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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAMS
JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1 AND UNIT 2

Docket Numbers 50-348 and 50-364

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ABSTRACT

This EG&G Idaho, Inc. report presents the results of our evaluation of the Joseph M. Farley Nuclear Plant, Unit 1 and Unit 2, Inservice Testing Programs for safety-related pumps and valves.

PREFACE

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

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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAMS
JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1 AND UNIT 2

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) programs submitted by the Alabama Power Company for their Joseph M. Farley Nuclear Plant, Unit 1 and Unit 2.

By a letter dated May 27, 1987, Alabama Power Company submitted an IST program for the Joseph M. Farley Nuclear Plant, Unit 1. The working session for the Joseph M. Farley Nuclear Plant, Unit 1, IST program was conducted with Alabama Power Company representatives on August 25 and 26, 1987. The licensee's revised program, dated September 30, 1987, as further revised by letters dated November 20, 1987, March 17, 19 (Revision 1), September 9, 1988, (Revision 2), October 4, 1989, (Revision , and August 20, 1990, (Revision 4), was received and compared to the previous submittal to identify any changes. A Unit 2 IST program, dated December 15, 1988, and revised by letters dated July 20, 1989, (Revision 1), and August 20, 1990, (Revision 2), was received and was compared to the revised Unit 1 IST program. The licensee's IST Programs were reviewed to verify compliance of proposed tests of safety-related pumps and valves 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). Any IST program revisions should follow the guidance presented in Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Programs."

In their submittals, Alabama Power Company has requested relief from the ASME Code testing requirements for specific pumps and valves and these requests have been evaluated individually to determine if the criteria in 10 CFR 50.55a for granting relief are met for the specified pumps and valves.

This review was performed utilizing the acceptance criteria of the Standard Review Plan, NUREG-0800, Section 3.9.6, the Draft Regulatory Guide and Value/Impact Statement titled "Identification of Valves for Inclusion in Inservice Testing Program", and Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Programs". These 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 Alabama Power Company bases for requesting relief from the Section XI requirements for the Joseph M. Farley, Units 1 and 2, pump testing program and the reviewer's evaluations and conclusions regarding these requests. Similar information is presented in Section 3 for the valve testing programs.

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

Justifications for exercising Category A, B and C valves during cold shutdowns and refueling outages instead of quarterly during power operations were reviewed and found acceptable except as noted in Appendix A.

A listing of P&IDs used for this review is contained in Appendix B.

This TER is applicable to both units with differences between the two programs noted in the b[illegible] this report. Unless noted otherwise, evaluations and conclusions apply to both unit's programs. Component numbers utilized in this TER are from Unit 1 unless identified otherwise.

2. PUMP TESTING PROGRAM

The Joseph M. Farley Nuclear Plant, Unit 1 and Unit 2, IST programs submitted by Alabama Power Company were examined to verify that all pumps that are included in the programs are subjected to the periodic tests required by the ASME Code, Section XI, except where specific relief from testing has been requested. Each Alabama Power Company basis for requesting relief from the pump testing requirements and the reviewer's evaluation of that request are summarized below. All relief requests and evaluations are applicable to both Unit 1 and Unit 2 unless otherwise noted.

2.1 All Pumps

2.1.1 Vibration Measurements

2.1.1.1 Relief Request. The licensee requested relief from the full-scale range requirements of Section XI, Paragraph IWP-4120, for vibration instrumentation and proposed to utilize digital vibration instrumentation.

2.1.1.1.1 Licensee's Basis for Requesting Relief--FNP uses an IRD Model 818 for monitoring pump vibrations. The IRD Model 818 is a microprocessor controlled digital vibration monitor. When used in the English measurement mode, the instrument autoscales in decade ranges. The requirement of IWP-4120 is not appropriate for vibrational measurement using this type of instrument. The accuracy of the instrument is 5% over all ranges. The IRD provides a digital display of vibration measurement to three (3) decimal places. This instrument provides significantly higher accuracy than an analog amplitude meter which is read visually and subject to human error and parallax. The use of a digital vibration meter has been reviewed by the ASME Code Committee and approved per Code Case N-472.

Alternate Testing: The autoscaling digital vibration monitor will be used for Code required pump vibration measurements.

2.1.1.1.2 Evaluation--Utilizing digital vibration instrumentation that automatically selects the appropriate scale is a reasonable alternative to the Code requirement that the full-scale range of the instrument be three times reference value or less because the accuracy of the instrument meets the accuracy requirements of the Code on all scales.

The licensee's proposed alternative should provide an acceptable level of quality and safety, therefore, relief may be granted from the requirements of Paragraph IWP-4120 as requested.

2.2 All Pumps Except Service Water and Diesel Fuel Oil Transfer

2.2.1 Bearing Temperature Measurements

2.2.1.1 Relief Request. The licensee requested relief from measuring pump bearing temperature annually on all pumps in the IST program, except the service water and diesel generator fuel oil transfer pumps, in accordance with the requirements of Section XI, Paragraph IWP-3300, and proposed to measure vibration, flow, and differential pressure to monitor pump condition.

2.2.1.1.1 Licensee's Basis for Requesting Relief--These pumps have no installed instrumentation which measures 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/year measurement will not provide significant information relative to pump condition. The extended 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 affect on the pump monitoring program, since other required test parameters are being measured.

Alternate Testing: Pump differential pressure, flow, and vibration (as applicable) will be used to monitor pump performance.

2.2.1.1.2 Evaluation--The annual bearing temperature measurement is an unreliable method of detecting bearing failure because a temperature rise in a failing bearing usually occurs only just prior to the failure. This failure characteristic makes detecting an impending bearing failure by the use of a single annual bearing temperature measurement very unlikely. Bearing temperatures taken at one year intervals provide little statistical basis for determining the incremental degradation of a bearing or meaningful trending information. Bearing temperature measurements are impractical for these pumps because temperature detectors are not installed in the bearings and temperature measurements taken on the bearing housing are affected by other factors which may mask changes in bearing condition, short of catastrophic failure. Extensive pump modification would be required to permit bearing temperature measurements in accordance with the Code requirements. Additionally, many of the bearings of the centrifugal pumps included in the Farley Unit 1 and Unit 2 IST Programs are water cooled, thus, bearing temperature measurements may be significantly influenced by the temperature of the cooling medium and may not necessarily be indicative of bearing condition. The burden on the licensee would not be justified by the limited information that would be provided concerning pump mechanical condition if the Code requirements were imposed.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed, and considering the quarterly pump vibration measurements that will be taken to determine pump mechanical condition and to detect pump bearing degradation, relief may be granted from the Section XI requirements as requested.

2.3 Residual Heat Removal Pumps

2.3.1 Instrumentation Full-Scale Range

2.3.1.1 Relief Request. The licensee requested relief from the instrumentation full-scale range requirements of Section XI, Paragraph IWP-4120, for the suction pressure instruments on the residual heat removal pumps, P001A-A and P001B-B, and has proposed to utilize the installed process instrumentation for measurement of Code required pump parameters.

2.3.1.1.1 Licensee's Basis for Requesting Relief--Reference values for suction pressures for these pumps is between 48 and 54 psig (Unit 2, 40 and 45 psig). This would require suction pressure gauges of 0-150 psig maximum. The accuracy required for these gauges would be 2 percent of 150 psig, which is 3.0 psig. The installed pump inlet pressure gauges are 0-200 psig. Although the installed instruments are above the maximum range limits, they are within the accuracy requirements and are therefore adequate for pump testing.

Alternate Testing: The installed instruments will be used for taking inlet pressure measurements during pump testing.

2.3.1.1.2 Evaluation--The licensee's proposal to utilize installed instrumentation whose range is greater than the Code-allowed three times reference value, but whose accuracy meets the Code requirements, should provide sufficiently accurate data to utilize in the pump monitoring program to assess pump degradation. The expense of system modifications would not be justified by the limited amount of additional information that may be obtained if this Code requirement were imposed.

The licensee's proposed alternative should provide an acceptable level of quality and safety, therefore, relief may be granted from the requirements of Paragraph IWP-4120 as requested.

2.3.2 Flow Rate and Differential Pressure Measurements

2.3.2.1 Relief Request. The licensee requested relief from establishing reference conditions for flow rate and differential pressure on the residual heat removal pumps, P001A-A and P001B-B, in accordance with the requirements of Section XI, Paragraph IWP-3100, and has proposed to utilize pump curves to compare differential pressure and flow rate during pump tests.

2.3.2.1.1 Licensee's Basis for Requesting Relief--Section IWP-3100 requires quarterly pump testing to be performed by varying the system resistance until either the measured differential pressure or the

measured flow rate equals the corresponding reference value, or by using a fixed resistance test flow path. The test flow path used to test these pumps does not contain flow control provisions sufficiently accurate to repeat an exact reference condition.

Alternate Testing: Pump testing will be performed at conditions as close to the reference conditions as can be reasonably achieved and the test data compared with a curve of reference values which establish the relationship between flow rate and differential pressure in a band around the reference point.

2.3.2.1.2 Evaluation--There are no valves in the test flow path that are suitable for throttling flow to accurately reproduce the flow rate and differential pressure reference values, therefore, it is impractical to establish the required reference points during pump tests. A pump curve defines the corresponding differential pressure for a given pump flow rate if the curve has been developed or verified by empirical data taken when the pump was known to be in good operating condition and forms an infinite set of fixed sets of reference values. The licensee's proposal to use a pump curve to compare differential pressure and flow rate during pump testing should provide reasonable assurance of pump operational readiness. Accurate reproduction of reference values during pump tests would require installing a valve designed for flow control. It would be burdensome to require the licensee to perform valve modifications because the expense would not be justified by the limited amount of additional information that may be obtained if these Code requirements were imposed.

The licensee has stated that the test data will be evaluated "in a band around the reference point", but has not clearly stated if alert and required action ranges have been established on the test curve so a degrading pump would be detected. Therefore, the licensee should establish alert and required action ranges for these pump curves consistent with the ranges of Section XI, Table IWP-3100-2, and document that definition in the IST program. Additionally, the licensee should develop a method of establishing conservative vibration reference values to be used to evaluate the pump vibration measurements taken when using pump curves in lieu of

fixed reference values because vibration is a variable pump parameter under those test conditions.

Based on the impracticality of duplicating reference values for flow rate and differential pressure for the residual heat removal pumps and considering the licensee's proposal to utilize pump curves during the quarterly pump tests for comparison of these parameters, relief may be granted from the requirements of Section XI as requested provided that the licensee determines or verifies the pump curves, documents the alert and required action ranges, and evaluates vibration measurements as discussed above.

2.4 Containment Spray Pumps

2.4.1 Flow Rate Measurements

2.4.1.1 Relief Request. The licensee requested relief from measuring flow rate quarterly in accordance with the requirements of Section XI, Paragraph IWP-3100, on the containment spray pumps, P001A-A and P001B-B (Unit 1 only), and has proposed to measure pump flow rate during refueling outages.

2.4.1.1.1 Licensee's Basis for Requesting Relief--Section IWP-3100 requires quarterly pump testing to be performed by varying the system resistance until the measured differential pressure or the measured flow rate equals the corresponding reference value, or by using a fixed resistance test flow path. Testing the containment spray pumps by varying the system resistance is not a practical method because to do so would inject a large quantity of water into the containment atmosphere. Use of the fixed resistance two inch recirculation line back to the refueling water storage tank restricts the test flow rate of these 3000 gpm pumps to approximately 150 gpm. Consequently, flow rate measurements using the recirculation flow path would not provide any useful information to monitor pump operability or degradation.

Alternate Testing: In addition to quarterly pump test measurements of differential pressure and vibration; pump flow rate, differential pressure, and vibration measurements will be performed at refueling when spool pieces are installed and pump full-flow can be directed to the refueling cavity.

2.4.1.1 2 Evaluation--Meaningful flow rate measurements cannot be taken while the containment spray pumps are operating on the minimum flow recirculation line because flow is in that region of the pump curve near shutoff head conditions where large changes in flow are associated with very small changes in differential pressure and deviations in pump hydraulic parameters may go undetected. Flow measurements taken under these operating conditions are not necessarily a meaningful test for pump operational readiness because the test flow rate is a small fraction of rated pump flow. However, the pump minimum flow line must be used when testing pumps quarterly because the only flow path containing flow instrumentation is into the containment spray headers. It is impractical to establish flow in the containment spray headers at any time because that would spray borated water into containment resulting in water damage to equipment in containment. Accurate flow measurements can be taken each refueling outage when test spool pieces are installed in the containment spray headers during the containment spray pump full flow injection tests. However, it is impractical to measure flow on these pumps quarterly during power operation because containment access is required to install the spool pieces and access is restricted due to personnel safety and radiation exposure concerns. It is also impractical to measure flow on these pumps during cold shutdowns because the time required to install the spool pieces, then remove them and leak test the flanges, could delay reactor startup. The licensee's proposal to measure all pump parameters, except flow, quarterly and to measure all pump parameters, including flow, during refueling outages is a reasonable alternative to the Code requirement of quarterly flow measurements.

Based on the impracticality of quarterly flow measurements, the burden on the licensee if these Code requirements were imposed, and considering that the licensee's alternative testing is in accordance with the guidance presented in Generic Letter No. 89-04, Attachment 1, Item 9, relief may be granted from the Section XI requirements as requested.

2.4.2 Flow Rate and Differential Pressure Measurements

2.4.2.1 Relief Request. The licensee requested relief from establishing flow and differential pressure reference values for the containment spray pumps, P001A-A, and P001B-B, in accordance with the requirements of Section XI, Paragraph IWP-3100, and proposed to utilize pump curves to compare differential pressure and flow rate during pump tests.

2.4.2.1.1 Licensee's Basis for Requesting Relief--Section IWP-3100 requires quarterly pump testing to be performed by varying the system resistance until either the measured differential pressure or the measured flow rate equals the corresponding reference value, or by using a fixed resistance test flow path. The test flow path used to test these pumps does not contain flow control provisions sufficiently accurate to repeat an exact reference condition.

Alternate Testing: Pump testing will be performed at conditions as close to the reference conditions as can be reasonably achieved and the test data compared with a curve of reference values which establish the relationship between flow rate and differential pressure in a band around the reference point.

2.4.2.1.2 Evaluation--The licensee's proposal to test these pumps at a substantial flow after the test spool pieces have been installed during refueling outages has been evaluated in Item 2.4.1.1 of this report.

There are no valves in the test flow path that are suitable for throttling flow to accurately reproduce the flow rate and differential pressure reference values, therefore, it is impractical to establish the required reference points during pump tests. A pump curve defines how differential pressures correspond to pump flow rates and if the curve has been developed or verified by empirical data taken when the pump is known to be in good operating condition it forms variable sets of reference values. The licensee's proposal to use a pump curve to compare differential pressure and flow rate during refueling outage testing should provide reasonable assurance of pump operational readiness. To accurately reproduce reference

values during pump tests would require installing a valve designed for flow control. It would be burdensome to require the licensee to perform system modifications because the expense would not be justified by the limited amount of additional information that may be obtained if these Code requirements were imposed.

The licensee has stated that the test data will be evaluated "in a band around the reference point", but has not clearly stated if alert and required action ranges have been established on each test curve so a degrading pump would be detected. Therefore, the licensee should establish alert and required action ranges for these pump curves consistent with the ranges of Section XI, Table IWP-3100-2, and document that definition in the IST program. Additionally, the licensee should develop a method of establishing conservative vibration reference values to be used to evaluate pump vibration measurements taken when using pump curves in lieu of fixed reference values because vibration is a variable pump parameter under those test conditions.

Based on the impracticality of duplicating reference values for flow rate and differential pressure for the containment spray pumps and considering the licensee's proposal to utilize pump curves during refueling outages for comparison of these parameters, relief may be granted from the requirements of Section XI as requested provided that the licensee determines or verifies the pump curves, documents the alert and required action ranges, and evaluates vibration measurements as discussed above.

2.5 High Head Safety Injection/Chemical and Volume Control Pumps

2.5.1 Flow Rate Measurements

2.5.1.1 Relief Request. The licensee requested relief from measuring flow rate quarterly in accordance with the requirements of Section XI, Paragraph IWP-3100, on the chemical and volume control pumps (HHSI), P002A, P002B, and P002C-B, and has proposed to measure pump flow rate during refueling outages.

2.5.1.1.1 Licensee's Basis for Requesting Relief--Section XI requires quarterly pump testing to be performed by either varying system resistance until either the measured differential pressure or the measured flow rate equals the corresponding reference value or by using a fixed resistance test flow path. Each charging pump supplies flow to both a common header and individual pump minimum flow lines. The discharge header supplies both normal RCS make up flow and RCS pump seal water flow. With this configuration, pump flow is distributed to three separate flow paths. The normal make up and RCS pump seal water flow lines are variable resistance flow paths. RCS pump seal flow is required during normal operation and cold shutdown to preclude seal damage from inflow of RCS particulates. Flow rate through the line is dependent on inline filters and RCS operating conditions. RCS make up is required during both normal operation and cold shutdown and is controlled by an inline flow control valve which automatically adjusts flow rate in response to RCS operating conditions. Because of these operating constraints, varying system resistance to achieve reference test conditions is not possible without significant impact on RCS operations. The only possible fixed resistance flow path is through the orificed two inch pump minimum flow lines. Use of the minimum flow lines restricts the test flow rate of these 600 gpm pumps to approximately 60 gpm. Consequently, flow rate measurements using the pump minimum flow lines would not provide any useful information to monitor pump operability or degradation.

Alternate Testing: In addition to quarterly pump test measurements of differential pressure and vibration; pump flow rate, differential pressure, and vibration measurements will be performed at refueling when the pumps can be aligned to inject full flow rate through the boron injection tank flow path to the RCS cold legs. Test data will be compared with a curve of reference values which establish the relationship between flow rate and differential pressure in a band around the design point.

2.5.1.1.2 Evaluation--Meaningful flow rate measurements cannot be taken while the charging pumps are operating on the minimum flow recirculation line because flow is in that region of the pump curve near shutoff head conditions where large changes in flow are associated with very

small changes in differential pressure and deviations in pump hydraulic parameters may go undetected. Measuring flow rate while these pumps are operating in a normal system configuration is not a meaningful test because the multiple flow paths contribute to additive instrument inaccuracies and significant pump degradation could go undetected. Testing these pumps by utilizing injection during power operation is not practical because the temperature variations could damage the injection nozzles and the flow variations could cause pressurizer level perturbations which could result in a reactor trip. Testing during cold shutdown could result in a low temperature overpressurization of the reactor coolant system because the system may not contain sufficient expansion volume to accommodate the required flow. Reactor coolant pump seals could also be damaged during cold shutdowns if cooling flow was diverted while testing the charging pumps.

The licensee's proposal to use a pump curve to compare differential pressure and flow rate during refueling outage testing should be acceptable because a pump curve defines the corresponding differential pressure for a given pump flow rate if the curve has been developed or verified by empirical data taken when the pump was known to be in good operating condition and forms an infinite set of fixed sets of reference values. The licensee has stated that the test data will be evaluated "in a band around the design point", but has not clearly stated if alert and required action ranges have been established on each test curve so a degrading pump would be detected. Therefore, the licensee should establish alert and required action ranges for these pump curves consistent with the ranges of Section XI, Table IWP-3100-2, and document that definition in the IST program. Additionally, the licensee should develop a method of evaluating the pump vibration measurements taken when using pump curves in lieu of fixed reference values because vibration is a variable pump parameter under those test conditions.

The licensee's proposal to measure all pump parameters, except flow, quarterly and to measure all pump parameters, including flow, during refueling outages when a full flow path to the reactor coolant system is available is a reasonable alternative to the Code requirement of quarterly flow measurements. Due to the design of this system, compliance with the

Code requirements is impractical and would be possible only if the system was substantially redesigned. It would be burdensome to require the licensee to perform system modifications because the expense would not be justified by the limited amount of additional information that may be obtained if this Code requirement were imposed.

Based on the impracticality of measuring pump flow quarterly and establishing reference values for flow rate or differential pressure, and considering the licensee's proposal to measure flow and utilize pump curves during refueling outages for comparison of these parameters, relief may be granted from the requirements of Section XI as requested provided that the licensee determines or verifies the pump curves, documents the alert and required action ranges, and evaluates vibration measurements as discussed above.

2.5.2 Instrumentation Full-Scale Range

2.5.2.1 Relief Request. The licensee requested relief from the instrumentation full-scale range requirements of Section XI, Paragraph IWP-4120, for the suction pressure instruments on the chemical and volume control pumps (HHSI), P002A-A, P002B-B, and P002C-B, and has proposed to utilize the installed process instrumentation for measurement of Code required parameters.

2.5.2.1.1 Licensee's Basis for Requesting Relief--Reference values for suction pressures for these pumps are between 25 and 35 psig (Unit 2, 30 and 35 psig). This would require suction pressure gauges of 0-75 psig maximum. The accuracy required for these gauges would be 2 percent of 75 psig, which is ±1.5 psig. The installed pump inlet pressure gauges are 0-100 psig ± 1 psig. Although the installed instruments are above the maximum range limits, they are within the accuracy requirements and are therefore adequate for pump testing.

Alternate Testing: The installed instruments will be used for taking inlet pressure measurements during pump testing.

2.5.2.1.2 Evaluation--The proposal to utilize instrumentation whose range is greater than the Code-allowed three times reference value, but whose accuracy exceeds the Code requirements, should provide sufficiently accurate data to utilize in the pump monitoring program to assess pump degradation. The expense of system modifications would not be justified by the limited amount of additional information that may be obtained if this Code requirement were imposed.

The licensee's proposed alternative should provide an acceptable level of quality and safety, therefore, relief may be granted from the requirements of Paragraph IWP-4120 as requested.

2.6 Boric Acid Transfer Pumps

2.6.1 Flow Rate Measurements

2.6.1.1 Relief Request. The licensee requested relief from measuring flow rate quarterly in accordance with the requirements of Section XI, Paragraph IWP-3100, on the boric acid transfer pumps, P005A-A and P005B-B, and has proposed to measure pump vibration quarterly and pump flow rate, without measuring vibration, when borating for cold shutdown.

2.6.1.1.1 Licensee's Basis for Requesting Relief--Quarterly pump testing is performed using the orificed pump discharge test line which runs back to the boric acid storage tank. This line does not have any installed flow measuring instrumentation. To utilize the system flow meter would require a test flow path which would transfer highly concentrated boric acid from the boric acid tank into the CVCS and into the RCS through the operating CVCS charging pump. The addition of concentrated boric acid to the RCS during normal operations would adversely affect the boric acid concentration in the RCS and could cause a forced plant shutdown. Because of the pump design and significant difference in flow path and operating conditions between quarterly and cold shutdown testing, pump vibration data taken at cold shutdown may not be useful to monitor pump degradation and could result in unnecessary pump repair. In addition, cold shutdown test duration is limited by the amount of concentrated boric acid that can be

transferred to the reactor coolant system and is insufficient to perform vibration measurements.

Alternate Testing: Of the test quantities listed in Table IWP-3100-1, pump flow rate and differential pressure will be measured during boric acid transfer pump operation for borating the RCS for entering cold shutdown.

2.6.1.1.2 Evaluation--Quarterly flow rate cannot be measured for the boric acid transfer pumps during recirculation to the boric acid storage tank due to the lack of installed instrumentation. However, this flow path must be used when testing pumps quarterly because the only other flow path is into the suction of the charging pumps and from there into the reactor coolant system resulting in a reactor shutdown. The licensee's proposal to measure all pump parameters, except flow, quarterly, and to measure flow and differential pressure during boration for entering cold shutdown when the instrumented flow path can be used, is a reasonable alternative to the Code requirement of quarterly flow measurements. Compliance with the Code requirements is impractical due to the lack of installed instrumentation in the pump recirculation line. It would be burdensome to require a system modification to allow flow measurements during the quarterly tests.

The licensee's proposal to delete vibration measurements during the cold shutdown flow testing of these pumps is unacceptable because pump vibration is a variable pump parameter under variable pump test conditions. Bearing degradation, in particular, could go undetected when the pump is running lightly loaded during the low flow quarterly tests and remain undetected during the cold shutdown tests because vibration measurements are not taken. The licensee has not demonstrated that it is impractical to measure and evaluate vibration during the cold shutdown flow measurement tests.

Based on the impracticality of measuring flow quarterly and the burden on the licensee if this Code requirement were imposed, relief may be granted from the Section XI quarterly flow measurement requirement provided the licensee measures pump bearing vibration during both the quarterly pump tests and the tests conducted during cold shutdowns.

2.6.2 Flow Rate and Differential Pressure Measurements

2.6.2.1 Relief Request. The licensee requested relief from establishing reference conditions for flow rate and differential pressure on the boric acid transfer pumps, P005A-A and P005B-B, in accordance with the requirements of Section XI, Paragraph IWP-3100, and has proposed to utilize pump curves to compare differential pressure and flow rate during pump tests.

2.6.2.1.1 Licensee's Basis for Requesting Relief--Section IWP-3100 requires quarterly pump testing to be performed by varying the system resistance until either the measured differential pressure or the measured flow rate equals the corresponding reference value, or by using a fixed resistance test flow path. The test flow path used to test these pumps does not contain flow control provisions sufficiently accurate to repeat an exact reference condition.

Alternate Testing: Pump testing will be performed at conditions as close to the reference conditions as can be reasonably achieved and the test data compared to a curve of reference values which establish the relationship between flow rate and differential pressure in a band around the reference point.

2.6.2.1.2 Evaluation--The licensee's proposal to test these pumps under substantial flow conditions when entering cold shutdowns has been evaluated in Item 2.6.1.1 of this report.

There are no valves in the test flow path that are suitable for throttling flow to accurately reproduce the flow rate and differential pressure reference values, therefore, it is impractical to establish the required reference points during pump tests. A pump curve defines the corresponding differential pressure for a given pump flow rate if the curve has been developed or verified by empirical data taken when the pump was known to be in good operating condition and forms an infinite set of fixed sets of reference values. The licensee's proposal to use a pump curve to compare differential pressure and flow rate during cold shutdown testing

should provide reasonable assurance of pump operational readiness. Accurate reproduction of reference values during pump tests would require installing a valve designed for flow control. It would be burdensome to require the licensee to perform valve modifications because the expense would not be justified by the limited amount of additional information that may be obtained if these Code requirements were imposed.

The licensee has stated that the test data will be evaluated "in a band around the reference point", but has not clearly stated if alert and required action ranges have been established on each test curve so a degrading pump would be detected. Therefore, the licensee should establish alert and required action ranges for these pump curves consistent with the ranges of Section XI, Table IWP-3100-2, and document that definition in the IST program. Additionally, the licensee should develop a method of evaluating the pump vibration measurements taken when using pump curves in lieu of fixed reference values as discussed in Item 2.6.1.1 of this report.

Based on the impracticality of duplicating reference values for flow rate and differential pressure for the boric acid transfer pumps and considering the licensee's proposal to utilize pump curves during cold shutdowns for comparison of these parameters, relief may be granted from the requirements of Section XI as requested provided that the licensee determines or verifies the pump curves, documents the alert and required action ranges, and evaluates vibration measurements as discussed above.

2.7 Auxiliary Feedwater Pumps

2.7.1 Flow Rate Measurements

2.7.1.1 Relief Request. The licensee requested relief from measuring flow rate quarterly in accordance with the requirements of Section XI, Paragraph IWP-3100, on the motor driven auxiliary feedwater pumps, P001A-A and P001B-B, and has proposed to measure pump flow rate during cold shutdown.

2.7.1.1.1 Licensee's Basis for Requesting Relief--Section IWP-3100 requires quarterly pump testing to be performed by varying the system resistance until either the measured differential pressure or the measured flow rate equals the corresponding reference value, or by using a fixed resistance test flow path. Testing the auxiliary feedwater pumps by varying system resistance is not a practical method because to do so would inject cold water into the steam generators. The introduction of cold water into the hot steam generator would result in a large thermal shock and could result in nozzle cracking. The only possible fixed resistance pump test flow paths are the pump minimum flow lines. Use of the minimum flow line restricts the test flow rate of these 350 gpm pumps to approximately 50 gpm. Consequently, flow rate measurements using the minimum flow path would not provide any useful information to monitor pump operability or degradation.

Alternate Testing: In addition to quarterly pump test measurements of differential pressure and vibration; pump flow rate, differential pressure, and vibration measurements will be performed at cold shutdown when the auxiliary feedwater pumps are in operation to perform check valve testing with flow into the steam generators. Test data will be compared with a curve of reference values which establish the relationship between flow rate and differential pressure in a band around the design point.

2.7.1.1.2 Evaluation--Flow rate measurements cannot be taken while the motor driven auxiliary feedwater pumps are operating on the minimum flow recirculation line because the recirculation line is not equipped with flow instrumentation. However, the minimum flow line must be used when testing pumps quarterly during power operation because the only other flow path is into the steam generators. Cold feedwater flow into the steam generators could result in auxiliary feedwater injection nozzle thermal shock and possible piping failure. On this basis, the licensee's proposal to measure all pump parameters, except flow, quarterly and to measure all pump parameters, including flow, during cold shutdowns is a reasonable alternative to the Code requirement of quarterly flow measurements. Compliance with the Code requirements is impractical due to the lack of installed instrumentation in the minimum flow recirculation line. A system modification would be necessary to allow direct measurement

of flow during the quarterly tests. It would be burdensome to require the licensee to perform system modifications because the expense would not be justified by the limited amount of additional information that may be obtained if this Code requirement were imposed.

The licensee's proposal to use a pump curve to compare differential pressure and flow rate during cold shutdown tests should be acceptable because a pump curve defines the corresponding differential pressure for a given pump flow rate if the curve has been developed or verified by empirical data taken when the pump was known to be in good operating condition and forms an infinite set of fixed sets of reference values. The licensee has stated that the test data will be evaluated "in a band around the design point", but has not clearly stated if alert and required action ranges have been established on each test curve so a degrading pump would be detected. Therefore, the licensee should establish alert and required action ranges for these pump curves consistent with the ranges of Section XI, Table IWP-3100-2, and document that definition in the IST program. Additionally, the licensee should develop a method of evaluating the pump vibration measurements taken when using pump curves in lieu of fixed reference values because vibration is a variable pump parameter under those test conditions.

Based on the impracticality of measuring pump flow quarterly and duplicating reference values for flow rate and differential pressure, and considering the licensee's proposal to measure flow, differential pressure, and vibration and utilize pump curves during cold shutdowns for comparison of flow and differential pressure, relief may be granted from the requirements of Section XI as requested provided that the licensee determines or verifies the pump curves, documents the alert and required action ranges, and evaluates vibration as discussed above.

2.7.2 Flow Rate and Differential Pressure Measurements

2.7.2.1 Relief Request . The licensee requested relief from establishing reference conditions for flow rate and differential pressure on the turbine driven auxiliary feedwater pump, P002, in accordance with the

requirements of Section XI, Paragraph IWP-3100, and has proposed to utilize pump curves to compare differential pressure and flow rate during pump tests.

2.7.2.1.1 Licensee's Basis for Requesting Relief--Section IWP-3100 requires quarterly pump testing to be perfcrmed by varying the system resistance until either the measured differential pressure or the measured flow rate equals the corresponding reference value, or by using a fixed resistance test flow path. The test flow path used to test this pump does not contain flow control provisions sufficiently accurate to repeat an exact reference condition.

Alternate Testing: Pump testing will be performed at conditions as close to the reference conditions as can be reasonably achieved and the test data compared with a curve of reference values which establish the relationship between flow rate and differential pressure in a band around the reference point.

2.7.2.1.2 Evaluation--There are no valves in the test flow path that are suitable for throttling flow to accurately reproduce the flow rate and differential pressure reference values, therefore, it is impractical to establish the required reference points during pump tests. A pump curve defines the corresponding differential pressure for a given pump flow rate if the curve has been developed or verified by empirical data taken when the pump was known to be in good operating condition and forms an infinite set of fixed sets of reference values. The licensee's proposal to use a pump curve to compare differential pressure and flow rate during pump testing should provide reasonable assurance of pump operational readiness. Accurate reproduction of reference values during pump tests would require installing a valve designed for flow control. It would be burdensome to require the licensee to perform valve modifications because the expense would not be justified by the limited amount of additional information that may be obtained if these Code requirements were imposed.

The licensee has stated that the test data will be evaluated "in a band around the reference point," but has not clearly stated if alert and

required action ranges have been established on the test curve so a degrading pump would be detected. Therefore, the licensee should establish alert and required action ranges for this pump curve consistent with the ranges of Section XI, Table IWP-3100-2, and document that definition in the IST program. Additionally, the licensee should develop a method of evaluating the pump vibration measurements taken when using pump curves in lieu of fixed reference values because vibration is a variable pump parameter under those test conditions.

Based on the impracticality of duplicating reference values for flow rate and differential pressure for the turbine driven auxiliary feedwater pump and considering the licensee's proposal to utilize pump curves during quarterly pump tests for comparison of these parameters, relief may be granted from the requirements of Section XI provided that the licensee determines or verifies the pump curves, documents the alert and required action ranges, and evaluates vibration measurements as discussed above.

2.7.3 Instrumentation Full-Scale Range

2.7.3.1 Relief Request. The licensee requested relief from the instrument full-scale range requirements of Section XI, Paragraph IWP-4120, for the auxiliary feedwater pump, P001A-A, P001B-B, and P002, inlet pressure instruments and proposed to utilize the installed process instrumentation for measurement of Code required pump parameters.

2.7.3.1.1 Licensee's Basis for Requesting Relief--Reference values for suction pressures for these pumps are between 23.8 and 50 psig. This would require suction pressure gauges of 0-75 psig maximum. The accuracy required for these gauges would be 2 percent of 75 psig, which is 1.5 psig. The installed pump inlet pressure gauges are 0-100 2 psig. Although the installed instruments are above the maximum range limits, they are essentially equal to the accuracy requirements and are therefore adequate for pump testing.

Alternate Testing: The installed instruments will be used for taking inlet pressure measurements during pump testing.

2.7.3.1.2 Evaluation--The proposal to utilize installed instrumentation whose range is greater than the Code-allowed three times reference value, but whose accuracy meets the Code requirements, should provide sufficiently accurate data to utilize for pump testing to assess pump degradation. Due to the expense of system modifications and considering the limited amount of additional information that may be obtained, requiring the licensee to meet the Code instrument range requirement would be a hardship without a compensating increase in the level of quality and safety.

Based on the determination that imposing the Code instrument range requirement would be a hardship without a compensating increase in the level of quality and safety and considering that the licensee's proposed alternative should provide an acceptable level of quality and safety, relief may be granted from the requirements of Paragraph IWP-4120 as requested.

2.8 Service Water Pumps

2.8.1 Test Configuration

2.8.1.1 Relief Request. The licensee requested relief from individually testing service water pumps P001A-A, P001B-A, P001C-AB, P001D-B, and P001E-B, in accordance with Section XI, Paragraph IWP-3400(a), and proposed to test these pumps in a two pump configuration and to utilize pump curves to compare differential pressure and flow rate.

2.8.1.1.1 Licensee's Basis for Requesting Relief--Due to the demands of dependent systems, the individual testing of service water pumps, as required by IWP-3400, would jeopardize safe plant operation and be impossible to accomplish during plant shutdown.

Alternate Testing: Tests involving combinations of two pumps within each train will indicate the hydraulic condition of the pumping system. The combinations are arranged such that each pump is included in at least one combination test in each train. The test results are applied to both pumps in the combination and will be compared with a curve of reference values

which establish t'e relationship between flow rate and differential pressure in a band around the design point.

2.8.1.1.2 Evaluation--Testing centrifugal pumps in a parallel alignment provides test results that are indicative of system performance but does not provide information for individual pump evaluation. The hydraulic performance of a degrading pump could be masked by the other pump, assuming it is in good working order, and corrective action may not be taken when required by Section XI, Table IWP-3100-2. Additionally, the licensee has not provided a discussion of specific problems encountered when individual pump tests are performed other than individual testing "would jeopardize safe plant operation" and "be impossible" during plant shutdowns.

The licensee's proposal to use a pump curve to compare differential pressure and flow rate when testing individual pumps should be acceptable because a pump curve defines the corresponding differential pressure for a given pump flow rate for a pump if the curve has been developed or verified by empirical data taken when the pump was known to be in good operating condition and forms an infinite set of fixed sets of reference values for that pump. The licensee has stated that the test data will be evaluated "in a band around the design point", but has not clearly stated if alert and required action ranges have been established nor explained how an individual degrading pump would be detected. Therefore, the licensee should establish alert and required action ranges for individual pump curves consistent with the ranges of Section XI, Table IWP-3100-2, and document that definition in the IST program. Additionally, the licensee should develop a method of evaluating the pump vibration measurements taken when using pump curves in lieu of fixed reference values because vibration is a variable pump parameter under those test conditions.

The licensee has not provided adequate technical justification demonstrating that individual tests of the service water pumps are impractical, therefore, relief from testing these pumps individually in accordance with Section XI, Paragraph IWP-3400(a), should not be granted as requested. Based on the impracticality of duplicating reference values for differential pressure and flow rate, relief may be granted from the

requirements of Section XI for the service water pumps provided that the licensee determines or verifies the pump curves for testing these pumps individually, documents the alert and required action ranges, and evaluates the vibration measurements as discussed above.

2.8.2 Vibration Measurements

2.8.2.1 Relief Request. The licensee requested relief from measuring vibration on the service water pumps, P001A-A, P001B-A, P001C-AB, P001D-B, and P001E-B, in accordance with the requirements of Section XI, Paragraph IWP-4500, and has proposed to measure vibration on these pumps at two locations on the top of the pump motor housings.

2.8.2.1.1 Licensee's Basis for Requesting Relief--These pumps are submerged in a pit which makes them inaccessible for measuring vibration amplitude at the pump bearings.

Alternate Testing: Vibration amplitude is to be measured on the top of the motor housing (which contains the motor thrust bearing) horizontally in two planes 90 degrees apart.

2.8.2.1.2 Evaluation--These pumps are submerged in the service water intake bays and are inaccessible, therefore, portable vibration instrumentation cannot be utilized during pump tests and permanent instrumentation is not installed. The licensee's proposal to measure vibration in two planes 90 degrees apart at the motor thrust bearing is a reasonable alternative to the Code requirements. Compliance with the Code requirements is impractical due to system design and conformance with the Code would be possible only if the service water pumps were substantially redesigned. It would be burdensome to require the licensee to perform system modifications because the expense would not be justified by the limited amount of additional information that may be obtained if this Code requirement were imposed.

Based on the impracticality of complying with the Code requirements, relief may be granted from the requirements of Section XI to measure pump bearing vibration as requested.

2.8.3 Instrumentation Accuracy

2.8.3.1 Relief Request. The licensee requested relief from the instrumentation accuracy requirements of Section XI, Table IWP-4110-1, when measuring flow rate for the service water pumps, P001A-A, P001B-A, P001C-AB, P001D-B, and P001E-B, and has proposed to use the installed annubar flow elements.

2.8.3.1.1 Licensee's Basis for Requesting Relief--In order to obtain the 1.1 percent accuracy for the installed annubar flow elements, they must be installed with at least 3 to 4 pipe diameters downstream and 6 pipe diameters upstream. Due to system pipe configuration, the downstream installation is in compliance but the upstream installation is a half-pipe diameter short. The annubars are certified for a 0.1 percent repeatability. Reputability is a more important consideration in monitoring for pump flow degradation. All flow measuring instrumentation associated with the annubars is in compliance with the requirements of Table IWP-4110-1.

Alternate Testing: The installed annubar flow elements will be used to measure pump test flow rate to the requirements of Pump Relief Request PR-11.

2.8.3.1.2 Evaluation--Revision 4 (Unit 1) and Revision 2 (Unit 2) have deleted Relief Request PR-11 referenced in the Alternate Testing above.

The accuracy and repeatability of the annubar flow elements and associated instrumentation meets the accuracy requirements of Section XI, Table IWP-4110-1, therefore, relief from these Code requirements is unnecessary. Additionally, the licensee's discussion of the flow element installation has not been evaluated because Section XI, IWP, does not address flow element installation requirements nor flow element installations and their locations relative to other components of the system.

2.8.4 Instrumentation Full-Scale Range

2.8.4.1 Relief Request. The licensee requested relief from the instrument full-scale range requirements of Section XI, Paragraph IWP-4120, for the discharge pressure instruments on the Unit 1 service water pumps, P001A-A, P001B-A, P001C-AB, P001D-B, and P001E-B, and proposed to utilize the installed instrumentation for measurement of Code required parameters.

2.8.4.1.1 Licensee's Basis for Requesting Relief--Reference values for discharge pressure for these pumps are between 88 and 92 psig. This would require discharge pressure gauges of 0-265 psig maximum. The accuracy required for these gauges would be 2 percent of 265 psig, which is 5.3 psig. The installed pump discharge pressure gauges are 0-300 6.0 psig. Although the installed instruments are above the maximum range limits, they are essentially equal to the accuracy requirements and are therefore adequate for pump testing.

Alternate Testing: The installed instrumentation will be used for taking discharge pressure measurements during pump testing.

2.8.4.1.2 Evaluation--The proposal to utilize installed instrumentation whose range is greater than the Code-allowed three times reference value, but whose accuracy meets the Code requirements, should provide sufficiently accurate data to utilize for pump testing to assess pump degradation. Due to the expense of system modifications and considering the limited amount of additional information that may be obtained, requiring the licensee to meet the Code instrument range requirement would be a hardship without a compensating increase in the level of quality and safety.

Based on the determination that imposing the Code instrument range requirement would be a hardship without a compensating increase in the level of quality and safety and considering that the licensee's proposed alternative should provide an acceptable level of quality and safety, relief may be granted from the requirements of Paragraph IWP-4120 as requested.

2.9 Component Cooling Water Pumps

2.9.1 Flow Rate Measurements

2.9.1.1 Relief Request. The licensee requested relief from measuring flow and differential pressure on the component cooling water pumps, P001A-B, P001B-AB, and P001C-A, in accordance with the requirements of Section XI, Paragraph IWP-3100, and proposed to utilize pump curves to compare differential pressure and flow rate during pump tests.

2.9.1.1.1 Licensee's Basis for Requesting Relief--This system does not have an installed pump test line and system operating conditions will not allow adjusting system resistance without significant impact on plant operations. This is a variable resistance system that is in continuous operation during all modes of plant operation. Depending on plant operating conditions and climatic conditions, the cooling requirements range from minimum cooling loads to 100 percent with many of the loads automatically placed in operation in response to local temperature requirements. Because of these normal operating requirements, it is not possible to specify a reference test flow path or flow rate that can be repeated for each test.

Alternate Testing: 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 establish the relationship between flow rate and differential pressure in a band around the design point. The "Required Action" and "Alert" ranges of Table IWP-3100-2 as specified in IWP-3210 will be applied.

2.9.1.1.2 Evaluation--The cooling demands placed on the component cooling water system by the equipment served do not allow system realignment solely for the sake of equipment testing. Cooling water flow to a vital piece of equipment could unknowingly be reduced to the point of damage from overheating.

A pump curve defines the corresponding differential pressure for a given pump flow rate if the curve has been developed or verified by empirical data taken when the pump was known to be in good operating condition and forms an infinite set of fixed sets of reference values. The licensee's proposal to use a pump curve to compare differential pressure and flow rate for pump inservice testing should provide reasonable assurance of pump operational readiness. The licensee has established alert and required action ranges on the test curves so a degrading pump would be detected. The licensee has also indicated that the reduced range limits allowed by Paragraph IWP-3210 will be applied to the test curves, therefore, the licensee should identify those reduced limits in the IST program. The licensee should also document why ranges in Table IWP-3100-2 cannot be met and how, with the revised ranges, assurance will be provided that the pumps can continue to fulfill their function.

Due to system design, compliance with the Code requirements is impractical and conformance with the Code would be possible only if this system was substantially redesigned. It would be burdensome to require the licensee to perform system modifications because the expense would not be justified by the limited amount of additional information that may be obtained if this Code requirement were imposed. However, the licensee should develop a method of evaluating the pump vibration measurements taken when using pump curves in lieu of fixed reference values because vibration is a variable pump parameter under those test conditions.

Based on the impracticality of duplicating reference values for flow rate and differential pressure for the component cooling water pumps and considering the licensee's proposed alternative of utilizing pump curves for comparison of these parameters, relief may be granted from the requirements of Section XI as requested provided that the licensee evaluates vibration measurements. The licensee should also justify, in the IST program, the bases for reduced limits of alert and required action ranges as discussed above.

2.10 Diesel Generator Fuel Oil Transfer Pumps

2.10.1 Inlet Pressure, Differential Pressure, Flow Rate Measurement, and Test Duration

2.10.1.1 Relief Request. The licensee requested relief from measuring inlet pressure, differential pressure, flow rate, and the minimum five minute run time on the diesel generator fuel oil transfer pumps, P501A-A, P501B-B, P502A-A, P502B-B, P503A-A, P503B-B, P504A-A, P504B-B (Unit 1), P503B-B, and P505A-A (Unit 2), in accordance with the requirements of Section XI, Paragraphs IWP-3100 and -3500, and proposed to calculate flow rate.

2.10.1.1.1 Licensee's Basis for Requesting Relief--The diesel generator fuel oil transfer pumps are located inside the storage tank with the pump discharge plenum and motor bolted to a flange on top of the tank. None of the pumps have installed instrumentation to measure either flow or discharge pressure. The only possible flow measurement is by measuring change in day tank level over time. The 4075 K.W. Diesel Generators (Units 1 and 2) have, by design, a maximum fuel consumption of 5.6 gpm and the 2850 K.W. units (Unit 1 only) have a fuel consumption of 4.2 gpm. Plant procedures require that day tank level be maintained approximately 80 percent full. To comply with the Code requirement to run the pumps for five minutes prior to taking test measurements would require draining the day tanks below a safe operating level.

Alternate Testing: Pump test flow rate will be obtained by measuring a change in day tank level over time. A day tank level change of approximately 10 percent shall be timed and the flow rate determined from tank curves. An Alert Range of 6% and a Required Action Range of 10% shall be applied as provided by IWP-3210 and clarified by Code Interpretation XI-1-79-19. Also, flow rates of 5.6 gal./min. for the P501 A/B and P502 A/B pumps and 4.2 gal./min. for the P503 A/B and P504 A/B pumps will be applied as an absolute minimum (5.6 gal./min. for pumps P503B-B and P505A-A, Unit 2).

2.10.1.1.2 Evaluation--The diesel generator day tanks are sized such that the pumps cannot be run for the required five minute stabilization period without the possibility of overflowing the day tank if the minimum required level is maintained in the tank. Either overfilling or draining these tanks could create a fire hazard and danger to test personnel in addition to violating station procedures requiring maintenance of minimum levels for operability. Also, stable system conditions can be established very rapidly after pump start and running the pump for a minimum of five minutes during each test is unnecessary.

The licensee has not provided a discussion of inlet pressure measurements or the difficulties encountered while obtaining them other than indicating a need for relief. The licensee should provide a relief request addressing this item or should be required to measure or calculate inlet pressure for these pumps.

The licensee has indicated that pump discharge pressure indication is not available for the fuel oil transfer pumps. Pump differential pressure and flow rate are the two prime indicators of centrifugal pump hydraulic condition and, since the lack of installed instrumentation is not a suitable justification for not performing the Code required measurements, the licensee should consider system modifications or temporary instrumentation in order to obtain pump discharge pressure data during the quarterly tests.

Due to system design, instrumentation is not installed to measure flow rate, however, flow rate can be calculated by monitoring the rate-of-change of level in the diesel generator day tank during pump testing while the diesel generator is secured. This is an acceptable alternate test method if the information obtained is sufficiently accurate to monitor pump degradation. A system modification would be required to allow direct measurement of pump flow rate. It would be burdensome to require the licensee to perform system modifications because the expense would not be justified by the limited amount of additional information that may be obtained if this Code requirement were imposed. Additionally, Code Interpretation XI-1-79-19 states, in part, "If these ranges cannot be met, the Owner can specify new range limits..... Using the less conservative

ranges, the Owner shall show that the overall pump performance has not degraded from its intended function." The licensee has not provided sufficient information to demonstrate that their proposed use of expanded ranges will permit detection of pump degradation prior to the pump being unable to meet its design basis flow requirements.

Based on the considerations discussed above, the licensee has not demonstrated that it is impractical to measure inlet pressure on these pumps during tests; therefore, relief should not be granted from this Code requirement. The licensee has not demonstrated that it is impractical to install temporary instrumentation to meet the Code requirement of measuring discharge pressure, therefore, relief should not be granted from this Code requirement. Additionally, the licensee should demonstrate in the program that the proposed expanded range limits allowed by Code Interpretation XI-1-79-19 will provide for detection of pump degradation and document that determination in the IST program.

Based on the impracticality of measuring pump flow directly and considering that pump flow rate can be calculated based on the level change in the day tank during pump tests, relief may be granted to calculate the fuel oil transfer pump flow rate as requested provided that the calculated flow is within the accuracy that would result from using instruments meeting the Code accuracy requirements. Based on the impracticality of running the fuel oil transfer pumps for five minutes in accordance with the requirements of Section XI, relief may be granted as requested.

2.10.2 Vibration Measurements

2.10.2.1 Relief Request. The licensee requested relief from measuring vibration on the diesel generator fuel oil transfer pumps, P501A-A, P501B-B, P502A-A, P502B-B, P503A-A, P503B-B, P504A-A, P504B-B (Unit 1), P503B-B, and P505A-A (Unit 2), in accordance with the requirements of Section XI, Paragraph IWP-3100, and proposed to measure vibration at the pump motor.

2.10.2.1.1 Licensee's Basis for Requesting Relief--The diesel generator fuel oil pumps are located inside the storage tanks with the pump

discharge plenum and motor bolted to a flange on top of the tank. The pumps are inaccessible for pump bearing vibration measurements.

Alternate Testing: Motor vibration measurements will be performed quarterly in lieu of Code required pump vibration measurements.

2.10.2.1.2 Evaluation--These pumps are submerged in the fuel oil storage tank and are inaccessible for direct measurement of vibration at the pump bearings using portable test instrumentation. Also, permanent instrumentation is not installed to permit remote measurements during pump tests. Due to the installation, the only pump element accessible for vibration measurements is the pump motor. It is impractical for the licensee to take vibration measurements on these submerged pumps and it would be burdensome to require the licensee to perform system modifications to allow these measurements.

Based on the impracticality of complying with the Code requirements and the burden on the licensee if the Code requirements were imposed, relief may be granted from the requirements of Section XI as requested.

3. VALVE TESTING PROGRAM

The Joseph M. Farley Nuclear Plant, Unit 1 and Unit 2, IST programs submitted by Alabama Power Company were examined to verify that all valves that are included in the programs are subjected to the periodic tests required by the ASME Code, Section XI, 1983 Edition through Summer 1983 Addenda, and the NRC positions and guidelines. The reviewers found that, except as noted in Appendix A or where specific relief from testing has been requested, these valves are tested to the Code requirements and the NRC positions and guidelines. Each Alabama Power Company basis for requesting relief from the valve testing requirements and the reviewer's evaluation of that request are summarized below and grouped according to system and valve category. All relief requests and evaluations are applicable to both Unit 1 and Unit 2 unless otherwise noted.

3.1 All Systems

3.1.1 Rapid-Acting Valves

3.1.1.1 Relief Request. The licensee requested relief from measuring and trending the stroke time of all rapid-acting power operated valves in the IST program in accordance with the requirements of Section XI, Paragraphs IWV-3413 and -3417, and proposed to assign a maximum stroke time limit of 2 seconds to these valves.

3.1.1.1.1 Licensee's Basis for Requesting Relief--For rapid-actuating power operated valves, the application of the above criteria could result in requiring corrective action when the valves are functioning normally. These valves are generally small air and solenoid-operated valves which, because of their size and actuator types, stroke very quickly. Operating history on this type of valve indicates that they generally either operate immediately or fail to operate in a reasonable length of time. The intent of the referenced Code sections is to track valve stroke time as means of detecting valve degradation. This type of valve does not lend itself to this tracking technique.

Alternate Testing: A maximum stroke time of 2 seconds will be specified for each rapid-actuating valve. If the measured valve stroke time is 2 seconds or less, it will be considered as acceptable and no corrective action will be required. If the measured valve stroke time exceeds 2 seconds, it will be considered inoperable and appropriate corrective action will be taken.

3.1.1.1.2 Evaluation--Rapid-acting valves are defined as those valves which stroke in 2 seconds or less. Industry experience has shown that these valves are difficult to stroke time using presently available methods of measurement and the results are subject to variation due to influences other than valve condition. Variations in the response time of the personnel performing the tests will result in slight variations in the stroke times and a very small increase in stroke time would result in a large percentage change which could easily exceed the limits of Section XI thus requiring corrective action whether necessary due to valve degradation or not. Considering the design of these valves, assigning a maximum stroke time limit of 2 seconds to them and taking corrective action upon exceeding that limit is a reasonable alternative to the Code requirements.

Based on the considerations discussed above and considering that the licensee's proposal is in accordance with the guidance presented in Generic Letter 89-04, Attachment 1, Item 6, the proposed alternative should provide an acceptable level of quality and safety, therefore, relief may be granted as requested

3.1.2 Containment Isolation Valves

3.1.2.1 Relief Request. The licensee requested relief from leak testing containment isolation Category A and A/C valves in accordance with the requirements of Section XI, Paragraphs IWV-3421 through -3425 and Paragraph IWV-3427(b), and proposed to leak rate test these valves in accordance with the requirements of 10 CFR 50, Appendix J, and Paragraphs IWV-3426 and -3427(a).

3.1.2.1.1 Licensee's Basis for Requesting Relief--Containment isolation valves which are designated as Category A or AC are leak rate

tested to the requirements of Appendix J to 10 CFR 50. Appendix J, Type C, valve local leak rate test procedures and requirements fulfill the intent of Articles IWV-3421 through IWV-3425. NRC Generic Letter 89-04, Attachment 1, Item 10, states that the additional testing requirements of IWV-3427(b) are unreasonably burdensome and without a commensurate benefit in extended valve operation.

Alternate Testing: Containment isolation valves will be local leak rate tested to the requirements of Appendix J, Type C, testing in lieu of those required by Articles IWV-3421 through IWV-3425. The analysis of leakage rates and corrective action requirements of Articles IWV-3426 and IWV-3427(a) will be performed.

3.1.2.1.2 Evaluation--The leak test procedures and requirements for containment isolation valves identified by 10 CFR 50, Appendix J, are equivalent to the requirements of Paragraphs IWV-3421 through -3425. Appendix J, Type C, leak rate testing adequately determines the leak tight integrity of these valves. Since the 10 CFR 50, Appendix J, leak rate testing does not trend or establish corrective actions based on individual valve leakage rates, the licensee has stated that the Analysis of Leakage Rates and Corrective Action requirements of Section XI, Paragraphs IWV-3426 and -3427(a) will be followed and, therefore, the proposed testing is acceptable.

The licensee's proposal to leak test containment isolation valves in accordance with the requirements of 10 CFR 50, Appendix J, and Section XI, Paragraphs IWV-3426 and -3427(a), is in accordance with the guidance presented in Generic Letter 89-04, Attachment 1, Item 10, and should provide an acceptable level of quality and safety, therefore, relief may be granted as requested.

3.1.3 Pressure Boundary Isolation Valves

3.1.3.1 Relief Request. The licensee requested relief from comparing leak rate test results in accordance with the requirements of Section XI, Paragraph IWV-3426, for all reactor coolant system pressure isolation valves

and proposed to leak rate test these valves in accordance with plant Technical Specifications.

3.1.3.1.1 Licensee's Basis for Requesting Relief--Technical Specification Section 3.4.7.2 defines the limiting conditions for operations and Section 4.4.7.2.2 defines the surveillance requirements for pressure isolation valves as follows:

> Each reactor coolant system pressure isolation valve specified in Table 3.4-1 shall be demonstrated operable pursuant to Specification 4.0.5 except that in lieu of any leakage testing required by Specification 4.0.5, each valve should be demonstrated operable by verifying leakage to be within the allowable leakage criteria of 0.5 gpm per inch of nominal valve size with an upper limit of the maximum allowable leakage in Table 3.4-1; and the measured leak rate for any given test cannot reduce the difference between the results of the previous test and the maximum allowable leakage specified in Table 3.4-1 by more than 50%:
>
> a. Every refueling outage during startup.
>
> b. Prior to returning the valve to service following maintenance, repair, or replacement work on the valve affecting the seating capability of the valve.
>
> c. Following valve actuation due to automatic or manual action or flow through the valve for valves identified in Table 3.4-1 by an asterisk.
>
> d. The provisions of Specification 4.0.4 are not applicable for entry into mode 3 or 4.

Alternate Testing: The Technical Specification defined surveillance testing will be performed, but no comparison of test results to previous results will be performed.

3.1.3.1.2 Evaluation--The Farley Technical Specifications identify the valves that are leak rate tested as pressure isolation valves and establish the maximum permissible leakage rate, the test frequency requirements, and the required action if the leak rate limit is exceeded. Testing the RCS pressure isolation valves in accordance with the Technical Specifications essentially meets the Section XI Code requirements since all of the major elements of Paragraphs IWV-3421 through -3427, except comparison of test results, are incorporated. The Technical Specification leak rate testing should adequately determine the leak tight integrity of these valves.

The licensee's proposed alternative for pressure isolation valve testing is in accordance with Generic Letter 89-04, Attachment 1, Item 4.a, and should provide an acceptable level of quality and safety, therefore, relief may be granted as requested.

3.2 Reactor Coolant System

3.2.1 Category A/C Valves

3.2.1.1 Relief Request. The licensee requested relief from exercising valves QV038, pressurizer relief tank makeup water supply check, and QV054, charging pump relief valve discharge line check, in accordance with Section XI, Paragraph IWV-3521, and proposed to verify closure (their safety position) during leak testing each refueling outage.

3.2.1.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.2.1.1.2 Evaluation--These valves are simple check valves that are located inside containment and are not equipped with position indication. Some of the required test connections are also located inside containment. The only practical method available to verify closure of these

valves is to perform a leak test. These valves are subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to the valves because they are inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Leak testing these valves during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.2.2 Category B Valves

3.2.2.1 Relief Request. The licensee requested relief from exercising, remote position indication verification, stroke timing, and fail-safe testing valves HV-1, -2, -3, and -4, reactor vessel head vents, in accordance with Section XI, Paragraphs IWV-3411, -3413, and -3415, and proposed to verify operational readiness by full-stroke exercising them during cold shutdowns if RCS pressure is less than 50 psig and during refueling outages.

3.2.2.1.1 Licensee's Basis for Requesting Relief--These reactor vessel head vent valves are Target Rock solenoid operated valves. The valve position indicators are located in the solenoid coil circuit and do not provide a positive means for valve position verification or valve stroke timing. In order to verify that the valves exercise open and reclose, it is necessary to establish flow through the vent lines. Since the valves vent directly to the containment atmosphere, a temporary flexible vent line to an appropriate waste drain must be installed during the test to preclude spraying reactor coolant system fluid into the containment atmosphere. Because of the flexible line used during testing, the reactor coolant system pressure must be 50 psig or less. Testing at pressures greater than 50 psig

could result in rupture of the test line and result in an uncontrolled release of reactor coolant system fluid into the containment atmosphere.

Alternate Testing: These valves will be full-stroke exercised and the head vent flow path verified operable at refueling or at least once every 18 months as required by the plant Technical Specifications. In addition, these valves will be exercised at cold shutdown if reactor coolant system pressure is less than 50 psig.

3.2.2.1.2 Evaluation--These valves are totally enclosed with no visible moving parts, therefore, valve movement and stroke timing cannot be observed directly. Because of this design feature, the only conventional alternate method available to verify that a valve changes position when it is exercised is observation of indirect evidence which, in this case, is flow from the reactor vessel vents. To prevent discharging reactor coolant directly to the containment atmosphere, it is necessary to install a temporary test fixture when exercising these valves. The RCS pressure must be 50 psig or less when using the test fixture to prevent failure of the test fixture tubing, therefore, it is impractical to exercise these valves during each cold shutdown because the RCS may not be depressurized below the testing pressure limit. It would be burdensome to require the licensee to depressurize the RCS solely to test these valves each cold shutdown since this could result in a delay in returning the plant to power operations.

The licensee's proposal will indicate a valve problem only when there is a complete failure to operate and provides no method of detecting valve degradation. Testing that does not provide a means to monitor valve condition and detect degradation is not acceptable on a long term basis. The licensee should develop a method to monitor valve condition and detect degradation, such as using non-intrusive diagnostic techniques to measure the full-stroke time of these valves. It would be burdensome to require the licensee to immediately develop a method of monitoring valve degradation, therefore, an interim period should be provided during which the licensee should develop a method of performing this testing. The licensee's proposal to verify that these valves operate during refueling outages and those cold

shutdowns when reactor coolant pressure is less than 50 psig should provide an acceptable level of quality and safety during the interim period.

Based on the impracticality of exercising, stroke timing, and fail-safe testing these valves during each cold shutdown, the burden on the licensee if these Code requirements were imposed, and considering the proposed alternate testing, interim relief may be granted for 12 months or the next refueling outage, whichever is longer. During this interim period, the licensee should develop a method to monitor for degradation of these valves.

3.3 Low Head Safety Injection/Residual Heat Removal System

3.3.1 Category A Valves

3.3 1.1 Relief Request. The licensee requested relief from remote position indication verification for valves QV025A and QV025B, containment sump isolations, in accordance with the requirements of Section XI, Paragraph IWV-3300, and proposed to verify the remote position indication accuracy during refueling outages.

3.3.1.1.1 Licensee's Basis for Requesting Relief--Remote position indicators will be used to verify valve position per IWV-3300. However, visual observation of valve operation is not practical because it would require removal of the valve protective chamber. Each valve is equipped with redundant, remote valve position indicators and displayed at three locations on the main control board. These indications are received from four-rotor type, four train, geared limit switches which are integral components of the Limitorque motor operators. Diverse power supplies are utilized to energize the control board indicator lights such that each remote position indication is an independent unit.

Alternate Testing: The leak rate test during each refueling outage will verify if the remote position indicators accurately reflect the closed position of the valves. No practical means exists to verify the open position of the valves. However, following each leak rate test, the air pressure will be relieved by opening these valves, thus verifying that the disk moves away from the seat.

In addition, visual verification of valve stem movement will be performed whenever the valve enclosure covers are removed for any other reason unless performed within the previous 2-year period. This inspection will be performed at least once in a 10-year interval.

3.3.1.1.c Evaluation--Visual verification of valve stem travel is impractical when exercising these valves because they are located in encapsulation chambers, which are extensions of containment. Access to the valves is through manways which are equipped with large bolted covers. Since the covers are sealed and form part of the containment boundary, the manways must be local leak rate tested as required by 10 CFR 50, Appendix J, following each entry.

The special design of the position indication on these valves, i.e., directly geared, redundant switches, with independent power supplies, greatly increases the reliability and the accuracy of the position indication. Because of this feature, the position of the associated valve should be accurately indicated during the ten year inspection interval proposed by the licensee. Additionally, the leak rate testing, followed by valve opening to relieve the test pressure, performed each refueling outage will aid in verifying the true position of the valve disk. It would be burdensome to require the licensee to observe these valves every two years due to the time and manpower required to remove and replace the manway covers and perform leak testing following reassembly.

Based on the impracticality of observing these valves every two years, the burden on the licensee if this Code requirement were imposed, and considering that these valves are equipped with redundant, independent position indication which should provide reasonable assurance of operational readiness, relief may be granted as requested.

3.3.2 Category A/C Valves

3.3.2.1 Relief Request. The licensee requested relief from exercising valves QV042A and QV042B, residual heat removal return header checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to full-stroke exercise these valves during refueling outages.

3.3.2.1.1 Licensee's Basis for Requesting Relief--Verification of forward flow operability of these normally closed check valves can only be performed by injecting residual heat removal (RHR) water into the RCS. During normal operation the low-pressure LHSI/RHR pumps cannot overcome the higher RCS operating pressure. Verification of full design flow rate operability cannot be done at cold shutdown due to back pressure from the RCS. Verification of full flow operability can only be done at refueling with the RCS depressurized, the reactor vessel head removed, upper internals in place, and the refueling cavity at refueling level.

Alternate Testing: Valves will be forward flow verified when the SI/LOSP test is being performed.

3.3.2.1.2 Evaluation--These check valves cannot be exercised during power operation because the only flow path is into the RCS and the residual heat removal pumps cannot overcome reactor system pressure. These valves cannot be full-stroke exercised during cold shutdowns because the RCS does not contain sufficient expansion volume to accommodate the flow required and a low temperature overpressure condition could result. Additionally, the residual heat removal pumps do not provide adequate flow rates against reactor system back pressure to full-stroke exercise these valves during cold shutdowns. The licensee's proposal to full-stroke exercise these valves with flow during refueling outages when the reactor vessel head is removed is a reasonable alternative to the full-stroke exercising requirements of the Code. Compliance with the Code required testing frequency would be burdensome since this would require quarterly plant shutdown, cooldown, and reactor head removal. Compliance with the Code during cold shutdowns would also require reactor head removal and would delay reactor startup. However, the licensee has not addressed part-stroke exercising these valves and has provided no technical justification for not doing so. It is apparent that quarterly part-stroke exercising cannot be done for the reasons discussed above, however, those plant conditions do not exist during cold shutdowns when the residual heat removal pumps are normally in operation. The licensee should conduct a part-stroke exercise test of these check valves during cold shutdowns in accordance with the requirements of Section XI, Paragraph IWV-3522, and document that testing in the IST program.

Based on the impracticality of full-stroke exercising these valves quarterly and during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and considering that the proposed alternate testing should provide reasonable assurance of operational readiness, relief may be granted from the full-stroke exercising requirements of Section XI as requested provided that the licensee part-stroke exercises these valves during cold shutdowns as discussed above.

3.3.2.2 Relief Request. The licensee requested relief from exercising valves QV021A, QV021B, and QV021C, residual heat removal cold leg injection checks, in accordance with the requirements of Section XI, Paragraphs IWV-3521 and -3522, and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.3.2.2.1 Licensee's Basis for Requesting Relief--These 6-inch Velan swing check valves are located in the low head safety injection flow paths to the RCS cold legs. Individual line flow rate cannot be used to verify individual valve operability due to lack of instrumentation.

Alternate Testing: One of these valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.3.2.2.2 Evaluation--There are no flow elements, instrument connections, or flow instruments installed in the injection headers containing these check valves, therefore, flow cannot readily be used to verify that the valves individually full-stroke exercise. Also, individual part-stroke exercising may not be positively verified since the parallel flow paths are not instrumented. The Code required testing could be verified after installation of flow instrumentation in each injection header or by using non-intrusive flow instruments or valve diagnostics. It would be

burdensome to require the licensee to perform system modifications that permit direct measurement of flow through these individual valves due to the expense involved.

Disassembly and inspection may be an acceptable method to assess valve condition when individually exercising valves with system flow cannot be verified. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. Therefore, the licensee should develop a method that verifies part-stroke exercising these valves. One of the options the licensee may consider is the use of portable flow instrumentation to verify flow through each valve.

Another alternative available to the licensee is to verify that these valves open sufficiently to pass the maximum required accident flow rate during flow testing by use of non-intrusive diagnostic testing techniques at least once each refueling outage.

The licensee's proposed alternative should provide reasonable assurance of operational readiness and provide an acceptable level of quality and safety provided they part-stroke exercise the affected valve prior to returning it to service following valve disassembly and inspection.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, relief may be granted from the Code requirements provided the valves are verified to be at least part-stroke exercised with flow following reassembly but prior to returning them to service. The licensee should actively investigate the use of portable flow

instrumentation or non-intrusive diagnostic techniques to demonstrate that these valves exercise open during flow testing. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves.

3.3.3 Category B Valves

3.3.3.1 Relief Request. The licensee requested relief from measuring the stroke time of valves QV032A and QV032B, residual heat removal heat exchanger outlets, and QV033A and QV033B, residual heat removal heat exchanger bypasses, in accordance with the requirements of Section XI, Paragraph IWV-3413.

3.3.3.1.1 Licensee's Basis for Requesting Relief--Valves QV032A, B are the RHR heat exchanger outlet valves and QV033A, B are the RHR heat exchanger bypass valves. Valves QV032A, B are normally open, fail open and valves QV033A, B are normally closed, fail closed valves. This is the required valve alignment for the LHSI mode of operation. The RHR function of these valves is to control cooldown rate by regulating flow through the RHR heat exchangers. Both the flow control and bypass valves modulate to control the amount of heat removal by the RHR heat exchangers. Valves QV032A, B modulate in response to a manually controlled position signal and valves QV033A, B automatically modulate to adjust bypass flow in response to the set position of valves QV032A, B. The only way to full-stroke the valves is by manually adjusting the flow control valve position control station through the full range of adjustment.

Alternate Testing: The valves will be tested quarterly by stroking each valve through its full range of travel.

3.3.3.1.2 Evaluation--The licensee has provided information during conference calls and through IST program submittals that demonstrates that these valves are maintained in their required safety-related position whenever the low head safety injection mode of the residual heat removal system is required to be operational. QV032A and QV032B are normally open valves that fail open and whose required safety position is open, therefore,

they do not have to change position to perform their intended safety function. Likewise, QV033A and QV033B are normally closed valves that fail closed and whose required safety position is closed, therefore, they do not have to change position to perform their intended safety function. Since these four valves are in their required safety position, fail in that position, and are not required to move from that position, they are passive valves in the LHSI mode and fail-safe testing is not required. The licensee's proposed testing was agreed upon during a conference call between the licensee, the reviewers, and the NRC staff October 30, 1987. The licensee then revised the IST program to remove the reference to fail-safe testing these valves. The licensee may wish to review the Section XI categorization of these four valves to determine if they are passive under all modes of system operation.

Each QV033 valve is slaved to its associated QV032 valve such that when the QV032 valve is manually positioned to adjust flow through the residual heat removal heat exchanger during decay heat removal operations, the QV033 valve opens to maintain a constant flow through the residual heat removal system. This design feature assures an unrestricted flow path to the RCS in the unlikely event of an automatic safety injection initiation during decay heat removal operations. Also due to this design feature, these valves cannot be accurately stroke timed because both valves are controlled with a single "thumb-wheel" Type Controller and initiation of valve movement is subject to considerable variation. This type of controller provides an output signal that is dependent upon the speed with which the controller is operated. Stroke time measurements obtained using this type of controller are very difficult to repeat due to the absence of valve control switches and do not contribute meaningful data to use in monitoring valve degradation. It would be burdensome to require the licensee to perform control circuit modifications to allow stroke timing these valves in accordance with the requirements of Section XI due to the expense involved.

However, since the licensee's proposal does not provide for detection of valve degradation, some method should be developed to detect and monitor valve condition. It may be possible to develop a fail-safe test during which stroke times could be measured when those stroke times are not influenced by

the existing control circuitry. It would be burdensome to require the licensee to immediately develop a means of monitoring valve degradation, therefore, an interim period should be provided during which the licensee can develop a method of performing this testing. The licensee's proposal of full-stroke exercising these valves quarterly, without stroke timing, should provide an acceptable level of quality and safety during the interim period since it does provide an indication of the ability of the valves to perform.

Based on the impracticality of complying with the Code required stroke time measurements, the burden on the licensee if these Code requirements were imposed, and considering the proposed alternate testing, interim relief may be granted for 12 months or the next refueling outage, whichever is longer. During this interim period, the licensee should develop a method of monitoring for degradation of these valves. When a method of monitoring valve degradation is developed, this relief request should be revised or deleted.

3.3.4 Category C Valves

3.3.4.1 Relief Request. The licensee requested relief from exercising valves QV051A, QV051B, and QV051C, combined high head/low head cold leg injection checks, in accordance with the requirements of Section XI, Paragraphs IWV-3521 and -3522, and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.3.4.1.1 Licensee's Basis for Requesting Relief--These 6-inch Velan swing check valves are located in the shared low-head and high-head safety injection lines to the reactor coolant system cold legs. Individual line flow rate cannot be used to verify individual valve operability due to lack of instrumentation.

Alternate Testing: One of these valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is

binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.3.4.1.2 Evaluation--There are no flow elements, instrument connections, or flow instruments installed in the injection headers containing these check valves, therefore, flow cannot readily be used to verify that the valves individually full-stroke exercise. Also, individual part-stroke exercising may not be positively verified since the parallel flow paths are not instrumented. The Code required testing could be verified after installation of flow instrumentation in each injection header or by using non-intrusive flow instruments or valve diagnostics. It would be burdensome to require the licensee to perform system modifications that permit measurement of flow through these individual valves due to the expense involved.

Disassembly and inspection may be an acceptable method to assess valve condition when individually exercising valves with system flow cannot be verified. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. Therefore, the licensee should develop a method that verifies part-stroke exercising these valves. One of the options the licensee may consider is the use of portable flow instrumentation to verify flow through each valve.

Another alternative available to the licensee is to verify that these valves open sufficiently to pass the maximum required accident flow rate during flow testing by use of non-intrusive diagnostic testing techniques at least once each refueling outage.

The licensee's proposed alternative should provide reasonable assurance of operational readiness and provide an acceptable level of quality and safety provided they part-stroke exercise the affected valve prior to returning it to service following valve disassembly and inspection.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, relief may be granted from the Code requirements provided the valves are verified to be at least part-stroke exercised with flow following reassembly but prior to returning them to service. The licensee should actively investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that these valves exercise open during flow testing. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves.

3.4 Containment Spray System

3.4.1 Category A Valves

3.4.1.1 Relief Request. The licensee requested relief from remote position indication verification for valves QV003A and QV003B, containment sump isolations, in accordance with the requirements of Section XI, Paragraph IWV-3300, and proposed to verify the remote position indication accuracy during refueling outages.

3.4.1.1.1 Licensee's Basis for Requesting Relief--Remote position indicators will be used to verify valve position per IWV-3300. However, visual observation of valve operation is not practical because it would require removal of the valve protective chamber. Each valve is equipped with redundant, remote valve position indicators and displayed at three locations on the main control board. These indications are received from four-rotor type, four train, geared limit switches which are integral components of the Limitorque motor operators. Diverse power supplies are utilized to energize the control board indicator lights such that each remote position indication is an independent unit.

Alternate Testing: The leak rate test during each refueling outage will verify if the remote position indicators accurately reflect the closed position of the valves. No practical means exists to verify the open position of the valves. However, following each leak rate test, the air pressure will be relieved by opening these valves, thus verifying that the disk moves away from the seat.

In addition, visual verification of valve stem movement will be performed whenever the valve enclosure covers are removed for any other reason unless performed within the previous 2-year period. This inspection will be performed at least once in a 10-year interval.

3.4.1.1.2 Evaluation--Visual verification of valve stem travel is impractical when exercising these valves because they are located in encapsulation chambers, which are extensions of containment. Access to the valves is through manways which are equipped with large bolted covers. Since the covers are sealed and form part of the containment boundary, the manways must be local leak rate tested as required by 10 CFR 50, Appendix J, following each entry.

The special design of the position indication on these valves, i.e., directly geared, redundant switches, with independent power supplies, greatly increases the reliability and the accuracy of the position indication. Because of this feature, the position of the associated valve should be accurately indicated during the ten year inspection interval proposed by the licensee. Additionally, the leak rate testing, followed by valve opening to relieve the test pressure, performed each refueling outage will aid in verifying the true position of the valve disk. It would be burdensome to require the licensee to observe these valves every two years due to the time and manpower required to remove and replace the manway covers and perform leak testing following reassembly.

Based on the impracticality of observing these valve every two years, the burden to the licensee if this Code requirement were imposed, and considering that these valves are equipped with redundant, independent position indication which should provide reasonable assurance of operational readiness, relief may be granted as requested.

3.4.2 Category C Valves

3.4.2.1 Relief Request. The licensee requested relief from exercising valves QV002A and QV002B, containment spray header checks, and QV014, containment spray pump refueling water storage tank suction check, (Unit 1 only) in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to part-stroke exercise QV014 quarterly and to full-stroke exercise all three valves during refueling outages.

3.4.2.1.1 Licensee's Basis for Requesting Relief--The only way to verify forward flow operability during normal operation or cold shutdown would be by using the pumps and injecting a large quality of water into the containment. Spraying the containment would result in extensive damage to safety-related equipment located inside the containment.

Alternate Testing: The system has been modified such that spool pieces can be installed downstream of these check valves. During refueling, these spool pieces will be installed and a full forward flow test performed by pumping water through these full flow test lines to the containment refueling cavity. Because of the time involved in installing the spool pieces and the large quantity of water necessary, this test can only be performed at refueling. In addition, QV014 will be partial forward flow verified during quarterly pump testing.

3.4.2.1.2 Evaluation--It is impractical to exercise valves QV002A and QV002B (Unit 1 only) with flow quarterly or during cold shutdowns because this would result in spraying containment causing electrical equipment and lagging damage. The only practical method of verifying valve operational readiness is the licensee's proposal to install spool pieces during refueling outages to allow full-stroke exercising these valves with flow by pumping to the refueling cavity. This test method will allow full-stroke verification of each valve because each containment spray header is equipped with flow instrumentation. It is impractical to full-stroke exercise valve QV014 (Unit 1 only) quarterly or during cold shutdowns because the only full flow path is into the containment spray headers with the same problems just described. However, this valve is part-stroke exercised during the quarterly pump tests

when pump minimum flow is established returning to the refueling water storage tank. This valve is full-stroke exercised during refueling outages after the test spool pieces have been installed so full flow can be established without spraying the containment. Compliance with the Code required testing frequency would be burdensome since this would require quarterly plant shutdown, containment entry, and spool piece installation. It is also impractical to perform this testing during cold shutdowns because the time required to install the spool pieces, then remove them and leak test the flanges, could delay plant startup.

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

3.4.2.2 Relief Request. The licensee requested relief from exercising valves QV002A and QV002B, containment spray header checks (Unit 2 only), in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.4.2.2.1 Licensee's Basis for Requesting Relief--The only way to verify forward flow operability during normal operation or cold shutdown 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 the containment.

Alternate Testing: One of these valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valve must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.4.2.2.2 Evaluation--It is impractical to exercise these valves with flow quarterly or during cold shutdown because that would result in spraying the containment causing electrical equipment and lagging damage. These valves could be exercised using system flow after installation of test spool pieces in each containment spray header. It would be burdensome to require the licensee to perform these system modifications due to the expense involved and possible reduction in system reliability because of the increased number of system penetrations and welds. Considering the design of this system, the licensee's proposal to disassemble and manually full-stroke these valves during refueling outages appears to be the only practical alternate exercising method available.

Disassembly and inspection is an acceptable method to assess valve condition in this situation since exercising with system flow is impractical. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. The licensee should investigate a method that verifies part-stroke exercising these valves.

An interim period is necessary to give the licensee time to complete their investigation, the test procedures, and any system design changes necessary to perform post-inspection part-stroke exercising. Immediate compliance could result in an extended outage which would be a burden to the licensee due to the expense involved. The licensee's proposed alternative, while not acceptable for the long term, should provide reasonable assurance of operational readiness in the interim since the incidence of improper reassembly should be low. Therefore, based on the impracticality of complying with the Code requirements and considering the burden on the licensee if the Code requirements were imposed, interim relief may be granted

for one year or until the next refueling outage, whichever is greater. In the interim, the licensee may use disassembly and inspection to verify the full-stroke capability of these check valves without a post-inspection part-stroke exercise with flow.

The licensee should investigate the use of non-intrusive diagnostic techniques to demonstrate that these valves are capable of full-stroke exercising open at least once during each refueling outage. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves.

3.4.2.3 Relief Request. The licensee requested relief from exercising valve QV014, containment spray pump refueling water storage tank suction check (Unit 2 only), in accordance with the requirements of Section XI, Paragraph IWV-3522, and proposed to verify valve operational readiness by sample disassembly and inspection every third refueling outage.

3.4.2.3.1 Licensee's Basis for Requesting Relief. The only way to verify forward flow operability using flow 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 the containment. There are no valves between QV014 and the RWST to shut off flow during valve disassembly. The valve has been disassembled, inspected, and manually full-stroke exercised three times since 1985 by freeze plugging the 12 in. line just upstream of the valve. This has been done at refueling outages with the RWST drained to minimum level. In each case the valve was found to be in excellent condition, with no visible signs of degradation. With the RWST at minimum level, there is a 66 foot head of water on the freeze plug. If the plug does not hold during disassembly, a minimum of 30,000 gallons of water will flood the auxiliary building with potential severe damage to safety-related equipment.

Alternate Testing: The valve will be disassembled and manually full-stroke exercised once every three refueling outages using the freeze plug method described above. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability.

3.4.2.3.2 Evaluation--It is impractical to full-stroke exercise this valve with flow quarterly or during cold shutdowns because the only full flow path is into the containment spray headers and would result in spraying containment causing electrical equipment and lagging damage. However, the licensee has not addressed part-stroke exercising this valve during the quarterly pump tests and has provided no technical justification for not doing so. Each containment spray pump is equipped with a minimum flow recirculation line to the refueling water storage tank for pump protection during low flow conditions which provides a flow path that could be used to part-stroke exercise this suction check valve. Therefore, the licensee should be able to conduct a part-stroke exercise test of this valve during the quarterly pump tests and document that testing in the IST program.

This valve could be full-stroke exercised using system flow after installation of test spool pieces in each containment spray header. It would be burdensome to require the licensee to perform these system modifications due to the expense involved and possible reduction in system reliability because of the increased number of system penetrations and welds. Considering the design of this system, the licensee's proposal to disassemble and manually full-stroke these valves during refueling outages appears to be the only practical alternate exercising method available.

Disassembly and inspection is an acceptable method to assess valve condition in this situation since full-stroke exercising with flow is not practical. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. The P&IDs provided with the IST Program indicate that a flow path is available to use to part-stroke exercise this valve.

Another alternative available to the licensee is to verify that this valve opens sufficiently to pass the maximum required accident flow rate during flow testing by use of non-intrusive diagnostic techniques at least once each refueling outage.

The licensee's proposal to decrease the inspection frequency from each refueling outage to every third refueling outage is acceptable provided that the guidelines in Generic Letter 89-04, Attachment 1, Item 2, are followed and the basis for extending the disassembly and inspection interval are justified and documented.

The licensee's proposed alternative should provide reasonable assurance of operational readiness and provide an acceptable level of quality and safety provided they part-stroke exercise the affected valve prior to returning it to service following valve disassembly and inspection.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, relief may be granted from the Code requirements provided the guidelines in Generic Letter 89-04, Attachment 1, Item 2, are followed and the basis for extending the disassembly and inspection interval are justified and documented in the IST program and provided this valve is part-stroke exercised following reassembly but prior to returning it to service. The licensee should actively investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that this valve is full-stroke exercised open during flow testing. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves.

3.4.2.4 Relief Request. The licensee requested relief from exercising Unit 1 valves QV007A and QV007B, spray additive tank eductor checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and has proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.4.2.4.1 Licensee's Basis for Requesting Relief--The only way to verify forward flow operability is by measuring for design flow rate through the line while operating the containment spray pumps under design flow conditions. There are no system design provisions for performing full flow pump testing except when spool pieces are installed and full flow pump testing is performed at refueling. Quarterly pump testing is through a small 2-inch line from the pump discharge back to the RWST. With this test configuration, there is no flow through the valves and testing for flow through the check valves is not possible without opening additional valves which will introduce sodium hydroxide into the RWST (ECCS water supply).

Alternate Testing: One valve will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valve must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.4.2.4.2 Evaluation--Exercising these valves with flow is impractical during normal plant operation because it would require either spraying the containment or injecting highly corrosive sodium hydroxide into the refueling water storage tank via the pump minimum flow recirculation line. Spraying the containment with water would result in equipment and lagging damage while adding sodium hydroxide to the RWST could greatly increase corrosion and reduce the reliability of all the systems in contact with the water. However, the P&IDs provided with the IST program indicate that test spool pieces have been installed in the Unit 1 containment spray system to facilitate full flow testing during refueling outages. It would be burdensome to require the licensee to install these spool pieces during cold shutdowns since this could delay returning the plant to power. However, it appears that the Unit 1 spray additive tank eductor check valves could be full-stroke exercised during system testing at refueling outages because there is a flow element in the flow path that could be used to verify maximum required accident flow rates. Therefore, the licensee should investigate the practicality of full-stroke exercising these valves during the system flow tests performed during refueling outages.

Disassembly and inspection can be used to exercise check valves and assess their condition in situations where it is impractical to full-stroke exercise them using system flow. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service.

An interim period is necessary to give the licensee time to complete their investigation, the test procedures, and any system design changes necessary to perform a full-stroke exercise of the Unit 1 valves using system flow. Immediate compliance could result in an extended outage which would be a burden to the licensee due to the expense involved. The licensee's proposed alternative, while not acceptable for the long term, should provide reasonable assurance of operational readiness in the interim.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were immediately imposed and considering the licensee's proposed alternative, interim relief may be granted for one year or until the next refueling outage, whichever is longer, provided that a part-stroke exercise with flow is performed after disassembly and inspection is completed but before the valve is returned to service. This relief request should be revised or deleted if another method is developed to verify the full-stroke capability of these valves.

3.4.2.5 Relief Request. The licensee requested relief from exercising Unit 2 valves QV007A and QV007B, spray additive tank eductor checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and has proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.4.2.5.1 Licensee's Basis for Requesting Relief--The only way to verify forward flow operability is by measuring for design flow rate through the line while operating the containment spray pumps under design flow conditions. There are no system design provisions for performing full flow pump testing except when spool pieces are installed and full flow pump testing is performed at refueling. Quarterly pump testing is through a small 2-inch line from the pump discharge back to the RWST. With this test configuration, there is no flow through the valves and testing for flow through the check valves is not possible without opening additional valves which will introduce sodium hydroxide into the RWST (ECCS water supply).

Alternate Testing: One valve will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valve must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.4.2.5.2 Evaluation--Exercising these valves with flow is impractical during normal plant operation because that would require either spraying the containment or injecting highly corrosive sodium hydroxide into the refueling water storage tank via the pump minimum flow recirculation line. Spraying the containment with water would result in equipment and lagging damage while adding sodium hydroxide to the RWST could greatly increase corrosion and reduce the reliability of all the systems in contact with the water.

Since the Unit 2 containment spray system has not been modified to include test spool pieces, conformance with the Code requirements would be possible only if the system were substantially redesigned. It would be burdensome to require the licensee to perform these system modifications due to the expense involved and possible reduction in system reliability. Considering the design of this system, the licensee's proposal to disassemble and manually full-stroke exercise these valves during refueling outages may be the only practical alternate exercising method available.

Disassembly and inspection of these valves is an acceptable method to assess valve condition in this situation because it is impractical to establish full system flow into the containment spray rings. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. The licensee should investigate methods of part-stroke exercising these valves following disassembly and inspection.

Another alternative available to the licensee is to verify that these valves open sufficiently to pass the maximum required accident flow rate during flow testing by use of non-intrusive diagnostic techniques at least once each refueling outage.

The licensee's proposed alternative should provide reasonable assurance of operational readiness and provide an acceptable level of quality and safety provided the affected valve is part-stroke exercised after disassembly and inspection but before returning it to service.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, relief may be granted from the Code requirements provided the valves are verified to be at least part-stroke exercised with flow following reassembly but prior to returning them to service. The licensee should actively investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that these valves exercise open during flow testing. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves.

3.5 Containment Isolation System

3.5.1 Category A/C Valves

3.5.1.1 Relief Request. The licensee requested relief from exercising valve QV001, containment air sample check, in accordance with Section XI, Paragraph IWV-3521, and proposed to verify closure (its safety position) during leak testing each refueling outage.

3.5.1.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.5.1.1.2 Evaluation--This valve is a simple check valve that is located inside containment and is not equipped with position indication. Some of the required test connections are also located inside containment. The only practical method available to verify closure of this valve is to perform a leak test. This valve is subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to this valve because it is inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Leak testing this valve during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.6 Safety Injection/Chemical and Volume Control System

3.6.1 Category A Valves

3.6.1.1 Relief Request. The licensee requested relief from exercising valves QV249A and QV249B, reactor coolant pump (RCP) seal water isolations, in accordance with the requirements of Section XI, Paragraph IWV-3411, and proposed to full-stroke exercise them during cold shutdowns when the RCS is vented or open to atmosphere.

3.6.1.1.1 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.

Alternate Testing: Exercise and time at cold shutdown when the RCS is vented or open to the atmosphere.

3.6.1.1.2 Evaluation--The reactor coolant pump seals serve as a pressure boundary for the RCS, therefore seal failure could result in unisolable coolant leakage from the RCS. The pump seals can be damaged by overheating or by migration of particulate from the RCS into the seals if seal water flow is stopped whenever the pumps are running. It is impractical to exercise these valves during any plant conditions that could result in abnormal seal wear which could lead to a seal failure because a seal failure is actually a small break loss of coolant accident. These valves will not be exercised each cold shutdown because the RCS will not be depressurized each cold shutdown. Primary plant depressurization solely to test these valves each cold shutdown could delay plant startup. The licensee's proposal to full-stroke exercise these valves during those cold shutdowns when the RCS is depressurized should provide an acceptable level of quality and safety.

However, the licensee has not addressed full-stroke exercising these valves during refueling outages when the RCS is depressurized thus allowing these valves to be tested. Therefore, the licensee should also exercise and stroke time these valves during refueling outages.

Based on the impracticality of exercising these valves quarterly and during those cold shutdowns when the RCS is pressurized and the burden on the licensee if these Code requirements were imposed, relief may be granted from the exercising requirements of Section XI as requested provided that the licensee also exercises and measures the full-stroke times of these valves during refueling outages.

3.6.2 Category A/C Valves

3.6.2.1 Relief Request. The licensee requested relief from exercising valves QV052, accumulator fill check, QV05B, accumulator nitrogen supply check, QV115A, QV115B, and QV115C, RCP seal injection checks, QV119, normal charging header check, and QV213, RCP seal water return thermal relief check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure (their safety position) during leak testing each refueling outage.

3.6.2.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.6.2.1.2 Evaluation--These valves are simple check valves that are located inside containment and are not equipped with position indication. Some of the required test connections are also located inside containment. The only practical method available to verify closure of these valves is to perform a leak test. These valves are subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or

during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to the valves because they are inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Leak testing these valves during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.6.2.2 Relief Request. The licensee requested relief from exercising valves QV032A, QV032B, QV032C, QV037A, QV037B, and QV037C, accumulator discharge checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.6.2.2.1 Licensee's Basis for Requesting Relief--The safety injection system accumulator tanks are isolated from the RCS by these normally closed check valves. Each accumulator is charged with a nitrogen blanket from 600 to 650 psig. This pressure is insufficient during operation to inject into the RCS. If these valves were to be exercised at cold shutdown, the contents of the tank would be dumped into the RCS at the charge pressure of 600 to 650 psig which would result in the overpressurization of the RCS.

Alternate Testing: One of these valves in each of the three-valve groups will be disassembled and visually inspected on a staggered test basis at each refueling. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.6.2.2.2 Evaluation--It is impractical to exercise these valves during power operation because the only flow path is into the RCS and accumulator pressure cannot overcome the higher RCS pressure. It is impractical to full-stroke exercise these valves quarterly during power operations unless extensive system modifications, such as installing full flow test loops, are made to permit this testing. It would be burdensome to require the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

These check valves cannot be full-stroke exercised by discharging the accumulators into the RCS during cold shutdowns because there is not an adequate expansion volume and injecting into the RCS could cause or contribute to a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full-stroke exercise these valves during cold shutdowns. Establishing the maximum required accident flow through these valves into the RCS during refueling outages when the vessel head is removed to provide an adequate expansion volume is not practical since this could cause hydraulic damage to the reactor and core components.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly and inspection to verify the full-stroke capability of check valves is an option only where full-stroke exercising cannot practically be performed by flow or by other positive means. The licensee has shown the impracticality of establishing maximum required accident condition flow through these valves during any plant operating mode. The licensee's proposed disassembly and inspection program may be the only practical alternate exercising method available for these valves. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to exercising produced by fluid flow. This procedure has risks which may make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the

valve type and service. The licensee should actively pursue the use of non-intrusive diagnostic techniques such as acoustics, ultrasonics, or magnetics to demonstrate that these valves fully open or open sufficiently to pass maximum required accident flow when subjected to flow from a reduced pressure accumulator discharge at refueling outages.

The Minutes of the Public Meeting on Generic Letter 89-04 also state that partial-stroke exercise testing with flow is expected to be performed after valve disassembly and inspection is completed but before returning the valve to service. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the determination that it is impractical to full-stroke exercise these valves using system flow, the burden on the licensee of making system modifications to permit this testing, and considering that the licensee's proposal to disassemble and inspect these valves should provide a reasonable indication that they are capable of performing their safety function, relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises the valves open after they have been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to demonstrate that these valves fully open or open sufficiently to pass maximum required accident flow when subjected to flow from a reduced pressure accumulator discharge at least once every refueling outage. If another method is developed to full-stroke exercise these valves, this relief request should be revised or withdrawn.

3.6.2.3 Relief Request. The licensee requested relief from exercising valves QV077A, QV077B, and QV077C, combined HHSI/LHSI hot leg injection checks, in accordance with the requirements of Section XI, Paragraphs IWV-3521 and -3522, and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.6.2.3.1 Licensee's Basis for Requesting Relief--These 6-inch Velan swing check valves are located in the safety injection lines to the

reactor coolant system hot legs. Individual line flow rate cannot be used to verify valve operability due to lack of instrumentation.

Alternate Testing: One of these valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.6.2.3.2 Evaluation--There are no flow elements, instrument connections, or flow instruments installed in the injection headers containing these check valves, therefore, flow cannot readily be used to verify that the valves individually full-stroke exercise. Also, individual part-stroke exercising may not be positively verified since the parallel flow paths are not instrumented. The Code required testing could be verified after installation of flow instrumentation in each injection header or by using non-intrusive flow instruments or valve diagnostics. It would be burdensome to require the licensee to perform costly system modifications that permit direct measurement of flow through these individual valves.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly and inspection to verify the full-stroke capability of check valves is an option only where full-stroke exercising cannot practically be performed by flow or by other positive means. The licensee has shown the impracticality of verifying maximum required accident condition flow through these valves during any plant operating mode. The licensee's proposed disassembly and inspection program may be the only practical alternate exercising method available for these valves. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail

in Generic Letter 89-04, Attachment 1, Item 2. The licensee should actively pursue the use of portable flow instrumentation or non-intrusive diagnostic techniques such as acoustics, ultrasonics, or magnetics to demonstrate that these valves fully open or open sufficiently to pass maximum required accident flow when subjected to flow at least once every refueling outage.

The Minutes of the Public Meeting on Generic Letter 89-04 stipulate that partial-stroke exercise testing with flow is expected to be performed after valve disassembly and inspection is completed but before returning the valve to service. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

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

3.6.3 Category B Valves

3.6.3.1 Relief Request. The licensee requested relief from exercising valves QV326A, QV326B, QV327A, and QV327B, charging pump discharge header isolations, in accordance with the requirements of Section XI, Paragraph IWV-3411, and proposed to full-stroke exercise them during cold shutdown when the RCS is vented or open to atmosphere.

3.6.3.1.1 Licensee's Basis for Requesting Relief--During normal operation only one charging pump is in operation which supplies both charging water to the RCS and seal water to the RCS pump seals. Due to system design configuration, exercising any of these valves will terminate either normal charging flow or seal water flow. Disruption of charging water flow would decrease significantly the capability of the chemical and volume control system (CVCS) to provide the proper boron concentration. If seal water is terminated, reactor coolant is forced from the high pressure RCS into the seals and can cause seal degradation. These valves full-stroke on initiation and cannot be part-stroke exercised.

Alternate Testing: Exercise and time at cold shutdown when the RCS is vented or open to atmosphere.

3.6.3.1.2 Evaluation--The reactor coolant pump seals serve as a pressure boundary for the RCS, therefore, seal failure could result in unisolable coolant leakage from the RCS. The pump seals can be damaged by overheating or by migration of particulate from the RCS into the seals if seal water flow is stopped whenever the pumps are running. It is impractical to exercise these valves during any plant conditions that could result in abnormal seal wear which could lead to a seal failure because a seal failure is actually a small break loss of coolant accident. It is impractical to exercise these valves each cold shutdown because when the RCS is at pressures above atmospheric there could be flow containing particulate into the seals and the RCS will not be depressurized each cold shutdown. Primary plant depressurization solely to test these valves each cold shutdown could delay plant startup. The licensee's proposal to full-stroke exercise these valves during those cold shutdowns when the RCS is depressurized should provide an acceptable level of quality and safety. However, the licensee has not addressed full-stroke exercising these valves during refueling outages when the RCS is depressurized thus allowing these valves to be tested. Therefore, the licensee should also exercise and stroke time these valves during refueling outages.

Based on the impracticality of exercising these valves quarterly and during those cold shutdowns when the RCS is pressurized and the burden on the

licensee if these Code requirements were imposed, relief may be granted from the exercising requirements of Section XI as requested provided that the licensee also exercises and measures the full-stroke stroke times of these valves during refueling outages.

3.6.3.2 Relief Request. The licensee requested relief from exercising valves QV063, safety injection cold leg isolation, QV068, and QV072, safety injection hot leg isolations, in accordance with the requirements of Section XI, Paragraph IWV-3411, and proposed to full-stroke exercise them during cold shutdown when the RCS is drained down to the mid-plane level and all charging pumps are secured or placed in an alignment that allows testing.

3.6.3.2.1 Licensee's Basis for Requesting Relief--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 would cause thermal shocking to the RCS piping and would also cause an overtemperature condition in the normal CVCS letdown line. Normal plant practice is to collapse the pressurizer steam bubble early in the shutdown procedure and cool the plant down in the solid condition. This is normally done well before reaching cold shutdown conditions. There is a period of time after reaching Technical Specification defined cold shutdown when one charging pump is maintained in operation. By plant procedure one charging pump is maintained in operation to maintain flow to the reactor coolant pump seals until the reactor vessel is drained down to the mid-plane level. If these valves were exercised open during that period of operation, charging pump flow would be injected directly in to the RCS. Overpressure protection is provided by RHR pump suction relief valves QV015A,B. This injection of charging pump flow could result in lifting these relief valves.

Alternate Testing: Exercise and time during cold shutdown when the RCS is drained down to the mid-plane level and all charging pumps are secured or placed in an alignment that allows testing.

3.6.3.2.2 Evaluation--It is impractical to exercise these valves during power operation because opening them would inject relatively cold water into the RCS which could result in thermal shock and possible premature failure of RCS piping. It is impractical to exercise these valves during the approach to cold shutdown because one charging pump is left running to supply seal water to the running reactor coolant pumps and the temperature differential is still large enough for thermal shock to be a concern. The operating charging pump cannot be stopped as long as a reactor coolant pump is operating because seal water flow must be maintained any time a pump is running to prevent seal damage from overheating or migration of particulate into the seals. Exercising these valves during cold shutdowns while one or more charging pump is operating would allow charging pump flow directly into the solid RCS which would challenge the residual heat removal system relief valves and possibly result in or contribute to low-temperature overpressurization of the RCS. It would be burdensome to require the licensee to depressurize the RCS each cold shutdown solely to exercise these valves because this could cause a delay in returning the plant to operation.

The licensee's proposal to full-stroke exercise these valves during those cold shutdowns when the RCS is depressurized and partially drained should provide an acceptable level of quality and safety. However, the licensee has not addressed full-stroke exercising these valves during refueling outages when the RCS is depressurized thus allowing these valves to be tested. Therefore, the licensee should full-stroke and stroke time these valves also during refueling outages.

Based on the impracticality of exercising these valves quarterly and during those cold shutdowns when the RCS is pressurized, the burden on the licensee if these Code requirements were imposed and considering the proposed alternate testing, relief may be granted from the exercising requirements of Section XI as requested provided that the licensee also full-stroke exercises and stroke times these valves during refueling outages.

3.6.4 Category C Valves

3.6.4.1 Relief Request. The licensee requested relief from exercising valve QV026, charging pump refueling water storage tank suction check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to full-stroke exercise this valve during refueling outages.

3.6.4.1.1 Licensee's Basis for Requesting Relief--The only possible full forward flow test of this valve is by operating the charging pumps and injecting full design flow into the RCS. During normal operations, full flow testing using the charging pumps is precluded because the maximum pump discharge pressure is less than that required to overcome RCS operating pressure sufficiently to inject at a flow rate equivalent to the RCS depressurized design flow rate. Full or partial flow testing at cold shutdown could only be done with a steam bubble in the pressurizer. Normal plant practice is to collapse the bubble early in the shutdown procedure and cool the plant down in the solid condition. Overpressure protection during cold shutdown is provided by the residual heat removal (RHR) pump suction relief valves. Verification of valve operability by charging pump flow could result in lifting these relief valves.

Alternate Testing: The valve will be forward flow verified by operating the charging pumps at refueling when filling the refueling cavity.

3.6.4.1.2 Evaluation--It is impractical to full-stroke exercise this check valve during power operation because the only full flow path is into the RCS and the charging pumps cannot develop full rated flow against normal operating RCS pressure. This valve cannot be full-stroke exercised during cold shutdowns because the RCS does not contain sufficient expansion volume to accommodate the flow required and a low temperature overpressure condition could result. The licensee's proposal to full-stroke exercise this valve with flow during refueling outages when the reactor vessel head is removed is a reasonable alternative to the full-stroke exercising requirements of the Code. It would be burdensome to require the licensee to perform a plant shutdown, cooldown, and reactor head removal on a quarterly frequency solely to test this valve. However, the licensee has not addressed

quarterly part-stroke exercising of this valve and has provided no technical justification for not performing this testing. Therefore, the licensee should part-stroke exercise this check valve in accordance with the requirements of Section XI, Paragraph IWV-3522, and document that testing in the IST program.

An interim period is necessary to give the licensee time to develop a test method and test procedures necessary to perform part-stroke exercising of this valve. Immediate compliance would be excessively burdensome to the licensee. The licensee's proposed alternate testing of full-stroke exercising this valve during refueling outages, while not acceptable for the long term, should provide reasonable assurance of operational readiness in the interim period.

Based on the impracticality of full-stroke exercising this valve quarterly and during cold shutdowns, the burden on the licensee if these Code requirements were imposed and considering the licensee's proposed alternate testing, interim relief may be granted from the exercising frequency requirements of Section XI for a period of one year or until the end of the next refueling outage, whichever is longer. At the end of this interim period, the licensee should also part-stroke exercise this valve in accordance with the Code as discussed above.

3.6.4.2 Relief Request. The licensee requested relief from exercising valves QV121A, QV121B, and QV121C, charging pump minimum flow line checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages.

3.6.4.2.1 Licensee's Basis for Requesting Relief--Verifying full forward flow operability would require measuring the flow rate through each of the charging pump minimum flow lines. Neither the individual minimum flow lines nor the common header is instrumented to measure flow rate.

Alternate Testing: One of these valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve

internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.6.4.2.2 Evaluation--There are no flow elements, instrument connections, or flow instruments installed in the pump minimum flow lines containing these check valves, therefore, flow cannot readily be used to verify that the valves full-stroke exercise. Part-stroke exercising may not be positively verified for the same reasons. The Code required testing could be verified after installation of flow instrumentation in each minimum flow line or by using non-intrusive flow instruments or valve diagnostics. It would be burdensome to require the licensee to perform system modifications that permit direct flow measurements through these valves because the expense involved may not be justified by the limited amount of additional information provided.

Disassembly and inspection on a sampling basis may be an acceptable method to assess valve condition when full-stroke exercising with system flow cannot be verified. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. Therefore, the licensee should develop a method of verifying a full-stroke exercise of these valves. One of the options the licensee may consider is using portable flow instrumentation so the flow rate through each valve could be verified.

Another alternative available to the licensee is to verify that these valves open sufficiently to pass the maximum required accident flow rate by use of non-intrusive diagnostic testing techniques during flow testing at least once each refueling outage.

The licensee's proposed alternative should provide reasonable assurance of operational readiness and provide an acceptable level of quality and safety.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, relief may be granted from the Code exercising requirements provided that a part-stroke exercise test using flow is performed after disassembly and inspection is completed but before the valve is returned to service. The licensee should investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that these valves full-stroke exercise open during flow testing. This relief request should be revised or deleted if another method is developed to verify full-stroke capability of these valves.

3.6.4.3 Relief Request. The licensee requested relief from exercising valves QV122A, QV122B, and QV122C, charging pump discharge checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to part-stroke exercise them quarterly and full-stroke exercise them during refueling outages.

3.6.4.3.1 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 QV347 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.

Alternate Testing: Valves will be partial-stroke exercised quarterly and verification of full forward flow operability performed at refueling.

3.6.4.3.2 Evaluation--It is impractical to full-stroke exercise these valves during power operation because the only full flow path is into the RCS and the charging pumps do not develop full design accident flow against reactor pressure. Using this flow path during power operation could also cause a loss of pressurizer level control and a reactor trip. These valves cannot be full-stroke exercised during cold shutdown because the RCS may not contain sufficient expansion volume to accommodate the flow required and a low temperature overpressure condition could result. The licensee's proposal to part-stroke exercise these valves quarterly and to full-stroke them during refueling outages when the reactor vessel head is removed is a reasonable alternative to the exercising requirements of the Code. It would be burdensome to require the licensee to perform a quarterly plant shutdown, cooldown, and reactor head removal solely for the purpose of testing these valves.

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

3.6.4.4 Relief Request. The licensee requested relief from exercising the following valves in accordance with the requirements of Section XI, Paragraphs IWV-3521 and -3522, and proposed to full-stroke exercise them by sample disassembly and inspection during refueling outages. The valves are:

QV062A, QV062B, and QV062C	BIT cold leg injection header checks
QV066A, QV066B, and QV066C	HHSI cold leg injection header checks
QV078A, QV078B, and QV078C	HHSI hot leg injection header checks
QV079A, QV079B, and QV079C	HHSI hot leg injection header checks

3.6.4.4.1 Licensee's Basis for Requesting Relief--(All valves)--These 2-inch Kerotest check valves are located in the parallel high head injection flow paths to the reactor coolant system. Individual line flow rate cannot be used to verify individual valve operability due to lack of instrumentation.

(Valves QV062A, QV062B, and QV062C)--The only possible way to verify full flow operability of these check valves is by using the CVCS charging pump flow through the boron injection tank into the RCS cold legs. However, injecting water into the RCS through the boron injection tank during power operation exposes the safety injection nozzles to thermal shock and interrupts normal charging and letdown. Injection of CVCS charging pump flow at cold shutdown would result in a low temperature overpressurization of the RCS. Verification of full design flow rate operability cannot be done at cold shutdown due to back pressure from the RCS. Verification of full flow operability can only be done at refueling with the RCS depressurized, the reactor vessel head removed, upper internals in place, and the refueling cavity at refueling level.

Alternate Testing (Valves QV062A, QV062B, and QV062C): Forward flow operability will be verified by full flow test or by disassembly. One of these valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

(Valves QV066A, QV066B, QV066C, QV078A, QV078B, QV078C, QV079A, QV079B, and QV079C)--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 would result in thermal

shock to the RCS piping. Verification of full design flow rate operability cannot be done at cold shutdown due to back pressure from the RCS. Verification of full flow operability can only be done at refueling with the RCS depressurized, the reactor vessel head removed, upper internals in place, and the refueling cavity at refueling level.

Disassembly of these valves can only be done with the RCS depressurized and the reactor vessel level at mid-plane.

Alternate Testing (Valves QV066A, QV066B, QV066C, QV078A, QV078B, QV078C, QV079A, QV079B, and QV079C): Forward flow operability will be verified by full flow test or by disassembly on a staggered basis at refueling per Relief Request Q1E21-RV-10 (Q2E21-RV-10). One of the valves in each of the three-valve groups will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.6.4.4.2 Evaluation--The licensee has discussed testing these twelve check valves in three different relief requests, Q1(2)E21-RV-4, Q1(2)E21-RV-6, and Q1(2)E21-RV-10. These three relief requests have been grouped together for the sake of brevity.

The licensee states in RV-4 and RV-6 that these twelve check valves will be full-stroke exercised by full flow test or by disassembly, then in RV-10, states that all twelve valves will be full-stroke exercised during a sample disassembly and inspection conducted during refueling outages. RV-10 states that no instrumentation is installed in any of the injection headers that can be used to verify a full flow test of individual valves. However, the P&IDs provided with the IST program indicate that flow elements and instrument connections are installed in the injection headers upstream of each of these check valves. The Minutes of the Public Meeting on Generic Letter 89-04

state that the use of disassembly and inspection to verify the full-stroke capability of check valves is an option only where full-stroke exercising cannot practically be performed by flow or by other positive means. The licensee's proposal in RV-10 to verify the full-stroke capability of these valves by a sample disassembly and inspection appears to be inappropriate because part of the necessary instrumentation (flow elements and test connections) is in place and actual flow rates through each valve can be measured. Therefore, relief should be denied to disassemble these valves.

It is impractical to full- or part-stroke exercise any of these check valves with flow during power operation because all of the associated flow paths bypass the regenerative heat exchanger and establishing flow through the valves would result in relatively cold water being injected into the RCS. The thermal stresses produced by injecting cold water could greatly reduce the service life of the injection nozzles. These valves cannot be full-stroke exercised during cold shutdowns because the charging pumps cannot develop full design accident flow against RCS back pressure. Additionally, the RCS may not contain sufficient expansion volume to accommodate the flow required and a low temperature overpressure condition could occur. It is impractical to verify a part-stroke exercise of these valves during cold shutdowns because permanent flow instrumentation is not installed on each of the parallel flow paths. It would be burdensome to require the licensee to install temporary instrumentation during cold shutdowns to measure individual valve flow rates because the time required to set up the equipment and perform the testing could delay reactor startup.

Based on the impracticality of full- or part-stroke exercising these valves quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and considering that full-stroke exercising these valves with flow at refueling outages should provide reasonable assurance of valve operational readiness, relief may be granted from the exercising frequency requirements of the Code. However, the licensee should verify the full-stroke capability of each of these valves by using temporary flow rate instrumentation during each refueling outage.

3.7 Liquid Waste Disposal System

3.7.1 Category A/C Valves

3.7.1.1 Relief Request. The licensee requested relief from exercising valves QV291, containment sump pump discharge check, and QV204, containment sump recirculation check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure (their safety position) during leak testing each refueling outage.

3.7.1.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.7.1.1.2 Evaluation--These valves are simple check valves that are located inside containment and are not equipped with position indication. Some of the required test connections are also located inside containment. The only practical method available to verify closure of these valves is to perform a leak test. These valves are subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to the valves because they are inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Leak testing these valves during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.8 Auxiliary Steam System

3.8.1 Category C Valves

3.8.1.1 Relief Request. The licensee requested relief from exercising valves QV010A and QV010B, turbine driven auxiliary feedwater pump steam supply checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and proposed to verify closure by sample disassembly and inspection during refueling outages.

3.8.1.1.1 Licensee's Basis for Requesting Relief--There are no system design provisions for verification of reverse flow closure.

Alternate Testing: One of the QV010A, B valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valve will also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.8.1.1.2 Evaluation--These check valves cannot be verif' ' to close using a reverse flow technique because there are no test con' 'on' installed either upstream or downstream of them. The Code requir' ,ing could be verified after system or valve modifications were performed. It would be burdensome to require the licensee to perform these modifications because the expense involved may not be justified by the limited amount of additional information obtained. Considering the design of this system, the licensee's proposal to disassemble and verify closure of these valves during refueling outages appears to be the only practical alternate method available.

The minutes from the public meetings on Generic Letter 89-04 state that the use of disassembly to verify valve closure capability may be acceptable depending on whether verification by flow or pressure measurement is

practical. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the Code required exercise testing. This procedure has risks which may make its routine use as a substitute for testing unacceptable when some other method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition and, as such, should be performed under the maintenance program at a frequency commensurate with the valve type and service. While the licensee's proposed alternative should provide reasonable assurance that these valves are capable of performing their safety function in the closed position, the licensee should investigate other methods of exercising them to the closed position. Specifically, the licensee should investigate the use of non-intrusive diagnostic techniques such as acoustics, or radiography to demonstrate that these valves close when subjected to reverse flow conditions.

The minutes from the public meetings on Generic Letter 89-04 also state that part-stroke exercise testing with flow is expected to be performed after valve disassembly and inspection is completed, but before returning the valve to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, relief may be granted from the Code requirements provided the disassembled valve is exercised after reassembly but prior to being returned to service. The licensee should investigate methods such as non-intrusive valve diagnostics or radiography to verify the reverse flow closure capability of these valves. This relief request should be revised or deleted if another method is developed to verify closure capability of these valves.

3.9 Auxiliary Feedwater System

3.9.1 Category B Valves

3.9.1.1 Relief Request. The licensee requested relief from exercising valves QV013A, QV013B, QV014A, QV014B, and QV014C, auxiliary feedwater pump service water supply, in accordance with the requirements of Section XI, Paragraph IWV-3412, and proposed to full-stroke exercise them during refueling outages.

3.9.1.1.1 Licensee's Basis for Requesting Relief--Exercising these valves open during normal operation or cold shutdown would introduce chlorides and fluorides into the auxiliary feedwater system and subsequently into the steam generators. The presence of chlorides and fluorides in the secondary water chemistry have been proven to contribute to steam generator degradation. Initiation of the auxiliary feedwater during testing would inject a large quantity of service water directly into the steam generators. The only way to isolate the service water system from the auxiliary feedwater system to perform testing is by closing inline manual block valves QV015E, QV016A, and QV016B. If an auxiliary feedwater initiation occurred during testing, one train of auxiliary feedwater would be disabled. In addition, there is no way to verify that subsequent flushing of the affected lines has removed all of the service water contaminates.

Alternate Testing: These valves will be exercised and timed at refueling when the service water system can be isolated from the auxiliary feedwater system and extensive flushing of any residual service water can be performed.

3.9.1.1.2 Evaluation--It is impractical to exercise these valves during power operation because this could introduce service water into the auxiliary feedwater system and into the steam generators. Any injection of service water would result in severe chemistry control problems and possible steam generator chemical stress damage. Additionally, manually isolating one service water header for testing the associated valve renders one train of auxiliary feedwater inoperable which, in turn, requires entering a Technical Specification Limiting Condition for Operation. While entering a limiting

Condition for Operation is not, by itself, sufficient justification for not performing required testing, the time required to flush the affected piping could exceed the time allowed by the appropriate Technical Specification Action Statement and could result in a forced plant shutdown. It is impractical to exercise these valves during cold shutdowns because all auxiliary feedwater trains are required to be operable prior to startup. An auxiliary feedwater train cannot be made operable while flushing the suction piping of that train, therefore, testing these service water cross connections could delay reactor startup. The Code required testing could be performed only if this system were substantially redesigned. It would be burdensome to require the licensee to perform these modifications due to the expense involved and possible reduction is system reliability because of the increased number of system penetrations and welds.

Based on the impracticality of exercising these valves during power operation and cold shutdowns, the burden on the licensee if these Code requirements were imposed, and considering that the proposed alternate testing should provide reasonable assurance of operational readiness, relief may be granted from the requirements of Section XI as requested.

3.9.2 Category C Valves

3.9.2.1 Relief Request. The licensee requested relief from exercising valves QV006, QV007A, and QV007B, auxiliary feedwater pump suction checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and proposed to verify closure by sample disassembly and inspection during refueling outages.

3.9.2.1.1 Licensee's Basis for Requesting Relief--There are no system design provisions for verification of reverse flow closure. The only possible test method would involve isolating the condensate storage tank, draining a large section of piping, and injecting service water into the auxiliary feedwater system. The service water is of poor quality and would contaminate the auxiliary feedwater piping. It cannot be guaranteed that flushing will remove all contamination after testing. Any contaminants which

remain in the piping may be injected into the steam generators which could adversely affect secondary water chemistry and contribute to steam generator degradation.

Alternate Testing: One of the QV007A, B valves will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valve must also be disassembled, inspected, and manually full-stroke exercised during the same outage. Valve QV006 will be disassembled and manually full-stroke tested at each refueling. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability.

3.9.2.1.2 Evaluation--It is impractical to verify these valves in the closed position by injecting service water into the auxiliary feedwater suction piping and then monitoring valve leakage or the condensate storage tank level. This type of test would contaminate the suction piping and possibly the entire condensate storage tank with service water. Low quality condensate could then be pumped to the steam generators resulting in severe chemistry control problems and possible steam generator stress corrosion damage.

The type of test just described appears to be unnecessary because the P&IDs provided with the IST program indicate there are vent and drain valves installed in the system that may be suitable for reverse flow testing these check valves. Using a temporary hose connection from a clean water source would prevent contaminating the auxiliary feedwater suction piping with service water and, in turn, eliminate the extensive flushing needed prior to returning the system to service. The licensee should investigate the feasibility of this type of reverse flow closure verification for these valves.

The minutes from the public meetings on Generic Letter 89-04 state that the use of disassembly to verify valve closure capability may be acceptable depending on whether verification by flow or pressure measurement is practical. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the Code required exercise testing. This procedure has risks which may make its routine use as a substitute for testing undesirable when some other method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition and, as such, should be performed under the maintenance program at a frequency commensurate with the valve type and service. While the licensee's proposed alternative should provide reasonable assurance that these valves are capable of performing their safety function in the closed position, the licensee should investigate other methods of exercising them to the closed position. Specifically, the licensee should investigate the use of leak testing (reverse flow closure verification) using a clean water source or non-intrusive diagnostic techniques such as magnetics or radiography to demonstrate that these valves close when subjected to reverse flow conditions.

The minutes from the public meetings on Generic Letter 89-04 also state that part-stroke exercise testing with flow is expected to be performed after valve disassembly and inspection is completed, but before returning the valve to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

An interim period is necessary to give the licensee time to complete their investigation, the test procedures, and the system design changes necessary to verify reverse flow closure by leak testing using a clean water source or using non-intrusive diagnostic techniques. Immediate compliance could result in an extended outage which would be a burden to the licensee due to the expense involved. The licensee's proposed alternative, while not acceptable for the long term, should provide reasonable assurance of operational readiness in the interim period.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, interim relief may be granted for one year or until the next refueling outage, whichever is greater. The licensee should investigate the use of leak testing using a clean water source or non-intrusive diagnostic techniques to demonstrate that these valves close when subjected to reverse flow conditions. This relief request should be revised or deleted if another method is developed to verify full-stroke capability of these valves.

3.10 Demineralized Water System

3.10.1 Category A/C Valves

3.10.1.1 Relief Request. The licensee requested relief from exercising valve QV002, containment demineralized water supply check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure (its safety position) during leak testing each refueling outage.

3.10.1.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.10.1.1.2 Evaluation--This valve is a simple check valve that is located inside containment and is not equipped with position indication. Some of the test connections needed for reverse flow closure verification are also located inside containment. The only practical method to verify closure of this valve is to perform a leak test. This valve is subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to the valves because they are inside containment. Containment entry is not allowed during power operation due to

personnel safety and radiation exposure considerations. Leak testing these valves during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.11 Service Water System

3.11.1 Category A Valves

3.11.1.1 Relief Request. The licensee requested relief from exercising valves QV071, reactor coolant pump motor cooler service water supply, QV072, and QV081, reactor coolant pump motor cooler service water return, in accordance with the requirements of Section XI, Paragraph IWV-3411, and proposed to full-stroke exercise them during cold shutdowns when all reactor coolant pumps are secured.

3.11.1.1.1 Licensee's Basis for Requesting Relief--These are the containment isolation valves in the RCS pump motor cooler lines. A loss of cooling water for more than a few minutes could result in extensive damage to the reactor coolant pump motors. Plant operating procedures require operation of at least one RCS pump at RCS temperatures above 160 degrees Fahrenheit for hydrogen control of RCS water. For short duration cold shutdowns where the RCS temperature is maintained near 200 degrees Fahrenheit. it is felt that stopping cooling water to the operating pump motor could contribute to motor degradation and result in unnecessary repairs. These valves full-stroke on initiation and cannot be partial-stroke exercised.

Alternate Testing: Exercise and time at cold shutdown when all reactor coolant pumps are secured.

3.11.1.1.2 Evaluation--It is impractical to exercise these valves whenever any one of the reactor coolant pumps is running because closing any one of these valves isolates cooling water flow to the reactor coolant pumps. Loss of cooling during operation could damage the pumps resulting in possible pump failure. Pump failure during power operation would result in a forced plant shutdown. Plant conditions may not allow stopping the pumps during every cold shutdown, therefore, the valves may not be exercised each cold shutdown. It would be burdensome to require the licensee to perform a quarterly plant shutdown and cooldown in order to establish plant conditions that allow stopping all reactor coolant pumps. Likewise, reducing the temperature of the RCS enough to allow stopping the pumps and testing these valves each cold shutdown could delay reactor startup.

However, the licensee has not addressed full-stroke exercising these valves during refueling outages when the RCS is depressurized and cooled thus allowing these valves to be tested. Therefore, the licensee should also exercise and measure the stroke time of these valves during refueling outages.

Based on the impracticality of exercising these valves quarterly and during those cold shutdowns when any reactor coolant pump is running, the burden on the licensee if these Code requirements were imposed, and considering that the proposed alternate testing should provide reasonable assurance of operational readiness, relief may be granted from the exercising requirements of Section XI as requested provided that the licensee also exercises and stroke times these valves during refueling outages.

3.11.2 Category A/C Valves

3.11.2.1 Relief Request. The licensee requested relief from exercising valve QV075, reactor coolant pump motor cooler service water supply check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure (its safety position) during leak testing at each refueling outage.

3.11.2.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.11.2.1.2 Evaluation--This valve is a simple check valve that is located inside containment and is not equipped with position indication. Some of the test connections needed to verify valve reverse flow closure are also located inside containment. The only practical method to verify closure of this valve is to perform a leak test. This valve is subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to the valves because they are inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Leak testing these valves during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.11.3 Category C Valves

3.11.3.1 Relief Request. The licensee requested relief from exercising valves QV564 and QV565, diesel generator service water return checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and proposed to part-stroke exercise them quarterly and to perform a sample disassembly and inspection during refueling outages.

3.11.3.1.1 Licensee's Basis for Requesting Relief--There are no system design provisions for verification of full forward flow operability.

Alternate Testing: Partial-stroke operability will be verified in conjunction with diesel generator testing by monitoring diesel generator jacket cooling water temperature. In addition, one valve will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valve must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.11.3.1.2 Evaluation--Cooling water from three diesel generators flows through QV564 and from two diesel generators through QV565. Since the diesel gererators are never intentionally operated at maximum load simultaneously, maintaining proper diesel operating temperatures cannot be used to verify that the valves open enough to remove the maximum heat load from all serviced engines. The present exercise test is a part-stroke exercise because only one diesel generator at a time is removed from service when the diesel generator surveillance procedures are performed. The Code required testing could be verified after installation of flow instrumentation in each diesel generator service water header. It would be burdensome to require the licensee to perform these system modifications due to the expense involved and possible reduction in system reliability because of the increased number of system penetrations and welds. Considering the design of this system, the licensee's proposal to disassemble and manually full-stroke these valves during refueling outages appears to be the only practical alternate exercising method available.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly and inspection to verify the full-stroke capability of check valves is an option only where full-stroke exercising cannot practically be performed by flow or by other positive means. The licensee has shown the impracticality of verifying maximum required accident condition

flow through these valves during any plant operating mode. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2. The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 further stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service.

Another alternative available to the licensee is to verify that these valves open sufficiently to pass the maximum required accident flow rate by use of non-intrusive diagnostic testing techniques during flow testing at least once each refueling outage.

The licensee has grouped these valves in a sampling program for disassembly and inspection. These valves serve components in two different Units and one valve passes cooling flow for three diesel generators while the other valve passes cooling flow for two diesel generators, therefore, their service conditions are not the same as required for grouping by Generic Letter 89-04, Attachment 1, Item 2. Further, failure of one of these valves in the closed position has a considerable safety significance because it could disable up to three diesel generators. Therefore, the use of a sample program for these valves is not considered to be appropriate.

Basod on the impracticality of full-stroke exercising these valves using system flow, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposed alternative, relief may be granted from the exercising requirements of Section XI as requested provided that the licensee complies with the Generic Letter 89-04 position regarding disassembly and inspection and performs a partial flow test of each valve prior to returning it to service following the disassembly and inspection procedure. The licensee should investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that

these valves full-stroke exercise open during flow testing. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves.

3.11.3.2 Relief Request. The licensee requested relief from exercising valves QV635A and QV635B, service water pump seal and motor cooler untreated water supply checks, and QV636A and QV636B, service water pump seal and motor cooler treated water supply checks, in accordance with the requirements of Section XI, Paragraph IWV-3522, and proposed to part-stroke exercise them quarterly and to perform a sample disassembly and inspection during refueling outages.

3.11.3.2.1 Licensee's Basis for Requesting Relief--There are no system design provisions for verification of either full forward flow operability or reverse-flow closure.

Alternate Testing: Partial-stroke operability is verified during normal operations by monitoring pump motor temperature. In addition, one valve from QV635A, B and one valve from QV636A, B will be disassembled and manually full-stroke tested at each refueling on a staggered test basis. The valve internals will be verified as structurally sound (no loose or corroded parts) and the disk manually exercised to verify full-stroke capability. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valve must also be disassembled, inspected, and manually full-stroke exercised during the same outage.

3.11.3.2.2 Evaluation--The P&IDs provided with the IST program indicate that there are no vents, drains, or test connections installed that can be used to verify the full-stroke capability of these valves. Monitoring the service water pump motor temperature is a part-stroke exercise because motor temperature would indicate only that one or the other valve opened but not the amount of opening nor which valve opened. Additionally, the condition of these check valves could be masked by normal seasonal variations in service water temperature as long as motor temperature remained below some maximum value. The Code required testing could be verified after

installation of flow instrumentation in each cooling water supply header. It would be burdensome to require the licensee to perform these system modifications because the expense involved would not be justified by the limited amount of additional information obtained. Considering the design of this system, the licensee's proposal to disassemble and manually full-stroke these valves during refueling outages appears to be the only practical alternate exercising method available.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly and inspection to verify the full-stroke capability of check valves is an option only where full-stroke exercising cannot practically be performed by flow or by other positive means. The licensee has shown the impracticality of establishing maximum required accident condition flow through these valves during any plant operating mode. The licensee's proposed disassembly and inspection program may be the only practical alternate exercising method available for these valves. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by flow. This procedure has risks which make its routine use as a substitute for testing unacceptable when some method of testing is possible. The NRC staff positions regarding valve disassembly and inspection are explained in detail in Generic Letter 89-04, Attachment 1, Item 2.

The minutes from the public meetings on Generic Letter 89-04 regarding Item 2 stipulate that a part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service.

The licensee should investigate a method that verifies a full-stroke exercise of these valves. One of the options the licensee may consider is using portable instrumentation so the flow rate through each valve could be verified. Another alternative available to the licensee is to verify that these valves open sufficiently to pass the maximum required accident flow rate by use of non-intrusive diagnostic testing techniques during flow testing at least once each refueling outage.

Based on the impracticality of full-stroke exercising these valves using system flow, the burden on the licensee if the Code requirements were imposed, and considering the licensee's proposed alternative, relief may be granted from the exercising requirements of Section XI as requested provided that the licensee performs a partial flow test of each valve prior to returning it to service following the disassembly and inspection procedure. The licensee should investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that these valves full-stroke exercise open during flow testing. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves.

3.11.3.3 Relief Request. The licensee requested relief from exercising valves QV552, QV553, QV554, QV555, and QV556, service water pump discharge checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify reverse flow closure during normal equipment rotation.

3.11.3.3.1 Licensee's Basis for Requesting Relief--The number of service water pumps in operation varies from a minimum of two to all five pumps, depending on operational and environmental conditions. During periods when more than two pumps are required, it is not possible to perform individual valve reverse flow closure verification without terminating cooling water flow to essential operating equipment, which could result in equipment damage or a forced plant shutdown.

Alternate Testing: Reverse flow closure will be verified only for those service water pumps which are idle. Verification will be performed during pump switching and pump shutdown unless reverse flow closure has been verified within 90 days.

3.11.3.3.2 Evaluation--These simple check valves cannot be exercised to the closed position unless the associated service water pump is stopped. Stopping or shifting service water pumps when service water cooling requirements are high could result in equipment damage or forced plant shutdown. Each valve may not be exercised quarterly or during a given cold

shutdown because plant cooling requirements and service water intake temperature may require running all the pumps and the exercising interval could exceed that allowed by Section XI. Since the licensee has not identified their service water pump rotation scheme, the maximum interval between testing these valves cannot be determined. The licensee should not defer testing of any of these valves longer than is reasonably practicable and in no case should the test interval be longer than once every refueling outage.

The licensee's proposed alternative should provide an acceptable level of quality and safety, therefore, relief may be granted from the exercising requirements of Section XI, Paragraph IWV-3521, as requested provided each valve is tested at least once each refueling outage.

3.12 Component Cooling Water System

3.12.1 Category A Valves

3.12.1.1 Relief Request. The licensee requested relief from exercising valves HV3095, excess letdown and reactor coolant drain tank heat exchanger component cooling water supply, HV3067, and HV3443, excess letdown and reactor coolant drain tank heat exchanger component cooling water return, in accordance with the requirements of Section XI, Paragraph IWV-3411, and proposed to full-stroke exercise them during those cold shutdowns when all reactor coolant pumps are secured.

3.12.1.1.1 Licensee's Basis for Requesting Relief--Exercising these valves closed creates a pressure/flow transient in the RCS pump thermal barrier and oil cooler lines. Pressure and flow are monitored at the discharge of the thermal barrier cooling water lines and will automatically close valve HV3184 on an increase of pressure or flow rate. Operating history indicates that the transient caused by closing these valves is sufficient to cause HV3184 to close. Loss of cooling water to the pumps for more than a few minutes could result in extensive damage to the pumps. Plant operating procedures require maintaining cooling water flow to the RCS pumps

at all times when RCS temperature is greater than 160 degrees Fahrenheit. These valves full-stroke closed on initiation and cannot be partial-stroke exercised.

Alternate Testing: These valves will be full-stroke exercised, stroke timed, and fail-safe tested during cold shutdowns when all reactor coolant pumps are secured.

3.12.1.1.2 Evaluation--It is impractical to exercise these valves whenever any one of the reactor coolant pumps is running because the protective features designed into the component cooling water system could isolate cooling water flow to the reactor coolant pumps. Loss of cooling water flow during operation could damage the pumps resulting in possible pump failure. Pump failure during power operation would result in a forced plant shutdown. Plant conditions may not allow stopping the reactor coolant pumps every cold shutdown, therefore, these valves may not be exercised each cold shutdown. It would be burdensome to require the licensee to quarterly perform a plant shutdown and cooldown in order to establish plant conditions that allow stopping all reactor coolant pumps. Likewise, reducing the temperature of the RCS enough to allow stopping the pumps and testing these valves each cold shutdown could delay reactor startup.

However, the licensee has not addressed full-stroke exercising these valves during refueling outages when the RCS is depressurized and cooled thus allowing the reactor coolant pumps to be secured. Therefore, the licensee should full-stroke and stroke time these valves also during refueling outages.

Based on the impracticality of exercising these valves quarterly and during those cold shutdowns when any reactor coolant pumps are running and the burden on the licensee if these Code requirements were imposed, relief may be granted from the requirements of Section XI as requested provided that the licensee also full-stroke exercises and stroke times these valves during refueling outages.

3.12.1.2 Relief Request. The licensee requested relief from exercising valves QV082, reactor coolant pump component cooling water supply, QV097, QV099, HV3045, and HV3184, reactor coolant pump component cooling water return, in accordance with the requirements of Section XI, Paragraph IWV-3411, and proposed to full-stroke exercise them during those cold shutdowns when all reactor coolant pumps are secured.

3.12.1.2.1 Licensee's Basis for Requesting Relief--These are the containment isolation valves in the RCS pump thermal barrier and bearing oil cooler 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 recommends that cooling water be provided to the pumps at all times when RCS temperature is above 200 degrees Fahrenheit. In addition, plant operating procedures require operation of at least one pump at RCS temperatures above 160 degrees Fahrenheit for hydrogen control of the RCS water. For short duration cold shutdowns where the RCS temperature is maintained near 200 degrees Fahrenheit, stopping cooling water to the operating pump could contribute to pump degradation and result in unnecessary pump repairs. These valves full-stroke on initiation and cannot be partial-stroke exercised.

Alternate Testing: These valves will be full-stroke exercised, stroke timed, and fail-safe (as appropriate) tested at cold shutdown when all reactor coolant pumps are secured.

3.12.1.2.2 Evaluation--It is impractical to exercise these valves whenever any one of the reactor coolant pumps is running because closing any one of these valves isolates cooling water flow to the reactor coolant pumps. Loss of cooling water flow during operation could damage the pumps resulting in possible pump failure. Pump failure during power operation would result in a forced plant shutdown. Plant conditions may not allow stopping the reactor coolant pumps every cold shutdown, therefore, these valves may not be exercised each cold shutdown. It would be burdensome to require the licensee to perform a quarterly plant shutdown and cooldown in order to establish plant conditions that allow stopping all reactor coolant

pumps. Likewise, reducing the temperature of the RCS enough to allow stopping the pumps and testing these valves each cold shutdown could delay reactor startup.

However, the licensee has not addressed full-stroke exercising these valves during refueling outages when the RCS is depressurized and cooled thus allowing the reactor coolant pumps to be secured. Therefore, the licensee should full-stroke and stroke time these valves also during refueling outages.

Based on the impracticality of exercising these valves quarterly and during those cold shutdowns when any reactor coolant pumps are running and the burden on the licensee if these Code requirements were imposed, relief may be granted from the requirements of Section XI as requested provided that the licensee also full-stroke exercises and stroke times these valves during refueling outages.

3.12.2 Category A/C Valves

3.12.2.1 Relief Request. The licensee requested relief from exercising valves QV083, reactor coolant pump component cooling water supply check, and QV159, excess letdown and reactor coolant drain tank heat exchanger component cooling water supply check, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure of these valves (their safety position) during leak testing each refueling outage.

3.12.2.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.12.2.1.2 Evaluation--These valves are simple check valves that are located inside containment and are not equipped with position indication. Some of the required test connections are also located inside

containment. The only practical method available to verify closure of these valves is to perform a leak test. These valves are subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to the valves because they are inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Leak testing these valves during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.12.3 Category C Valves

3.12.3.1 Relief Request. The licensee requested relief from exercising valves QV087A, QV087B, and QV087C, reactor coolant pump thermal barrier component cooling water supply checks (Unit 1 only), in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure (their safety position) during refueling outages.

3.12.3.1.1 Licensee's Basis for Requesting Relief--There are no installed taps or position indicators that could be used to verify reverse flow closure. To verify reverse flow closure, a spool piece in each line between the valve and the reactor coolant pump must be removed and either the valve disassembled and inspected or a special test performed by connecting an external fluid source to the line flange. The only time these spool pieces are removed is during pump maintenance/repair during refueling outages. To remove the spool pieces for the sole purpose of valve testing would require draining and waste processing a large amount of chromated water. This type of test procedure involves an excessive amount of time and personnel exposure to hazardous chemicals and could cause delays in plant startup.

Alternate Testing: Valve disassembly and inspection or verification of reverse flow closure by fluid test will be performed when the spool pieces are removed to perform pump maintenance/repair at refueling. If there is no pump maintenance/repair performed during a refueling outage, valve disassembly or testing will be delayed until the next refueling. All three valves will be disassembled or tested at least once each three refueling outage cycle and failure of any one valve will initiate disassembly or testing of the other two valves.

3.12.3.1.2 Evaluation--It is impractical to verify the reverse flow closure of valves QV087A, QV087B, and QV087C (Unit 1 only) during power operation because they have no remote position indication and are inaccessible since they are located inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Draining the chemically treated water, removing the spool pieces, and installing a test source of water to verify closure during cold shutdown could delay plant startup due to the time required to set up the test equipment and perform the test. Additionally, the associated reactor coolant pump must be stopped when exercising any one of these valves because valve testing requires isolating cooling water to that pump. Loss of cooling water during pump operation could damage the pump resulting in possible pump failure. It would be burdensome to require the licensee to perform a plant shutdown and cooldown quarterly in order to establish plant conditions that allow stopping reactor coolant pumps. Likewise, reducing the temperature of the RCS enough to allow stopping the pumps and testing these valves each cold shutdown could further delay reactor startup.

The minutes from the public meetings on Generic Letter 89-04 state that the use of disassembly to verify valve closure capability may be acceptable depending upon whether verification by flow or pressure measurement is practical. The licensee indicated that it is practical to verify the reverse flow closure of these valves during refueling outages when the reactor coolant pumps are stopped and spool pieces are removed in the cooling water piping for maintenance or repairs. Therefore, disassembly and inspection should not be used in lieu of testing these valves. Check valve disassembly has risks which make its routine use as a substitute for testing undesirable

when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition and, as such, should be performed under the maintenance program at a frequency commensurate with the valve type and service.

The licensee's proposal of performing valve reverse flow closure verification is an acceptable test method and could be performed during refueling outages when ample time is available to establish the proper plant conditions and connect necessary test equipment. However, the use of a sampling program and the extension of valve exercising intervals from the Code required quarterly or during cold shutdowns to greater than once each refueling outage is only approved in cases of extreme hardship. The licensee's proposal to lengthen the required interval for the reverse flow closure verification of these valves to every third refueling outage has not been adequately justified and is not acceptable.

While the licensee's proposed reverse flow closure fluid test should provide reasonable assurance that these valves are capable of performing their safety function in the closed position, the licensee should investigate other methods of exercising them to the closed position. Specifically, the licensee should consider the use of non-intrusive diagnostic techniques, such as magnetics, ultrasonics, acoustics, and radiography, to demonstrate that these valves close when subjected to reverse flow conditions at least once every refueling outage.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed and considering the licensee's proposal to verify valve closure with a reverse flow closure fluid test, relief may be granted from the exercising frequency requirements of the Code. The licensee should test each of these valves every refueling outage and should investigate the use of non-intrusive diagnostic techniques to demonstrate that these valves close when subjected to reverse flow conditions.

3.12.3.2 Relief Request. The licensee requested relief from exercising valves QV087A, QV087B, and QV087C, reactor coolant pump thermal barrier component cooling water supply checks (Unit 2 only), in accordance the requirements of Section XI, Paragraph IWV-3522, and proposed to verify closure (their safety position) during refueling outages.

3.12.3.2.1 Licensee's Basis for Requesting Relief--The only way to verify reverse flow closure of these valves requires isolating component cooling water flow to the reactor coolant pumps, entering the containment and injecting an external source of water in the component cooling water system through downstream taps. Plant procedures strictly regulate entry into the containment during normal operation and at cold shutdown.

Alternate Testing: During each refueling outage, component cooling water flow to the reactor coolant pumps will be isolated and an external source of water attached to the downstream taps. Reverse flow closure will be verified by measuring makeup flow rate into the component cooling water system from the external water source.

3.12.3.2.2 Evaluation--It is impractical to exercise valves QV087A, QV087B, and QV087C (Unit 2 only) closed during power operation because they have no remote position indication and are inaccessible since they are located inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. The associated reactor coolant pump must be stopped when exercising any one of these valves because valve testing requires isolating component cooling water to that pump. Loss of cooling water during pump operation could damage the pump resulting in possible pump failure. It would be burdensome to require the licensee to perform a plant shutdown and cooldown quarterly in order to establish plant conditions that allow stopping reactor coolant pumps. Likewise, reducing the temperature of the RCS enough to allow stopping the pumps and testing these valves each cold shutdown could delay reactor startup. The licensee's proposal to perform a reverse flow closure verification test during refueling outages when ample time is available to establish the proper plant conditions and connect the necessary test equipment is an acceptable test method and should provide an acceptable level of quality and safety.

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

3.13 Instrument Air System

3.13.1 Category A/C Valves

3.13.1.1 Relief Request. The licensee requested relief from exercising valves QV002 and QV004, containment instrument air supply checks, in accordance with the requirements of Section XI, Paragraph IWV-3521, and proposed to verify closure of these valves (their safety position) during leak testing each refueling outage.

3.13.1.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing during Appendix J, Type C, testing at refueling.

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

3.13.1.1.2 Evaluation--These valves are simple check valves that are located inside containment and are not equipped with position indication. Some of the required test connections are also located inside containment. The only practical method available to verify closure of these valves is to perform a leak test. These valves are subjected to an Appendix J, Type C, leak rate test during refueling outages and it would be burdensome to require the licensee to verify valve closure quarterly or during cold shutdowns. Quarterly testing would require quarterly reactor shutdown to provide access to the valves because they are inside containment. Containment entry is not allowed during power operation due to personnel safety and radiation exposure considerations. Leak testing these valves during cold shutdown could delay reactor startup due to the time required to set up the test equipment and perform the test.

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

3.14 Diesel Generator Air Start System

3.14.1 Category B Valves

3.14.1.1 Relief Request. The licensee requested relief from measuring the stroke time of valves QV519, QV520, (Unit 2), and QV519, QV520, QV582, QV583, QV638, QV639, QV640, and QV641, (Unit 1), diesel generator air start solenoids, in accordance with the requirements of Section XI, Paragraph IWV-3413, and proposed to measure diesel generator start time to monitor valve degradation.

3.14.1.1.1 Licensee's Basis for Requesting Relief--These are three-way solenoid valves mounted on the diesel generator (DG) skid mounted package. They are in the DG air start line between the air receiver tanks and the air start manifolds. Since each generator has two tanks and two manifolds, the DG may start on air supplied by either or both tanks. The diesel generator test procedure verifies operability of each of these valves independently on an alternating basis by isolating one air start header and starting the DG from one header at a time. Stroke time cannot be measured because there are no position indicators and visual observation is not possible due to valve design. The total time from initiation to DG operation is measured such that in effect each valve's stroke time is verified as acceptable. The DG start test is performed more frequently than required by Section XI so that actual valve testing criteria is more limiting than Section XI requirements.

Alternate Testing: These valves will be tested as part of the diesel generator air start test. Acceptable diesel generator start time will be used to verify valve operability and acceptable stroke time.

3.14.1.1.2 Evaluation--These valves are totally enclosed solenoid operated valves which have no externally visible indication of valve position. It is not possible to measure the stroke time of these solenoid operated valves because there is no way to determine when a valve receives a signal to open or when it reaches the open position. These solenoid valves are rapid-acting valves which normally stroke almost instantly and when they do not operate promptly, they most commonly fail to operate at all.

These valves function to admit starting air to the diesel generator, therefore, valve opening can be indirectly verified by monitoring the diesel generator start times to insure that the diesel starts within the limit identified in the plant Technical Specifications. Measuring the diesel start times gives an indication of possible valve degradation since any significant change in valve stroke time would result in longer diesel generator start times. Valve full-stroke times cannot be measured unless significant system modifications were made to permit this testing. It would be burdensome for the licensee to make such modifications because of the time and expense involved and the limited amount of additional information that would be provided.

Based on the impracticality of complying with the Code required testing method, the burden on the licensee if the Code requirements were imposed, and considering that the proposed alternate testing should provide reasonable assurance of operational readiness, relief may be granted from the stroke timing requirements of Section XI as requested

APPENDIX A

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

APPENDIX A

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

Inconsistencies and omissions in the licensee's IST programs 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. Unless otherwise noted, relief request numbers apply to both Unit 1 and Unit 2.

1. The specific Code requirements from which relief is requested should be identified in all relief requests.

2. Pump Relief Request PR-14, Unit 1, requests relief for the service water pump discharge gauges in the "Basis for Relief", but proposes to use installed instruments for the inlet pressure measurements in the "Alternate Testing". The licensee should correct this typographical error.

3. The licensee should establish alert and required action ranges when using pump curves instead of fixed reference values for the residual heat removal pumps. The licensee should also verify the pump curves by empirical data taken when the pump was known to be in good operating condition and develop a method to evaluate vibration measurements taken while using the curves. (See Item 2.3.2.1)

4. The licensee should establish alert and required action ranges when using pump curves instead of fixed reference values for the containment spray pumps. The licensee should also verify the pump curves by empirical data taken when the pump was known to be in good operating condition and develop a method to evaluate vibration measurements taken while using the curves. (See Item 2.4.2.1)

5. The licensee should establish alert and required action ranges when using pump curves instead of fixed reference values for the chemical and volume control pumps (charging pumps). The licensee should also verify

the pump curves by empirical data taken when the pump was known to be in good operating condition and develop a method to evaluate vibration measurements taken while using the curves. (See Item 2.5.1.1)

6. The licensee should measure vibration on the boric acid transfer pumps during each pump test. (See Item 2.6.1.1)

7. The licensee should establish alert and required action ranges when using pump curves instead of fixed reference values for the boric acid transfer pumps. The licensee should also verify the pump curves by empirical data taken when the pump was known to be in good operating condition and develop a method to evaluate vibration measurements taken while using the curves. (See Item 2.6.2.1)

8. The licensee should establish alert and required action ranges when using pump curves instead of fixed reference values for the motor driven auxiliary feedwater pumps. The licensee should also verify the pump curves by empirical data taken when the pump was known to be in good operating condition and develop a method to evaluate vibration measurements taken while using the curves. (See Item 2.7.1.1)

9. The licensee should establish alert and required action ranges when using pump curves instead of fixed reference values for the turbine driven auxiliary feedwater pump. The licensee should also verify the pump curves by empirical data taken when the pump was known to be in good operating condition and develop a method to evaluate vibration measurements taken while using the curves. (See Item 2.7.2.1)

10. The licensee should test the service water pumps individually and should establish alert and required action ranges when using pump curves instead of fixed reference values. The licensee should also verify the pump curves by empirical data taken when the pump was known to be in good operating condition and develop a method to evaluate vibration measurements taken while using the curves. (See Item 2.8.1.1)

11. In letters transmitting Revision 4 (Unit 1) and Revision 2 (Unit 2) of the IST programs, the licensee has deleted Pump Relief Request PR-11 and has stated in Item 5 of both letters that "PR-11 is not necessary since expansion of the allowable ranges of inservice test quantities described by Table IWP-3100-2 is acceptable in accordance with Paragraph IWP-3210 of the ASME Code, Section XI". The licensee's basis for the expanded range limits proposed in the deleted PR-11 is no longer valid because the request to combine service water pumps during tests (PR-10) has been denied while PR-13 is unnecessary. Therefore, t! licensee should measure flow on the service water pumps in accordance with Section XI, Table IWP-3100-2, unless valid documentation is available that explains why the ranges of Table IWP-3100-2 cannot be met and how, using the revised ranges, assurance will be provided that the pumps can continue to fulfill their function. Additionally, the licensee should delete PR-13 from the IST program. (See Item 2.8.3.1)

12. The licensee requested relief from the Code requirement to establish reference flow or differential pressure for the component cooling water pumps, P001A-B, P001B-AB, and P001C-A, and proposed to utilize pump curves to compare differential pressure and flow rate during pump tests. The licensee has also indicated that reduced range limits will be applied to the test curves. The licensee should identify those reduced limits in the IST program and document why the ranges in Table IWP-3100-2 cannot be met and how the revised ranges will provide assurance that the pumps can continue to fulfill their function. The licensee should develop a method to evaluate vibration measurements taken while using pump curves instead of fixed reference values for the component cooling water pumps. (See Item 2.9.1.1)

13. The licensee has not demonstrated that it is impractical to measure inlet pressure on the diesel generator fuel oil transfer pumps during testing, therefore, the licensee should measure or calculate pump inlet pressure. Additionally, the licensee has not demonstrated that it is impractical to install temporary instrumentation to measure pump discharge pressure, therefore, the licensee should measure this parameter to determine pump differential pressure which can be used with

flow rate to evaluate pump hydraulic condition. Further, the licensee should demonstrate that the proposed expanded range limits will provide for detection of pump degradation and document that determination in the IST program. (See Item 2.10.1.1)

14. As per NRC's interim approval of the Unit 2 Inservice Testing program for pumps and valves, dated 3/31/89, Enclosure 1, Item 2, the testing of valves QV115A, QV115B, and QV115C is not a deviation from the Code requirements and relief is not necessary. Since the testing and the relief requests are identical for both plants, Valve Relief Requests Q1E21-RV-12 and Q2E21-RV-12 should be deleted from the IST program.

15. The licensee requested relief from exercising, remote position indication verification, stroke timing, and fail-safe testing the reactor vessel head vent valves and proposed to verify operational readiness by full-stroke exercising them during cold shutdowns if RCS pressure is less than 50 psig and during refueling outages. The licensee's proposal will indicate a valve problem only when there is a complete failure to operate and provides no method of detecting valve degradation. Testing that does not provide a means to monitor valve condition and detect degradation is not acceptable on a long term basis. Interim relief may be granted for one year or until the end of the next refueling outage, whichever is longer. During the interim period the licensee should develop a method to monitor valve condition and detect degradation, such as using non-intrusive diagnostic techniques to measure the full-stroke time of these valves. (See Item 3.2.2.1)

16. The licensee requested relief from full-stroke exercising residual heat removal valves QV042A and QV042B quarterly or during cold shutdowns and proposed to full-stroke exercise these valves during refueling outages. The relief request does not provide a justification for not part-stroke exercising these valves during cold shutdowns, therefore, the licensee should develop a test to part-stroke exercise these valves during cold shutdowns. (See Item 3.3.2.1)

17. The licensee requested relief from full-stroke exercising valves QV021A, QV021B, and QV021C quarterly or during cold shutdowns and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages. Relief may be granted from the Code requirements provided the valves are verified to be at least part-stroke exercised with flow following reassembly but prior to returning them to service. The licensee should actively investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that these valves exercise open during flow testing. This relief request should be revised or deleted if a method is developed to verify the full-stroke capability of these valves. (See Item 3.3.2.2)

18. The licensee requested relief from measuring the stroke time of valves QV032A, QV032B, QV033A and QV033B, but has not proposed any alternate method of monitoring valve condition and degradation. The licensee should develop a method to monitor degradation of these valves. Also, the safety-related function of these valves should be reviewed to determine if they are passive valves in all modes of system operation. Interim relief may be granted from the stroke time measurement requirements of the Code for 12 months or until the next refueling outage, whichever is longer. During this interim period, the licensee should develop a method of monitoring for valve degradation. When a method of monitoring valve degradation is developed, this relief request should be revised or deleted. (See Item 3.3.3.1)

19. The licensee requested relief from exercising valves QV051A, QV051B, and QV051C in accordance with the requirements of Section XI and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages. Relief may be granted from the Code requirements provided these valves are part-stroke exercised following reassembly but prior to returning them to service. The licensee should investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that these valves full-stroke exercise open during flow testing. (See Item 3.3.4.1)

20. The licensee requested relief from exercising valves QV002A and QV002B in accordance with the requirements of Section XI and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages. A part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. The licensee should investigate a method that verifies part-stroke exercising these valves. An interim period is necessary to give the licensee time to complete their investigation, therefore, interim relief may be granted for one year or until the next refueling outage, whichever is greater. (See Item 3.4.2.2)

21. The licensee requested relief from exercising valve QV014 (Unit 2 only) in accordance with the requirements of Section XI and proposed to verify valve operational readiness by sample disassembly and inspection every third refueling outage. Relief may be granted from the Code requirements provided the guidelines in Generic Letter 89-04, Attachment 1, Item 2, are followed and the basis for extending the disassembly and inspection interval are justified and documented and provided this valve is part-stroke exercised following reassembly but prior to returning it to service. The licensee should actively investigate the use of portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate that this valve is full-stroke exercised open during flow testing. (See Item 3.4.2.3)

22. The licensee requested relief from exercising Unit 1 valves QV007A and QV007B in accordance with the requirements of Section XI and proposed to verify valve operational readiness by sample disassembly and inspection during refueling outages. The licensee may be able to full-stroke exercise these valves during testing at refueling outages. An interim period is necessary to give the licensee time to investigate this possible testing, therefore, interim relief may be granted for one year or until the next refueling outage, whichever is greater, provided the licensee part-stroke exercises these valves with flow following the sample disassembly and inspection but prior to returning them to service. (See Item 3.4.2.4)

23. The licensee requested relief from exercising Unit 2 valves QV007A and QV007B to the Section XI requirements and proposed to perform valve sample disassembly and inspection during refueling outages. A part-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. Relief may be granted from the Code requirements provided the licensee part-stroke exercises these valves with flow following valve reassembly. (See Item 3.4.2.5)

24. The licensee requested relief from exercising valves QV249A and QV249B in accordance with the Section XI requirements and proposed to exercise them during cold shutdowns when the RCS is vented or open to atmosphere. The licensee should also exercise and measure the stroke times of these valves during refueling outages. (See Item 3.6.1.1)

25. The licensee requested relief from exercising the accumulator discharge check valves in accordance with the requirements of Section XI and proposed to perform valve sample disassembly and inspection during refueling outages. Relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises the valves open with flow after they have been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to demonstrate that these valves fully open or open sufficiently to pass maximum required accident flow when subjected to flow from a reduced pressure accumulator discharge at least once every refueling outage. (See Item 3.6.2.2)

26. The licensee requested relief from exercising the combined HHSI/LHSI hot leg injection check valves in accordance with the requirements of Section XI and proposed to perform valve sample disassembly and inspection during refueling outages. Relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises the valves open with flow after they have been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostic techniques to demonstrate that these valves fully open or open sufficiently to pass maximum required accident flow when subjected to flow. (See Item 3.6.2.3)

27. The licensee requested relief from exercising valves QV326A, QV326B, QV327A, and QV327B in accordance with the requirements of Section XI and proposed to exercise them during cold shutdowns when the RCS is vented or open to atmosphere. These valves should also be exercised during refueling outages. (See Item 3.6.3.1)

28. The licensee requested relief from exercising valves QV063, QV068, and QV072 in accordance with the requirements of Section XI and proposed to full-stroke exercise them during cold shutdown when the RCS is drained down to the mid-plane level and all charging pumps are secured or placed in an alignment that allows testing. These valves should also be exercised during refueling outages. (See Item 3.6.3.2)

29. The licensee requested relief from exercising valve QV026 in accordance with the requirements of Section XI and proposed to full-stroke exercise this valve during refueling outages. The licensee has not addressed quarterly part-stroke exercising of this valve and has provided no technical justification for not performing this testing. Therefore, the licensee should part-stroke exercise this check valve in accordance with the requirements of Section XI, Paragraph IWV-3522. Interim relief may be granted to give the licensee time to develop a test method and test procedures to perform part-stroke exercising. (See Item 3.6.4.1)

30. The licensee requested relief from exercising valves QV121A, QV121B, and QV121C in accordance with the requirements of Section XI and proposed to perform valve sample disassembly and inspection during refueling outages. Relief may be granted from the exercising requirements of the Code provided the licensee part-stroke exercises the valves open with flow after they have been reassembled. Further, the licensee should investigate the use of non-intrusive diagnostics to demonstrate that these valves fully open or open sufficiently to pass maximum required accident flow when subjected to flow. (See Item 3.6.4.2)

31. The licensee requested relief from the Code exercising requirements for the safety injection header check valves listed in Relief Requests Q1(2)E21-RV-4, -6, and -10 and proposed to exercise these valves or to

perform valve sample disassembly and inspection during refueling outages. The P&IDs provided with the IST program indicate that flow elements and instrument connections are installed in each injection header upstream of each of these check valves. Since it is possible to measure the flow rate through each of these valves, the licensee's proposal in RV-10 to verify the full-stroke capability of these valves by sample disassembly and inspection is inappropriate and relief should not be granted from the Code test method requirements. Also, the licensee should review these relief requests to consolidate and clarify them. (see Item 3.6.4.4).

32. The licensee requested relief from exercising valves QV010A and QV010B in accordance with the requirements of Section XI and proposed to verify closure by sample disassembly and inspection during refueling outages. Relief may be granted from the Code requirements provided the disassembled valve is exercised after reassembly but prior to being returned to service. The licensee should investigate methods such as non-intrusive valve diagnostics or radiography to verify the reverse flow closure capability of these valves. (See Item 3.8.1.1)

33. The licensee requested relief from exercising valves QV006, QV007A, and QV007B in accordance with the requirements of Section XI and proposed to verify closure by sample disassembly and inspection during refueling outages. Interim relief may be granted for one year or until the next refueling outage, whichever is greater. The licensee should investigate the use of leak testing using a clean water source or non-intrusive diagnostic techniques to demonstrate that these valves close when subjected to reverse flow conditions. (See Item 3.9.2.1)

34. The licensee requested relief from exercising valves QV071, QV072, and QV081 in accordance with the requirements of Section XI and proposed to full-stroke exercise them during cold shutdowns when all reactor coolant pumps are secured. The licensee should also full-stroke exercise these valves during refueling outages. (See Item 3.11.1.1)

35. The licensee requested relief from exercising valves QV564 and QV565 in accordance with the requirements of Section XI and proposed to part-stroke exercise them quarterly and to perform a sample disassembly and inspection during refueling outages. The licensee should verify part-stroke capability of valves QV564 and QV565, diesel generator service water return checks, following the sample disassembly and inspection and prior to returning them to service. (See Item 3.11.3.1)

36. The licensee requested relief from exercising valves QV635A, QV635B, QV636A, and QV636B in accordance with Section XI and proposed to part-stroke exercise them quarterly and to perform a sample disassembly and inspection during refueling outages. Relief may be granted from the exercising requirements of Section XI provided the licensee performs a partial flow test of each valve prior to returning it to service after reassembly. The licensee should investigate using portable flow instrumentation or non-intrusive diagnostic techniques to demonstrate a full-stroke exercise open during flow testing. (See Item 3.11.3.2)

37. The licensee requested relief from exercising valves HV3095, HV3067, and HV3443 in accordance with the requirements of Section XI and proposed to full-stroke exercise them during those cold shutdowns when all reactor coolant pumps are secured. The licensee should also full-stroke exercise these valves during refueling outages. (See Item 3.12.1.1)

38. The licensee requested relief from exercising valves QV082, QV097, QV099, HV3045, and HV3184 in accordance with the requirements of Section XI and proposed to exercise them during those cold shutdowns when all reactor coolant pumps are secured. The licensee should also exercise these valves during refueling outages. (See Item 3.12.1.2)

39. The licensee requested relief from exercising valves QV087A, QV087B, and QV087C in accordance with Section XI and proposed to verify valve closure during refueling outages. Relief may be granted from the exercising frequency requirements of the Code. The licensee should test each of these valves every refueling outage and should investigate the use of non-intrusive diagnostic techniques to demonstrate that these valves close when subjected to reverse flow. (See Item 3.12.3.1)

APPENDIX B

P&ID LIST

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P&ID LIST

The P&IDs listed below (Unit 1) were used during the course of this review.

System	P&ID	Revision
Reactor Coolant System	175037-1	14
	175037-2	11
Residual Heat Removal System	175041	10
Safety Injection System	175038-1	17
	175038-2	15
Containment Spray System	175038-3	12
Containment Cooling and Purge System	175010-1	10
	175010-2	8
Chemical and Volume Control System	175039-1	14
	175039-2	21
	175039-3	10
Post Accident Combustible Gas Control System	175019	11
Waste Processing System	175042	14
Radioactive Drains and Vents System	175004	23
Steam Generator Blowdown Processing System	175071	13
Spent Fuel Cooling System	175043	12
Main Feedwater System	175073	12
Main and Auxiliary Steam System	175033-1	19
	175033-2	14
Auxiliary Feedwater System	175007	16
Demineralized Water System	175047	21

System	P&ID	Revision
Sampling System	175039-1	21
	175009-2	11
Service Water System	175003-1	15
	175003-2	10
	170119-1	21
	170119-2	21
	170119-3	6
	170113	13
Component Cooling Water System	175002-1	19
	175002-2	14
Service Air System	175035	8
Instrument Air System	175034-1	18
	175034-2	8
	175034-3	3
Penetration Filtration System	175022	11
Chemical Injection System	175000	5
River Water System	170119-6	11
	170119-7	11
Diesel Generator Air Start System	170806-1	9
	170806-2	7
	170807-1	9
	170807-2	7
Control Room Ventilation and Filtration System	205012	14
	175012	17
Diesel Generator Fuel Oil System	170060	9