging pump suctions from the volume control tank and the refueling water storage tank, cannot be exercised quarterly during power operations because these two sets of block valves are interlocked such that both sets of valves cannot be open at the same time, therefore, exercising these valves would result in refueling water storage tank water, with its high concentrations of boric acid, being injected into the reactor coolant system and reactor coolant pump seals which would cause power fluctuations and possibly result in a plant shutdown. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

7.3 Category C Valves

1CS-279, the check valve in the line from the boric acid filter to the charging pump suction header, cannot be exercised quarterly during power operations because the only flow path available to exercise this check valve with flow would result in supplying water with high concentrations of boric acid to the charging pump suction and from there into the reactor coolant system which would cause power fluctuations and possible shutdown of the reactor. This check valve will be full-stroke exercised when borating on the way to cold shutdowns and during refueling outages.

1CS-294, the check valve in the line from the refueling water storage tank to the charge pump suction header, cannot be exercised quarterly during power operations because the only flow path to exercise this check valve with flow would supply refueling water storage tank water with high concentrations of boric acid to the charging pump suction and from there into the reactor coolant system resulting in power fluctuations and possible plant shutdown. This valve will be full-stroke exercised during cold shutdowns and refueling outages.

8. SAFETY INJECTION SYSTEM

8.1 Category A Valve

1SI-359, the isolation valve in the RHR recirculation line to the RCS hot leg, cannot be exercised during power operations because the valve is required to remain closed with electrical power removed from its operator by Technical Specification 4.5.2.8 during power operations to prevent overpressurization of the low pressure RHR system piping by the high pressure reactor coolant system. This valve will be exercised and have its stroke time measured during cold shutdowns and refueling outages.

8.2 Category AC Valves

The following pressure boundary isolation check valves, which protect the low-pressure residual heat removal (RHR) system piping from the high pressure reactor coolant system, cannot be exercised during power operations because the RHR pumps do not produce sufficient head to overcome normal RCS operating pressure and using the charging pumps could cause a loss of pressurizer level control which could lead to a plant trip. These valves will be exercised open during cold shutdowns and refueling outages.

1SI-134	1SI-137	1SI-356
1SI-135	1SI-346	1SI-357
1SI-136	1SI-347	1SI-358

8.3 Category C Valves

1SI-81, 82, and 83, the check valves in the low pressure safety injection line to the RCS cold legs, cannot be exercised during power operations because the RHR pumps do not produce sufficient head to overcome normal RCS operating pressure and using the charging pumps could cause loss of pressurizer level control which could lead to a plant trip. These valves will be exercised during cold shutdowns and refueling outages.

9. CONTAINMENT SPRAY SYSTEM

9.1 Category B Valves

1CT-102 and 105, the containment recirculation sump isolation valves in the containment spray pump suctions, cannot be exercised quarterly during power operations because opening these valves would allow some system water to drain into the containment sump and this highly oxygenated stagnant water could cause corrosion of the sump structure. No provisions exist for removing this water and drying the sump from outside of containment, therefore, a containment entry would be required in order to remove this water. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

10. RESIDUAL HEAT REMOVAL SYSTEM

10.1 Category A Valves

1RH-1, 2, 39, and 40, the pressure boundary isolation valves on the RHR suction lines from the RCS hot legs, cannot be exercised during power operations because these valves are interlocked with RCS pressure and cannot be opened when RCS pressure is greater than 425 psig to prevent overpressurization of the low pressure RHR system by the high pressure reactor coolant system which could lead to an inter-system LOCA. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

APPENDIX C
P&ID AND FIGURE LIST

APPENDIX C
P&ID LIST

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

System	P&ID	Revision
Main Steam System	S-0542	2
Feedwater System	S-0544	2
Condensate and Air Evacuation Systems	S-0545	2
Circulating and Service Water Systems	S-0547	2
Containment Spray System	S-0550	3
Steam Generator Blowdown System	S-0551	1
Sampling System--Nuclear	S-0552	1
Diesel Fuel Oil System	S-0563	2
Radiation Monitor Systems	S-0605	0
Diesel Generator Systems	S-0633	2
Diesel Generator Systems	S-0633S01	1
Drainage System--Containment	S-0685	2
Primary and Demineralizer Water Systems	S-0799	2
Service Air System	S-0800	2
Instrument Air System	S-0801	1
Fuel Pools Cooling System	S-0805	3
Cooling Tower Systems	S-0808	1
Fire Protection System--Sh. 4	S-0888	1
Intake Structures Pump Support Systems	S-0936	2
HVAC Essential Services Chilled Water System	S-998	1
HVAC Essential Services Chilled Water System	S-998S02	1
HVAC Essential Services Chilled Water System	S-998S03	0
HVAC Essential Services Chilled Water System	S-998S04	0

System	P&ID	Revision
HVAC Essential Services Chilled Water System	S-999S	1
HVAC Essential Services Chilled Water System	S-999S02	1
HVAC Essential Services Chilled Water System	S-999S03	0
HVAC Essential Services Chilled Water System	S-999S04	0
Reactor Coolant System--Sh. 2	S-1301	2
Chemical and Volume Control System	S-1303	3
Chemical and Volume Control System	S-1303S01	2
Chemical and Volume Control System	S-1303S02	2
Chemical and Volume Control System--Sh. 2	S-1304	2
Chemical and Volume Control System--Sh. 3	S-1305	3
Chemical and Volume Control System--Sh. 4	S-1306	3
Chemical and Volume Control System	S-1307	2
Safety Injection System--Sh. 1	S-1308	3
Safety Injection System--Sh. 2	S-1309	3
Safety Injection System--Sh. 3	S-1310	3
Waste Processing System	S-1313	2
Component Cooling Water System--Sh. 1	S-1319	2
Component Cooling Water System--Sh. 2	S-1320	0
Component Cooling Water System--Sh. 3	S-1321	2
Component Cooling Water System--Sh. 4	S-1322	2
Component Cooling Water System--Sh. 5	S-1322S01	0
Residual Heat Removal System	S-1324	2
HVAC Air Flow Diagram--Containment Bldg.	G-517	6
HVAC Air Flow Diagram--Auxiliary Bldg.	G-517S03	5
HVAC Air Flow Diagram--Control Room	G-517S04	5
HVAC Air Flow Diagram--Switchgear Room	G-517S05	7
HVAC Air Flow Diagram--Fuel Handling Bldg.	G-533	8

APPENDIX D

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

APPENDIX D

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 identified many changes to the Shearon Harris Unit 1 IST program in their A.B. Cutter to H.R. Denton letter dated December 31, 1986, however, they have not submitted the necessary program modifications, such as revised relief requests etc., to support these identified changes. This TER addresses the affected components as if the identified program modifications were in place and in many cases recommends the granting of relief from the Section XI requirements based on these identified changes even though the relief request in the September 16, 1986, IST program is not judged to be acceptable. In order to make the Shearon Harris Unit 1 IST program correct and complete, the licensee should make the following modifications to the program and submit them to the NRC for review:

    a. Auxiliary feedwater relief request RV-1 should be changed to a cold shutdown justification for valves 1AF-16 and 31 and these valves should be identified as being tested on a cold shutdown frequency on the valve listing table.

    b. Auxiliary feedwater relief request RV-2 should be changed to a cold shutdown justification for valves 1AF-19 and 34. The IST program should also be modified to exercise, fail-safe test, and measure the stroke times of these valves on a cold shutdown frequency. In addition the licensee should provide an augmented justification for not exercising these valves during the quarterly auxiliary feedwater pump tests.

c. Auxiliary feedwater relief request RV-3 should be changed to a cold shutdown justification for valves 1AF-49, 50, 51, 129, 130 and 131. The IST program should also be modified to exercise, fail-safe test, and measure the stroke times of these valves on a cold shutdown frequency. In addition the licensee should provide an augmented justification for not exercising these valves during the quarterly auxiliary feedwater pump tests.

d. Auxiliary feedwater relief request RV-6 should be modified to indicate that valves 1AF-65, 84, and 103 will be tested using a sample disassembly and inspection program on a refueling outage frequency (refer to Section 3.4.1.2 of this report).

e. Auxiliary feedwater relief request RV-7 should be changed to a cold shutdown justification for valves 1AF-117, 136, 142, and 148.

f. Auxiliary feedwater relief requests RV-4 and RV-5 for valves 1AF-54, 73, and 92 should be combined and modified to indicate that these valves will be exercised during each cold shutdown as the plant is being taken to the cold shutdown condition.

g. Condensate system relief requests RV-1 and RV-2 for valves 1CE-36, 46, and 56 should be combined into one relief request that addresses all three valves being tested in both the open and the closed positions. In addition, a discussion should be provided that justifies grouping 1CE-56 with the other two valves in a sampling disassembly and inspection program (refer to Section 3.5.1.1 of this report).

h. Containment spray system relief request RV-2 should be changed to a cold shutdown justification for valves 1CT-102 and 105.

i. Since the containment spray additive tank vacuum breaker valves are tested in accordance with the Code requirements for relief valves, containment spray relief request RV-3 is not necessary and should be deleted from the IST program and Note 10 should be augmented to indicate the type of testing that is being performed.

j. Instrument air system relief request RV-2 should be modified to indicate that valves 1IA-784, 785, 786, 787, 788, and 789 will be individually verified to close by a sample disassembly and inspection program on a refueling outage frequency (refer to Section 3.7.1.1 of this report).

k. Chemical and volume control system relief request RV-1 should be modified to indicate that valves 1CS-341, 382, 423, 470, and 472 will be exercised during those cold shutdowns when the reactor coolant system is open, vented, and drained to the top of the reactor vessel flange (refer to Section 3.8.1.1 of this report).

l. Chemical and volume control system relief request RV-3 should be changed to a cold shutdown justification for valves 1CS-165, 166, 231, and 292 because these valves will be exercised during cold shutdowns.

m. Chemical and volume control system relief request RV-5 should be changed to a cold shutdown justification for valve 1CS-279 because this valve will be exercised when borating on the way to cold shutdown.

n. Chemical and volume control system relief request RV-6 should be changed to a cold shutdown justification for valve 1CS-294 because this valve will be exercised during cold shutdowns.

o. Safety injection system cold shutdown justification CS-1 should be augmented to include the reasons that the high head safety injection/ charging pumps cannot be used to exercise valves 1SI-81, 82, 83, 134, 135, 136, 137, 346, 347, 356, 357, and 358 quarterly during power operations.

p. Component cooling water cold shutdown justification RV-1 should be modified to indicate that valves 1CC-207, 208, 249, 251, 297, and 299 will be exercised during those cold shutdowns when the reactor coolant system temperature is 200 degrees F or lower and all reactor coolant pumps are secured (refer to Sections 3.10.1.1 and 3.10.2.1 of this report).

q. Containment HVAC system relief request RV-1 for valves 1CB-3, 1CB-7, and 1CM-7 should be modified to indicate that these valves will be verified closed by a visual inspection of the valve disk closing against the valve seat and are manually tested open, using a spring gage to measure the valve operating torque, during those cold shutdowns when the reactor containment is opened and during reactor refueling outages (refer to Section 3.3.1.1 of this report).

r. Pump relief requests PR-7 and PR-8 for the boric acid transfer pumps should be modified to indicate that the flowrates will be measured for the boric acid transfer pumps on a cold shutdown frequency when borating on the way to cold shutdown. They should also be modified to indicate that vibration measurements will be taken on these pumps during the quarterly pump tests (refer to Sections 2.6.1 and 2.6.2 of this report).

s. Pump relief request PR-2 for the emergency service water pumps should be modified to indicate that the vibration measurements will be made on the upper motor bearings to give an indication of the pump mechanical condition.

t. Pump relief request PR-5 for the emergency service water screen wash pumps should be modified to indicate that the pump flowrate measurements will be made using an ultrasonic flow measurement technique and these flowrates will be compared to the measured pump differential pressures utilizing the pump characteristic curve to give an indication of the pump hydraulic condition (refer to Section 2.7.1 of this report).

2. Auxiliary feedwater system relief request RV-2 for valves 1AF-19 and 34 should be changed to a cold shutdown justification. The justification submitted does not provide adequate information to warrant using the cold shutdown test frequency instead of the required quarterly frequency, however, additional information was provided to the reviewers by the licensee in their December 31, 1986 submittal and in a telephone conversation, and the added justification is judged to be satisfactory. The licensee should modify their IST program to include an appropriate cold shutdown justification for these valves.

3. The licensee's basis for relief in component cooling water relief request RV-1 for valves 1CC-118 and 119 is not acceptable and, therefore, the licensee should verify the reverse flow closure of these valves by valve disassembly and inspection during refueling outages until such time that appropriate system modifications can be made that allow these valves to be tested in accordance with the Code (refer to Section 3.10.3.2 of this report).

4. The licensee proposed to verify the reverse flow closure of auxiliary feedwater check valves 1AF-54, 73, 92, 117, 136, 142, and 148 by using acoustic detection (refer to Item 3. in the licensee's submittal of December 31,1986). Insufficient information was provided by the licensee for the reviewer to determine that this method would provide a positive indication of valve closure as required by the Code. Relief should not be

granted from the Code requirement of individually verifying closure of these valves (refer to Sections 3.4.1.1 and 3.4.1.3 of this report).

5. By the end of the first refueling outage the licensee should determine if the ranges of Table IWP-3100-2 can be met for the flowrate measurements of the high head safety injection/charging pumps. If the Code specified ranges cannot be met, the licensee should specify appropriate alternate ranges as provided for in the Code (refer to Section 2.5.1 of this report).

6. The licensee should provide reduced range limits for the flowrate measurements on the diesel generator fuel oil transfer pumps as specified in Section XI, Paragraph IWP-3210 (refer to Section 2.4.1 of this report).

7. In their letter dated March 20, 1987, the licensee indicated that 1MS-T would be exercised in accordance with the Code and they provided a more detailed justification for not measuring the full-stroke time for 1MS-G. Main steam system relief request RV-1 should be modified to remove valve 1MS-T and to include the additional justifications for 1MS-G.

NRC FORM 335 (2-84) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

SEE INSTRUCTIONS ON THE REVERSE

1. REPORT NUMBER (Assigned by TIDC, add Vol No., if any): EGG-NTA-7492

2. TITLE AND SUBTITLE: TECHNICAL EVALUATION REPORT, PUMP AND VALVE INSERVICE TESTING PROGRAM, SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

3. LEAVE BLANK

4. DATE REPORT COMPLETED

MONTH	YEAR
March	1987

5. AUTHOR(S)

C. B. Ransom
T. L. Cook

6. DATE REPORT ISSUED

MONTH	YEAR
March	1987

7. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

NRR and I&E Support
EG&G Idaho, Inc.
P. O. Box 1625
Idaho Falls, ID 83415

8. PROJECT/TASK/WORK UNIT NUMBER

9. FIN OR GRANT NUMBER: A6812

10. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

PWR-A Engineering Branch
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washingtonm, DC 20555

11a. TYPE OF REPORT

b. PERIOD COVERED (Inclusive dates)

12 SUPPLEMENTARY NOTES

13. ABSTRACT (200 words or less)

This EG&G Idaho, Inc. report presents the results of our evaluation of the Shearon Harris Nuclear Power Plant Unit 1 Inservice Testing Program for pumps and valves that perform a safety related function.

14 DOCUMENT ANALYSIS a. KEYWORDS/DESCRIPTORS

b. IDENTIFIERS/OPEN-ENDED TERMS

15 AVAILABILITY STATEMENT: Unlimited

16 SECURITY CLASSIFICATION

(This page) Unclassified

(This report) Unclassified

17. NUMBER OF PAGES

18 PRICE