UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM REQUESTS FOR RELIEF

COMMONWEALTH EDISON COMPANY

BYRON STATION, UNITS 1 AND 2

DOCKET NOS. STN 50-454 AND STN 50-455

1.0 INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a, requires that inservice testing (IST) of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to Sections (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements determined acceptable to the staff. Alternatives that conform to the guidance in GL 89-04 may be implemented without additional NRC approval. Implementation of the GL 89-04 positions is subject to inspection.

Section 10 CFR 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to authorizing alternatives and granting or not granting the relief requested as part of the licensee's IST program are contained in this Safety Evaluation (SE).

In rulemaking to 10 CFR 50.55a, effective September 8, 1992, (see 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of pumps and valves shall meet the requirements set forth in ASME Operations and Maintenance Standards Part 6 (OM-6), "Inservice Testing of Pumps in Light-Water Reactor Power Plants," and Part 10 (OM-10), "Inservice Testing of Valves in Light-Water Reactor Power Plants." Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the

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respective editions or addenda are met, and subject to Commission approval. Because the alternatives meet later editions of the Code, relief is not required for those inservice tests that are conducted in accordance with OM-6 and OM-10, or portions thereof, provided all related requirements are met and Commission approval has been given. Whether all related requirements are met is subject to NRC inspection.

By letters dated March 11, 1994, December 1, 1993, and February 8, 1993, the Commonwealth Edison Company (the licensee) provided Revisions 9b and 10 of the IST Pump Program and Revisions 11 and 12 of the IST Valve Program for Byron Station Units 1 and 2. These Revisions respond to the action items specified in an NRC SE dated January 31, 1992, and include a number of new and revised relief requests.

This SE covers the following: revised relief requests PR-1, PR-7, VR-1, Draft VR-2a, VR-5, VR-8, VR-9, VR-10, VR-15A-D, and VR-19; and new relief requests VR-23, VR-24, and VR-25. Relief requests VR-18 and VR-22 have been deleted. The IST program evaluated in this SE covers the first ten-year IST intervals, from September 16, 1985, to September 15, 1995, for Byron 1 and from August 21, 1987, to August 20, 1997, for Byron 2. The first ten-year interval IST program is based on the requirements of the 1983 Edition, including addenda through the Summer 83 Addenda, of the ASME Section XI Code.

2.0 RELIEF REQUEST PR-1

In the SE dated January 31, 1992, PR-1 was approved on the condition that the licensee meets the OM-6 requirements for pump vibration measurements. The licensee stated in its February 8, 1993, submittal that Byron Units 1 and 2 are in full compliance with the vibration measurement requirements of OM-6 with the exception of the essential service water makeup pumps OSX02PA & B, which are addressed in PR-7. The revised relief request PR-1 meets the condition for approval specified in the SE dated January 31, 1992.

3.0 RELIEF REQUEST PR-7

In the SE dated January 31, 1992, PR-7 was approved on the condition that the licensee obtains vendor's concurrence in the proposed pump vibration ranges and complies with all other OM-6 vibration measurement requirements. The licensee stated in its February 8, 1993, submittal that PR-7 has been revised to contain vendor's recommended vibration limits and to include a letter containing vendor's concurrence in the proposed vibration limits for the essential service water make-up pumps OSX02PA & B. The utility also indicated that PR-7 complies with all other OM-6 vibration measurement requirements.

The vendor's letter attached to PR-7 specifies a "minimum standard of vibration" of 0.56 inches per second. The licensee's use of this value as the beginning of the alert range and 0.9 inches per second as the beginning of the required action range is questionable since the vendor's letter does not recommend the licensee's proposed required action limit of 0.9 inches per second.

In order to meet the conditions for approval specified in the SE dated January 31, 1992, the licensee should obtain vendor's concurrence in the 0.9 inches per second required action limit or propose vibration limits that are consistent with vendor recommendations. Implementation of IST program requirements is subject to NRC inspection.

4.0 RELIEF REQUEST VR-1

The licensee revised relief request VR-1 by adding valves 1(2)RY075 to the list of primary containment isolation valves. The relief request was granted in the SE dated September 14, 1990, based on the determination that the proposed leak testing alternative meets GL 89-04, Position 10. The status of this relief request would not change because of this revision.

5.0 RELIEF REQUEST DRAFT VR-2a

Draft VR-2a requests relief from the test method and frequency requirements of Section XI, ¶ IWV-3520 for the check valves, 1(2)CS020A and B, in the line between the containment spray (CS) additive tank and the CS eductors. The licensee proposes to verify their full-stroke capability by sample disassembly and inspection at least every five years and follow this by exercising the valves open with flow during the Technical Specification (TS) eductor flow test.

Draft VR-2a is a revised version of VR-2 and proposes to relax the disassembly and inspection frequency of every refueling outage that is proposed in VR-2. The SE dated January 31, 1992, approved VR-2 with the provision that the licensee complies with GL 89-04, Position 2.

5.1 Alternative Testing

Two of four valves, one from each of two groups, will be disassembled and inspected at least every five years prior to the eductor flow test. The A and B train valves are of the same design (manufacturer, size, model number, and materials of construction) and have the same service conditions, including orientation. This forms an acceptable sample disassembly group per GL 89-04, Position 2c.

5.2 Licensee's Basis for Relief

These check valves in the containment spray additive system cannot be stroked without introducing NaOH into the CS system, unless the piping between the NaOH storage tank and the injection isolation valves, 1(2)CS021A and B, is drained into containers. Draining the piping results in almost two 55 gallon drums of potentially (radioactive/toxic) mixed waste that requires either recycling or disposal. Then, primary water is connected to the CS system and is used to flow test the line to ensure that the proper TS eductor flow rate can be passed via special test connections.

The problem with disposal stems from the caustic being slightly contaminated, as well as having a high ph. Recycling (pouring the contents of the drums back into the NAOH tank) is not always a viable option either, considering the caustic has been contained in a stagnate line (up to five years) and may not meet chemistry requirements. Thus storage of hazardous mixed waste can become very costly. This is due to the non-existence of commercial disposal facilities for mixed waste, which means that any mixed waste generated would have to be stored on-site. Also, the draining and handling of this highly caustic material poses a significant hazard to personnel, and can result in loss of eye sight and/or chemical burns, if splashed or spilled.

If the disassembled valve is not capable of being manually full-stroke exercised or there is binding or failure of internals, the remaining valve on the affected unit will be evaluated for further action.

Full flow testing of these valves cannot be accomplished without posing a serious threat to the safety of equipment and personnel. It is impractical to either full or part-stroke exercise these valves since flow through them requires draining and flushing the piping to prevent the introduction of caustic effluent into the CS system. The problem of mixed waste disposal or recycling created by system draining of approximately two 55 gallon drums is considered an undue hardship, if the Code requirements are imposed.

The alternate test frequency (same frequency as the TS eductor flow test of at least once every five years) is justifiable in that maintenance history and previous inspections of these valves at both Byron and Braidwood stations have shown no evidence of degradation or physical impairments (i.e., corrosion, chemical buildup, wear). This is to be expected since these valves see limited operation (flow in line during eductor flow test only).

Industry experience, as documented in NPRDS, shows no history of problems with these valves. A company wide check valve evaluation addressing the Application Guidelines for Check Valves in Nuclear Power Plants revealed that the location, orientation and application of these valves are not conducive to the type of wear or degradation correlated with SOER 86-03 type failures.

The alternate test method, visual inspection of internals followed by the TS eductor flow test, at least once every five years, is sufficient to ensure operability of these valves and is consistent with GL 89-04 guidelines. The hardship involved with the hazardous mixed waste disposal and handling caustic material with regards to personnel safety does not provide a compensated increase in safety of the CS system equipment.

5.3 Evaluation

The check valves, 1(2)CS020A and B, are required by the Code to be exercised quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions.

Exercising these valves quarterly during power operation is not practical because it would require removing the CS system from service, draining and flushing a section of piping between the spray additive tank and the eductor, hooking up special primary water test connections, running the test, and restoring the system to operating conditions. This testing would involve operators working with mixed waste that is caustic, toxic, and possibly slightly radioactive. Approximately 100 gallons of this mixed waste would be generated during testing. Performing this testing during cold shutdowns is also not practical because waste would be generated and setting up, running the test, and restoring the system to operation is time consuming and could result in a delay in returning the plant to operation.

GL 89-04 states that the use of disassembly to verify full-stroke capability of check valves is an option only where full-stroke exercising cannot be performed by flow or by other positive means. The TS required eductor flow test, performed every five years, should be used to exercise the valves. Supplementing the test with a disassembly and inspection program on a more frequent basis would provide useful information about the valves' condition such as erosion, corrosion, fouling, wear, binding, loose parts, and fatigue failure.

The licensee proposes to disassemble, inspect, and manually exercise at least one valve in each of the two groups every five years and to verify the TS eductor flow rate through these valves following reassembly. Testing once every five years is a significant extension of Code allowed testing intervals. Such an extension can be allowed by GL 89-04, Position 2, but only in cases of extreme hardship where the extension is supported by industry and in-plant data. However, the argument presented by the licensee regarding problems with mixed waste disposal is questionable. NUREG/CR-5938, "National Profile on Commercially Generated Low-Level Radioactive Mixed Waste," identifies available treatment technologies for low-level mixed waste. The report also contains information on existing commercial waste treatment facilities. NaOH is commonly used in industry; and draining, neutralizing, and/or disposing the low level waste in question on a refueling outage interval should not involve extreme hardship.

5.4 Conclusion

Based on the determination that information presented by the licensee does not support relaxing the disassembly and inspection frequency of every refueling outage proposed in VR-2, relief request Draft VR-2a cannot be granted as requested.

6.0 RELIEF REQUESTS VR-5

This request concerns relief from the test frequency requirements of Section XI, ¶¶ IWV-3521 and 3522, for the safety injection accumulator discharge check valves, 1(2)SI8956A through D. The licensee proposed to full-stroke exercise these valves open during refueling outages and to verify closure on the same

frequency as the reactor coolant system (RCS) pressure isolation valves (PIVs) leak testing identified in the TS.

6.1 Alternate Tests

These valves will be backflow tested on the same schedule as the TS leakage test as follows:

a. At least once per 18 months,
b. Prior to entering MODE 2 whenever the plant has been in COLD SHUTDOWN for 72 hours or more and if leakage testing has not been performed in the previous 9 months,
c. Prior to returning the valve to service following maintenance, repair or replacement work on the valve, or
d. Within 24 hours following valve actuation due to manual action or flow through the valve.

These check valves will be full-stroke exercised during refueling outages when the accumulators are discharged into the reactor vessel.

6.2 Licensee's Basis For Relief

Relief is requested from the three-month test frequency for the full-stroke and backflow test as stated in ASME Section XI, IWV-3521: "Check valves shall be exercised at least once every three months, except as provided by IWV-3522." IWV-3522 states that valves that cannot be exercised during plant operation shall be specially identified by the owner and shall be full-stroke exercised during cold shutdown.

The 1(2)SI8956A-D check valves are located inside the containment building missile barrier on the lines from the accumulator tanks to the RCS cold legs. These eight check valves have safety functions in both the open and closed directions. The safety function in the closed direction is to maintain the RCS pressure boundary. The safety function in the open direction is to permit the injection of borated water into the reactor vessel cold legs during the passive injection phase of a safety injection. These check valves cannot be tested during unit operation because of the pressure differential between the accumulators (650 psig) and the RCS (2235 psig). Full-stroke exercising of these valves could occur only with a rapid depressurization of the RCS.

These eight valves are part of the passive injection subsystem portion of the safety injection system. This subsystem is designed to inject borated water into the reactor cold legs only after the RCS pressure has decreased below the accumulator nitrogen gas pressure. Under normal plant conditions the RCS system pressure is 2235 psig and the accumulator pressure is 650 psig. Therefore, it is not possible to full-stroke these valves unless there is rapid depressurization of the RCS. Full-stroke testing of these valves during operation or at cold shutdown would require depressurization of the RCS.

Additionally, full-stroking these valves during cold shutdown, routinely or forced, would impose hardship with no compensating increase in plant safety. To perform this test, the RCS must be at approximately 40 psi with all four reactor pumps (RCPs) off and accumulator pressure at 100 psi over RCS pressure. The RCS boron concentration is low compared to the 2000 ppm concentration of the accumulators. This injection test requires that approximately 8,000 gallons of this boron concentrated water be injected into the RCS. This would result in a considerable increase in the boron concentration of the RCS. The feed and bleed process required to restore desired RCS boron concentration would result in considerable increases in restoration time and in amount of radioactive water rejected from the site.

Successful completion of the seat leakage test will provide positive verification of closure. Therefore, backflow testing these valves on the same schedule as their required TS leak rate testing will adequately maintain the system in a state of operational readiness.

6.3 Evaluation

The check valves, 1(2)SI8956A-D, are required by the Code to be exercised quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions.

In rulemaking to 10 CFR 50.55a effective September 8, 1992 (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

The licensee proposes to full-stroke exercise these valves open during refueling outages and to verify the closure capability on the same frequency as the reactor coolant system pressure isolation valves leak testing frequency identified in the TS. Full or part-stroke exercise these valves quarterly during power operations is not practicable because the accumulators and safety injection pumps are not capable of overcoming normal operating RCS pressure. The bases for not testing during cold shutdowns include the complexity and time consuming nature of the test and the large quantities of radioactive waste generated by the test. However, the licensee did not discuss part-stroke exercising during cold shutdowns. Part 10, ¶ 4.3.2.2(d) and Section XI, IWV-3522, require part-stroking during cold shutdowns if exercising is not practicable during plant operation and full-stroking during cold shutdowns is also not practicable. A part-stroke of 1(2)SI8956A through D (the accumulator discharge valves) may be practical by burping the accumulators (leaving the

discharge isolation valves open as RCS pressure is being lowered until there is a measurable decrease in accumulator level and then closing the discharge valves) when going into cold shutdowns. Part-stroke exercising should be performed on these valves if practicable or the basis for not performing this test should be documented as called for in Paragraph 6.2(d) of OM-10.

6.4 Conclusion

The proposed alternative to test the safety injection accumulator discharge check valves as described in Section 6.1 is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that (1) part-stroke exercising is performed during cold shutdowns, or if such testing is not practicable, the justification is documented in the IST program and (2) all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

7.0 RELIEF REQUEST VR-8

VR-8 requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for component cooling water supply to reactor coolant pumps check valve 1(2)CC9486 and component cooling water header overpressure protection check valves 1(2)CC9518 and 1(2)CC9534.

VR-8 pertaining to valves 1(2)CC685, 1(2)CCF9413A, 1(2)CC9414, 1(2)CC9416, 1(2)CC9438 is not evaluated herein because relief for these valves was granted in the SE dated September 15, 1988.

7.1 Alternate Tests

During cold shutdowns if the reactor coolant pumps are not in operation, check valves 1(2)CC9518 and 1(2)CC9534 will be full-stroke exercised open and closed and 1(2)CC9486 will be full-stroke exercised closed. RCPs will not necessarily be secured for the sole purpose of performing this test. This testing period will be each refueling outage as a minimum, but not more frequently than once per quarter. Both these tests will be performed in conjunction with the seat leakage test. 1(2)CC9486 will also be full-stroke exercised open during power operations.

7.2 Licensee's Basis For Relief

Relief is requested for check valves 1(2)CC9486, 1(2)CC9518 and 1(2)CC9534 from the three-month test frequency as stated in ASME Section XI IWV-3521: "Check valves shall be exercised at least once every three months, except as provided by IWV-3522." IWV-3522 states that valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full-stroke exercised during cold shutdown.

1(2)CC9486 are located on the component cooling supply line to the RCP motor bearings and thermal barrier. The safety function of these valves in the closed direction is to provide a leak-tight barrier between the containment

atmosphere and the environment during accident conditions. The function of these valves in the open direction is to supply component cooling water to the RCP motor bearings and thermal barriers. Component cooling water flow to the RCPs is required at all times while the pumps are in operation and for an extended period of time while in cold shutdown. Failure of 1(2)CC9486 in a closed position during an exercise test would result in a loss of cooling flow to the pumps and eventual pump damage and/or trip.

1(2)CC9518 are located on the component cooling water return line from the RCP thermal barrier. The safety function of these valves in the closed direction is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions. The function of these valves in the open direction is to provide pressure equalization between inside containment isolation valves 1(2)CC9438 and outside containment isolation valves 1(2)CC685.

1(2)CC9534 are located on the component cooling water return line from the RCP motor bearings. The safety function of these valves in the closed direction is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions. The function of these valves in the open direction is to provide pressure equalization between piping inside and outside containment.

Full-stroke and backflow testing of check valves 1(2)CC9518 and 1(2)CC9534 would interrupt flow from the RCP thermal barrier and motor bearings. Therefore, full flow testing of the 1(2)CC9518 and 1(2)CC9534 is only possible with the RCP shut down.

This alternate frequency will adequately maintain the system in a state of operational readiness by testing these valves as often as safety possible. Shutting down the RCPs and the subsequent restarting incurs a reactor vessel overpressurization risk. In addition, it is operationally undesirable because of the time and manpower involved in starting an RCP. Also, an operator is required to observe the RCP shaft rotation upon starting. Stopping and starting RCPs would add unnecessary radiation exposure (approximately 20 mRem).

7.3 Evaluation

The check valves, 1(2)CC9486, 1(2)CC9518 and 1(2)CC9534, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions. In lieu of Code required frequencies for stroke testing, the licensee proposes the following: During cold shutdowns if the reactor coolant pumps are not in operation, check valves 1(2)CC9518 and 1(2)CC9534 will be full-stroke exercised open and closed and 1(2)CC9486 will be full-stroked exercised closed. RCPs will not necessarily be secured for the sole purpose of performing this test. This testing period will be each refueling outage as a minimum, but not more frequently than once per quarter. Both

these tests will be performed in conjunction with the seat leakage test. 1(2)CC9486 will also be full-stroke exercised open during power operations.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

The licensee demonstrated that during power operations, full-stroke exercising open and closed 1(2)CC9518 and 1(2)CC9534 and full-stroke exercising closed 1(2)CC9486 would not be practical because the testing would require shutting down the reactor, stopping the RCPs, and entering hazardous areas inside containment. It is impractical to perform this testing when RCPs are operating during cold shutdowns because this would involve stopping all RCPs and establishing test configurations inside containment with high radiation levels and other personnel hazards. Exercising these valves when RCPs are operating could result in pump damage. Stopping the RCPs could extend the cold shutdown period. The licensee's proposal to full-stroke exercise the valves during cold shutdown periods when RCPs are not operating is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

7.4 Conclusion

The proposed alternative to perform specified testing of 1(2)CC9518, 1(2)CC9534, and 1(2)CC9486 during cold shutdowns if the reactor coolant pumps are not in operation is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

8.0 RELIEF REQUEST VR-9

VR-9 requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for 1(2)CV8113, the check valves that provide overpressure protection for the piping between the isolation valves in the return lines from the RCP seals.

VR-9 pertaining to valves 1(2)CV8100 and 1(2)CV8112 is not evaluated herein because relief for these valves was granted in the SE dated September 15, 1988.

8.1 Alternate Tests

The 1(2)CV8113 valves will be full-stroke exercised open and closed during cold shutdown provided all RCPs are not in operation and seal leak-off can be isolated.

8.2 Licensee's Basis For Relief

Relief is requested for valves 1(2)CV8113 from the three-month test frequency for the full-stroke test as stated in ASME Section XI IWV-3521: "Check valves shall be exercised at least once every three months, except as provided by IWV-3522." IWV-3522 states that valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full-stroke exercised during cold shutdowns.

1(2)CV8113 are normally closed check valves located across containment isolation valves 1(2)CV8112 inside containment. Their safety function in the closed direction is to maintain the integrity of the reactor RCS pressure boundary and to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions. The safety function of these valves in the open direction is to relieve any pressure that may buildup between containment isolation valves 1(2)CV8100 and 1(2)CV8112. These check valves function only when the associated containment isolation valves are closed. Therefore, they cannot be full-stroke tested without closing the 1(2)CV8100 and 1(2)CV8112 valves. Failure of either 1(2)CV8100 or 1(2)CV8112 in the closed position during an exercise test would result in an abnormal seal water return flow being diverted to the pressurizer relief tank by lifting a relief valve 1(2)CV8121 upstream of the isolation valves.

This alternate frequency will adequately maintain the system in a state of operational readiness, by testing these valves as often as safely possible. shutting down the RCPs and the subsequent restarting incurs a reactor vessel overpressurization risk. In addition, it is operationally undesirable because of the time and manpower involved in starting an RCP. Also, two operators are required to observed the RCP shaft rotation upon starting. Stopping and re-starting RCPs would add unnecessary radiation exposure (approximately 20 mRem).

8.3 Evaluation

The check valves, 1(2)CV8113, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions. In lieu of Code required frequencies for stroke testing, the licensee states that check valves 1(2)CV8113 will be full-stroke exercised open and closed during cold shutdowns provided all RCPs are not in operation. This testing will be performed at least each refueling outage.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

The licensee demonstrated full- or part-stroke exercising these valves quarterly during power operations is not practicable because it would require shutting down the reactor, stopping the RCPs, and entering hazardous areas inside containment. It is impractical to exercise these valves when RCPs are operating during cold shutdowns because this would involve stopping all RCPs and establishing test configurations inside containment with high radiation levels and other personnel hazards. The licensee's proposal to full-stroke exercise the valves during cold shutdown periods when RCPs are not operating is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

8.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

9.0 RELIEF REQUEST VR-10

VR-10 requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for 1(2)IA091, the check valves in the supply air lines to valves 1(2)IA066 which are isolation valves in the instrument air supply to containment.

VR-10 pertaining to valves 1(2)IA065 and 1(2)IA066 is not evaluated herein because relief for these valves was granted in the SE dated 9/14/90.

9.1 Alternate Tests

The 1(2)IA091 valves will be full-stroke exercised (open and closed) at a frequency of at least every refueling outage.

9.2 Licensee's Basis For Relief

Relief is requested from the three-month test frequency for the backflow test as stated in ASME Section XI, IWV-3521: "Check Valves shall be exercised at least once every three months, except as provided by IWV-3522." IWV-3522 states that valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full-stroke exercised during cold shutdowns.

The 1(2)IA091 valves are located on the air supply lines to the 1(2)IA066 valves. The 1(2)IA066 valves are the inboard containment isolation valves for the instrument air supply lines to containment. The safety function of the 1(2)IA091 valves in the closed direction is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions. The function in the open direction is to supply control air to the 1(2)IA066 valves. Stroke testing of the 1(2)IA091 valves cannot be performed without actuating the 1(2)IA066 and would result in the isolation of all instrument air to containment.

Check valves 1(2)IA091 provide the air supply to maintain the 1(2)IA066 valves in the open position. Testing of the 1(2)IA091 valves in the closed position would force the 1(2)IA066 valves to their fail closed position, by design, causing loss of instrument air to containment. Loss of instrument air would result in scenarios such as the following:

1. The pressurizer spray valves 1(2)RY455B & C and the pressurizer auxiliary spray valves 1(2)CV8145 would fail closed and not be available for pressurizer pressure control.

2. Disruption in the unit letdown flow paths would result in pressurizer level increase. Such valves as the letdown orifice containment outlet header isolation valve 1(2)CV8160, the letdown line isolation valves 1(2)CV459 and 1(2)CV460, the letdown orifice outlet isolation valves 1(2)CV8149 A, B & C, the excess letdown heat exchanger inlet isolation valves 1(2)CV8153A & B, and the regenerative heat exchanger letdown inlet isolation valves 1(2)CV8389A & B would go to their fail closed positions. Additionally, the ability to normally make up reactor coolant inventory and adjust the reactor chemical shim (i.e. normal boration/dilution) would also be lost as the regenerative heat exchanger inlet isolation valves 1(2)CV8324A & B would fail to their respective closed positions.

3. The penetration cooling supply flow control valve 1(2)CC053 would go to its fail-closed position. The loss of penetration cooling would result in elevated temperatures being imposed on the penetrations being supported by the component cooling system.

4. The service air downstream isolation valve 1(2)SA033 would go to its fail-closed position. This loss of service air in the containment building would eliminate the normal source of supplied breathing air

needed to support numerous maintenance and component inspection activities in a containment environment.

9.3 Evaluation

The check valves, 1(2)IA091, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

The licensee proposes to full-stroke exercise these valves open and closed at a frequency of at least every refueling outage. Exercising these valves quarterly during power operations is not practical because it would isolate the instrument air supply to safety related equipment inside containment. Loss of instrument air would cause several control valves to move to the fail-safe positions, seriously disrupting reactor operations. During cold shutdowns, exercising these valves would cause the service air downstream isolation valve to fail closed and disrupt the supply of breathing air to workers in containment. Loss of instrument air to containment would inhibit the performance of shutdown maintenance activities and inspections and would be burdensome to the licensee. Therefore, testing these valves during cold shutdowns is not practical. The licensee's proposal is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

9.4 Conclusion

The proposed alternative to exercise 1(2)IA091 during refueling outages is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

10.0 DRAFT RELIEF REQUEST VR-15A

VR-15A requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for the following check valves.

Identification	Function
1(2)CV8481A,B	Centrifugal charging pump discharge check valves
1(2)CV8546	Centrifugal charging pump suction check valve off the refueling water storage tank
1(2)SI8815	Charging pump discharge to cold leg check valve
1(2)SI8900A-D	High pressure injection check valves

10.1 Alternate Tests

The closure verification for 1(2)SI8815 and 1(2)SI8900A-D will be performed at frequencies specified in the TS for PIV leak testing:

1. At least once per 18 months

2. Prior to entering Mode 2 whenever the plant has been in cold shutdown for greater than 72 hours or more if leakage testing has not been performed within the previous nine months

3. Prior to returning the valve to service following maintenance, repair, or replacement work on the valve

4. Within 24 hours following valve actuation due to automatic or manual operation or flow through the valve.

The full-stroke exercise testing (open and closed) of the check valves, 1(2)CV8481A,B, 1(2)CV8546, 1(2)SI8815, 1(2)SI8900A-D, will be performed at each refueling outage.

10.2 Licensee's Basis for Relief

1(2)SI8815 are in the line from the chemical and volume control centrifugal charging pump. Their safety function in the open direction is to permit flow of coolant from the centrifugal charging pump to the four lines which branch off and provide flow to the RCS cold legs during the high pressure injection phase of a safety injection. The safety function of these valves in the closed direction is to provide a redundant (back up to 1(2)SI8900A-D) RCS pressure boundary.

1(2)SI8900A-D are in the four lines which branch off from the lines containing the 1(2)SI8815 mentioned above. Their safety function in the open direction is to permit flow of coolant from the chemical and volume control centrifugal charging pumps to the RCS cold legs during the high pressure injection phase of a safety injection. The safety function of these valves in the closed direction is to provide a RCS pressure boundary.

1(2)CV8481A and B are located at the discharge of the chemical and volume control charging pumps. Their function in the closed direction is to prevent reverse flow from the charging header when the charging pump is not in

operation. The safety function in the open position is to permit flow from the charging pumps during a safety injection.

1(2)CV8546 are located at the combined suction of the charging pumps. Their closure function is to prevent reverse flow from the suction header to the RWST. The safety function in the open position is to permit flow of coolant when the charging pumps take suction from the RWST during a safety injection.

The stroking of check valves 1(2)SI8815 and 1(2)SI8900A-D, associated with the emergency core cooling system (ECCS), during operation would induce thermal stresses on their respective reactor vessel nozzles as the RCS (maintained at greater than 500°F) is injected with water from the RWST (maintained approximately 65°F). 1(2)CV8546 and 1(2)CV8481A,B are in series and cannot be full stroke exercised without exercising 1(2)SI8815 and 1(2)SI8900A-D.

These valves cannot be exercised during cold shutdowns without increasing the possibility of LTOP of the RCS. The TS require that all safety injection pumps and all but one charging pump be inoperable during Modes 4, 5, and 6, except when the vessel head is removed to prevent LTOP. In addition, injecting large quantities of highly borated water from the RWST would likely delay reactor start up and the cost of processing the reactor coolant to restore the optimum boron concentration is consequential.

1(2)SI8815 and 1(2)SI8900A-D can only be verified closed by performance of a leakage test on each valve. These are simple lift check valves and are not equipped with an external operator or disk position indication. It is impractical to verify them closed during power operation or during cold shutdowns. System configuration and connecting and disconnecting leak testing equipment during cold shutdown would likely delay the return to power. This would be costly and burdensome to the station. System redesign and modification would be necessary to allow testing these valves closed quarterly, which would also be costly and burdensome. Both of these alternatives would provide no compensating increase in plant safety.

Based on the guidance provided in question 24 of the "Public Meeting Notes on Generic Letter 89-04," check valves possessing safety functions in both the open and closed directions should be stroked to the open position and then stroked to the closed position. For the 1(2)SI8815 and 1(2)SI8900A-D valves, it is best to perform the backflow test in conjunction with the leakage test, on the same frequency as the full flow test, thus stroking them to their open position and then testing in their closed position.

Check valves 1(2)CV8481A,B and 1(2)CV8546 cannot be full-stroke exercised without causing stroking of 1(2)SI8815 and 1(2)SI8900A-D because of the system configuration. Therefore, 1(2)CV8481A,B will be full-flow and backflow tested in conjunction with the 1(2)SI8815 and 1(2)SI8900A-D full-flow test (B train backflow tested during A train full-flow test and vice versa). The 1(2)CV8546 will also be full-flow test in conjunction with the full-flow test of the 1(2)SI8815 and 1(2)SI8900A-D.

In addition, the high pressure safety injection (HPSI) check valves will have their seat tightness demonstrated during the TS testing required to verify the pressure isolation capability.

10.3 Evaluation

The check valves, 1(2)CV8546, 1(2)CV8481A,B, 1(2)SI8815, and 1(2)SI8900A-D, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is to demonstrate that the obturator is capable of moving to its safety function positions to assess the operational readiness. Valves 1(2)SI8815 and 1(2)SI8900A-D are RCS PIVs in the HPSI lines. The TS require leak rate testing to be performed whenever these valves are actuated, following maintenance or repairs, if the unit is in cold shutdown and if such leak rate testing has not been performed within nine months, and during refueling outages. 1(2)CV8546 are the combined suction check valve for the centrifugal charging pumps from the RWST. 1(2)CV8481A,B are discharge check valves for the centrifugal charging pumps. The licensee proposes to full-stroke exercise these valves open and closed during refueling outages. In addition, 1(2)SI8815 and 1(2)SI8900A-D will be verified closed by leak testing at frequencies that correspond to the TS requirements.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

With the exception of valves 1(2)CV8481A,B, which are part-stroke exercised quarterly, these valves cannot be full- or part-stroke exercised during power operations because of thermal stress concerns. In addition, injecting borated water could result in reactivity additions and power fluctuations. The opening of valves 1(2)SI8815 and 1(2)SI8900A-D to perform exercise testing would cause leak rate testing to be performed per TS. It would be burdensome to full- or part-stroke exercise these valves during each cold shutdown because the resultant leak rate testing would cause additional radiation exposure to workers connecting and disconnecting the leak testing equipment and could delay the return to power operations. It is impractical to full-stroke exercise charging system check valves 1(2)CV8546, 1(2)CV8481A and B each cold shutdown because the only full-flow path through these valves is into the RCS through valves 1(2)SI8815 and 1(2)SI8900A-D, which would require a leak test prior to returning the plant to power. Full-stroke exercising during refueling outage and the closure verification at the frequencies specified in the TS are consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power

operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

10.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

11.0 DRAFT RELIEF REQUEST VR-15B

VR-15B requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for 1(2)RH8705A,B, the check valves that provide overpressure protection for the piping between the residual heat removal (RHR) suction isolation valves.

11.1 Alternate Tests

The 1(2)RH8705A,B check valves will be exercised open each refueling outage. The closure capability for these valves will be verified by performing a leak test each refueling outage.

11.2 Licensee's Basis for Relief

1(2)RH8705A,B valves are located on the 3/4" branch line between the 1(2)RH8701A,B and 1(2)RH8702A,B RHR suction isolation valves. Their safety function in the open direction is to relieve excess pressure due to thermal expansion back to the RCS when both suction isolation valves are closed in order to prevent over pressurization of the piping. The safety function of these valves in the closed direction is to maintain the integrity of the RCS pressure boundary.

The 1(2)RH8705A,B thermal/pressure relief check valves can only be verified closed by performance of an individual leakage test on each valve. These valves are simple spring loaded lift check valves and are not equipped with an external operator or disk position indication. It is impractical to verify them closed during power operation or during cold shutdowns. System reconfiguration and connecting and disconnecting leak testing equipment in conjunction with depressurizing the RCS during cold shutdowns would delay the return to power. This would be costly and burdensome to the station. System redesign and modification would be necessary to allow testing these valves closed quarterly, which would also be costly and burdensome.

Performing the exercise test requires placing the standby train of RHR in an inoperable condition and that the RCS be depressurized (requires all four RCPs to be stopped). This will delay reactor start-up and return to power. In addition, taking away the redundant train of RHR reduces both the plant decay removal capability and the available safety margin regarding shutdown risk

assessment. Furthermore, these valves are also given specific exemption from being leakage tested (no closure test required) following flow through the suction isolation valves per TS (regarding PIV testing).

11.3 Evaluation

The check valves, 1(2)RH8705A and B, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. The licensee demonstrated that it is impracticable to exercise these valves quarterly during power or during every cold shutdowns because it would require shutting down the reactor and depressurizing the RCS, taking the associated RHR train out of service, and entering hazardous areas inside containment to perform complex test evolutions. The licensee proposes to full-stroke exercise open and leak test during refueling outages.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

1(2)RH8705A, B valves have a safety function in the closed direction to prevent an intersystem LOCA and but are not leak tested in the TS as PIVs. Therefore, reverse flow verification and leak testing in the IST program would have to provide the required assurance that these valves will close. 1(2)RH8705A, B are located in the branch line between the PIVs, 1(2)RH8701A, B and 1(2)RH8702A, B; and in series with 1(2)RH8701A, B, the valves provide redundant barriers against intersystem LOCAs. For PIVs, the TS require leak rate testing to be performed following actuation, following maintenance or repairs, if the unit is in cold shutdown and if such leak rate testing has not been performed within nine months, and during refueling outages. Given that the PIVs in the connecting branch lines are already being tested at these TS frequencies, the licensee should assess the practicality of verifying closure of 1(2)RH8705A, B during the leakage testing of these PIVs at the frequencies specified in the TS. Non-intrusive techniques, such as ultrasonics or thermography may be better suited for some applications. If the closure verification of 1(2)RH8705A, B cannot be performed at the TS frequencies for PIV leak testing, the justification for not testing at these frequencies should be documented in the IST program.

11.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that (1) closure of 1(2)RH8705A, B is verified at the frequencies in

the TS for PIV leak testing or the justification for not testing at these frequencies is documented in the IST program and (2) all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of IST requirements is subject to NRC inspection.

12.0 DRAFT RELIEF REQUEST VR-15C

VR-15C requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for the following check valves.

Identification	Function
1(2)SI8819A-D	SI cold leg injection check valves
1(2)SI8905A-D	SI hot leg injection check valves
1(2)SI8949B,D	SI/RH hot leg injection check valves

12.1 Alternate Tests

Full-stroke exercising of these valves can only be safely performed in Mode 6 with the reactor vessel head removed. Therefore, full-stroke exercising and backflow testing of these valves will be performed at each refueling outage.

12.2 Licensee's Basis for Relief

1(2)SI8819A-D are located in the lines going from the SI pumps to the reactor vessel cold legs. Their safety function in the open direction is to permit flow of coolant to the reactor cold legs during a safety injection. The safety function of these valves in the closed direction is to maintain the RCS pressure boundary (PIV).

The safety function of 1(2)SI8905A-D in the open direction is to permit flow of coolant from the SI pump to the reactor vessel hot legs during the hot leg recirculation portion of a safety injection. The closed safety function of these valves is to maintain the reactor coolant pressure boundary.

The safety function of 1(2)SI8949B,D in the open direction is to permit flow of coolant from the SI pumps to the reactor vessel hot legs during the hot leg recirculation portion of a safety injection. The closed safety function of these valves is to maintain the RCS pressure boundary.

These valves cannot be full stroke exercised during operation or during routine Mode 5 cold shutdowns because of the TS requirement that all SI Pumps and all but one charging pump be inoperable during modes 4, 5, and 6 (temperature less then 350°F), except when the reactor vessel head is removed (the reactor head is only removed during refueling outages). This requirement minimizes the possibility of LTOP of the RCS.

These check valves cannot be stroked during cold shutdown without exceeding the TS limiting condition for operation (LCO 3/4.5.3), since stroking these valves requires starting an SI pump. Stroke exercising check valves

1(2)SI8819A-D, 1(2)SI8905A-D, and 1(2)SI8949B,D during each reactor refueling outage will insure compliance with the TS and will reduce the risk of LTOP of the RCS.

12.3 Evaluation

The check valves, 1(2)SI8819A-D, 1(2)SI8905A-D, and 1(2)SI8949B,D are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions. In lieu of Code required frequencies for stroke testing, the licensee proposes to full-stroke exercise these valves open and closed during refueling outages.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

The check valves, 1(2)SI8819A-D, 1(2)SI8905A-D, and 1(2)SI8949B,D cannot be full-stroked exercised open with flow quarterly because the shutoff head of the SI pump is below RCS operating pressure and flow cannot be established. Full flow testing these valves during cold shutdown is not practical because of the risk associated with LTOP of the RCS. Full-flow exercising should be performed only when the reactor vessel head is removed to allow sufficient surge volume for the high pressure pumps used during the testing. The removal of vessel head would only be practical during refueling outages because of the time consuming and difficult nature of the task. These valves are designated as PIVs; therefore, the closure capability is verified at the frequencies specified in the TS for PIV leak testing. The licensee's proposal to full-stroke exercise the valves during refueling outage is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

12.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

13.0 DRAFT RELIEF REQUEST VR-15D

VR-15D requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for 1(2)SI8841A,B, RH hot leg injection check valves, and (2)SI8949A,C, SI/RH hot leg injection check valves.

13.1 Alternate Tests

These check valves will be exercised open and closed during each refueling outage. The closure test will be done in conjunction with the leak test.

13.2 Licensee's Basis for Relief

The safety function of the 1(2)SI8841A,B check valves in the open direction is to permit flow of coolant from the RHR Pumps to the reactor vessel hot legs during the hot leg recirculation phase of a safety injection. The safety function of these valves in the closed direction is to maintain the RCS pressure boundary (PIV).

The safety function of the 1(2)SI8949A,C check valves in the open direction is to permit flow of makeup water upon a safety injection from: (1) the SI pumps during the HPSI phase, or (2) the RHR pumps during the hot leg recirculation phase, to the reactor vessel hot legs. The closed safety function of these valves is to maintain the RCS pressure boundary.

The full-stroke exercising of check valves 1(2)SI8841A,B and 1(2)SI8949A,C associated with the ECCS and the RHR system cannot be accomplished during normal reactor operation because the low head developed by the RHR pumps (less than 250 psi) is not enough to inject water into the RCS (2235 psi).

In addition, the SI Pumps cannot be used to full stroke the 1(2)SI8949A,C check valves at power because of (1) the high thermal stresses imposed on the reactor vessel nozzles, (2) the margin of safety is reduced for brittle fracture prevention, and (3) an unacceptable reactivity excursion would be created (high boron concentration and low temperature water).

Exercising these check valves in cold shutdowns is not practical, full or partial, because they are required by TS to be leak tested if there has been flow through them. This leak rate testing will cause a delay in returning the plant to power. Flow testing and the resultant leak rate testing would cause unnecessary radiation exposure to test personnel.

Based on the guidance provided in question 24 of the "Public Meeting Notes on Generic Letter 89-04:" "Check valves possessing safety functions in both the open and closed direction should be stroked to the open position and then tested in the closed position. For the 1(2)SI8841A,B and 1(2)SI8949A,C valves, it is best to perform the backflow test, which in this case is accomplished in conjunction with the leakage test, on the same frequency as the full-flow test, thus testing them to their open position and then to their closed position.

13.3 Evaluation

The check valves 1(2)SI8841A,B and 1(2)SI8949A,C are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions. In place of Code required frequencies for stroke testing, the licensee proposes to full-stroke exercise open and closed during refueling outages.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related req uirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

The check valves 1(2)SI8841A,B and 1(2)SI8949A,C cannot be full-stroked exercised open with flow quarterly because the shutoff head of the SI pump or the RH pump is below RCS operating pressure and flow cannot be established. In addition, injecting borated water could result in reactivity additions and power fluctuations. The opening of valves 1(2)SI8841A,B and 1(2)SI8949A,C to perform exercise testing would cause leak rate testing to be performed per TS. It would be burdensome and impractical to full- or part-stroke exercise these valves during each cold shutdown because the resultant leak rate testing would cause additional radiation exposure to workers connecting and disconnecting the leak testing equipment and could delay the return to power operations. These valves are designated as PIVs; therefore, the closure capability is verified at the frequencies specified in the TS for PIV leak testing. The licensee's proposal to full-stroke exercise the valves during refueling outage is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

13.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

14.0 RELIEF REQUEST VR-19

VR-19 requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for the closure verification of 1(2)AF001A and B, the auxiliary feedwater (AFW) pump suction check valves.

14.1 ALTERNATE TESTS

The licensee proposes to verify closure of these valves using acoustic techniques every refueling outage.

14.2 Licensee's Basis for Relief

The 1(2)AF001A and B valves are the suction check valves to the AFW pumps from the condensate storage tanks; they function to prevent backflow of essential service water if that suction source is required. It is undesirable to full-stroke open these valves quarterly because of the transients placed on the feedwater system and the thermal stresses imposed on the steam generators (SG) nozzles.

With respect to acoustically testing these valves to prove closure, versus disassembly, the operating surveillance procedure used for the AFW check valve cold shutdown full-stroke test is written to test a single train of AFW at a time. With an AFW pump running on mini-flow recirculation, flow is initiated to each SG on a gradual basis, while simultaneously reducing feedwater flow. As soon as the required flow data is obtained, AFW flow is gradually reduced, while simultaneously increasing feedwater flow, to minimize feedwater flow perturbations to the SGs. Because of this gradual change in flow, the open and close acoustical impacts cannot be observed from that of the flow noise.

However, the acoustic data taken during the 18-month dual pump injection test has provided sufficient data to determine valve disk closure. This test is scheduled during the shutdown process, preceding reactor refueling, because of the large transient placed on feedwater flow and the thermal stresses imposed on the SGs.

The application of Reliability Centered Maintenance to the AFW system has both concluded and recommended that performing acoustic monitoring on a three-year frequency is sufficient to detect if the check valves fail to close. The failure analysis process required that the functional failures identified be evaluated using the failure modes and effects analysis (FMEA). The FMEA provides a format for identifying the dominant failure modes of component failures leading to a functional failure and the impact of each component failure locally at the component, on the system, and on the plant.

Additionally, the closure capability of these valves cannot be verified adequately by performing a back pressure test because of the multiple boundary isolation points. The system configuration makes it impossible to assign any observed leakage to any individual valve or component using standard mass make-up or pressure decay techniques.

Performing a pressure test to verify closure is impractical because of the system configuration. To perform this test it would be necessary to attach a pump or some other type of pressure source to a test connection and pressurize the line containing the valve. However, this line also contains many potential leakage paths (valves, pump seals, and instruments). It is not possible to assign a leakage value to any specific path using available methods of seat leakage testing.

Maintenance history and previous inspections of these valves at both Byron and Braidwood Stations has shown no evidence of degradation or physical impairments. Industry experience, as documented in NPRDS, has shown no history of problems with these valves. A company wide check valve evaluation addressing the "EPRI Application Guidelines for Check Valves in Nuclear Power Plants" revealed that the location, orientation and application of these valves are not conducive to the type of wear or degradation correlated with SOER 86-03 type problems.

Acoustic testing provides ample information relative to valve condition, without physically taking the valve apart for visual inspection to prove valve closure. These valves are of the same design (manufacturer, size, model, and materials of construction) and have the same service conditions, including orientation. Upon abnormal or questionable acoustic test results, the valve will be scheduled for disassembly and internal visual inspection. The results of this inspection will be used to further evaluate the standby train valve as well, for possible action. This type of alternate testing provides more than adequate assurance of both valve functional and operational requirements.

14.3 Evaluation

The check valves, 1(2)AF001A and B, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions. The licensee proposes to verify closure of these valves using acoustic techniques every refueling outage instead of the Code required frequencies for stroke testing.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the IST plan.

Exercising these valves quarterly during power operations is not practicable because it would require removing the AFW system from service, connecting a pump or pressure source to a test connection and pressurizing the line containing the valve. Since this line contains many leakage paths, determining the amount of leakage through a particular path would be extremely difficult. This method is impractical during cold shutdowns for the same reasons. Using acoustic techniques to verify closure during cold shutdowns is also not practical because establishing the necessary test conditions, AFW flow into the SGs, could cause thermal stresses on the SG nozzles which could lead to premature failure. Further, setting up, running the test, and restoring the system to operation is time consuming and could result in a delay in returning the plant to operation. The licensee's proposal to full-stroke exercise the valves during refueling outage using acoustics is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

14.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

15.0 RELIEF REQUEST VR-23

VR-23 requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for 1(2)RY8046 and 1(2)RY8047, the check valves in the primary water (PW) makeup line and the nitrogen line to the pressure relief tank (PRT).

15.1 Alternate Tests

The 1(2)RY8046 valves will be backflow tested at cold shutdowns provided the RCPs are not in operation. RCPs will not necessarily be secured for the sole purpose of performing this test. The testing period will be each refueling outage as a minimum, but no more frequently than once per quarter. The backflow test will be performed in conjunction with their leakage test.

The 1(2)RY8047 valves will be backflow tested each refueling outage. The backflow test will be performed in conjunction with their leakage test.

15.2 Licensee's Basis For Relief

Relief is requested from the 3 month test frequency for the backflow test as stated in ASME Section XI IWV-3521: "Check Valves shall be exercised at least once very three months, except as provided by IWV-3522." IWV-3522 states that valves that cannot be exercised during plant operation shall be specifically

identified by the owner and shall be full-stroke exercised during cold shutdown.

1(2)RY8046 are located on the PW supply line to the PRT and RCP standpipes. Their safety function in the closed direction is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions. Their function in the open direction is to provide PW to the PRT and RCP standpipes. Testing these valves to the closed position while the RCPs are in operation could result in a loss of seal flow to the pump and eventual pump damage and/or trip. Shutting down the RCPs and the subsequent restarting incurs a reactor vessel overpressurization risk. In addition, it is operationally undesirable because of the time and manpower involved in starting an RCP. Also, an operator is required to observe the RCP shaft rotation upon starting. Stopping an starting RCP's would add unnecessary radiation exposure (approximately 20 mRem).

1(2)RY8047 are located on the nitrogen supply line to the PRT. Their safety function in the closed direction is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions. Testing these valves to the closed position could cause the loss of the Nitrogen blanket maintained in the PRT to prevent the creation of an explosive atmosphere. The frequency specified in Section 16.1, above, will avoid placing the plant in the unsafe condition which would result from removing the protective Nitrogen blanket from the PRT. Removal of this blanket could result in the creation of an explosive mixture of Hydrogen and Oxygen.

15.3 Evaluation

The check valves, 1(2)RY8046 and 1(2)RY8047, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions. In lieu of Code required frequencies for stroke testing, the licensee proposes to (1) verify closure of 1(2)RY8046 and 1(2)RY8047 during seat leakage test at refueling outages and (2) verify closure of 1(2)RY8046 during cold shutdowns when the RCPs are not in operation.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the IST plan.

Exercising these valves quarterly during power operations would require a containment entry and setup and testing in areas with high radiation levels and other personnel safety hazards. Verifying closure of the subject valves during cold shutdowns is impractical because this testing requires containment entry and performance of time consuming and complex procedures. The licensee demonstrated that exercising these valves during power operations or every cold shutdowns would not be practical because such testing would compromise RCS pressure protection and control and safe operation of PRT and RCP. Exercising 1(2)RY8046 to the closed position while the RCPs are in operation could result in a loss of seal flow to the pump and eventual pump damage and/or trip. Testing 1(2)RY8047 to the closed position could cause the loss of the Nitrogen blanket maintained in the PRT to prevent the creation of an explosive atmosphere. The licensee's proposal is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

15.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d), of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

16.0 RELIEF REQUEST VR-24

VR-24 requests relief from the test frequency requirements of Section XI, ¶ IWV-3521, for the closure verification of 1(2)W0007A and B, the check valves in the supply lines to the reactor containment fan cooler (RCFC) chilled water coils.

16.1 Alternate Tests

These valves will be backflow tested each refueling outage. The backflow test will be performed in conjunction with their leakage test.

16.2 Licensee's Basis For Relief

Relief is requested from the three-month test frequency for the backflow test as stated in ASME Section XI IWV-3521: "Check Valves shall be exercised at least once very three months, except as provided by IWV-3522." IWV-3522 states that valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full-stroke exercised during cold shutdowns.

These valves are located inside containment on the chilled water supply lines to RCFC chilled water coils. Their safety function in the closed direction is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions.

The alternate frequency of every refueling outage will adequately maintain the system in a state of operational readiness, by testing these valves as often as is practical. Backflow testing of these valves during operation or at cold shutdown would involve removing this system from service for approximately three (3) days per valve to complete. This includes approximately two (2) days to drain approximately 3000 gallons of chilled water from the RCFC coils and approximately one (1) day to fill and vent the isolated portions of the piping. Therefore, the time required for test execution and preparation and the processing of such a large quantity of water make it impractical to perform this test on anything other than a refueling frequency.

16.3 Evaluation

The check valves, 1(2)WO007A and B, are required by the Code to be stroke tested quarterly or, if impractical, during cold shutdowns. This testing is an assessment of valves' operational readiness and demonstrates that the obturators are capable of moving to their safety function positions. Instead of the Code required frequencies for stroke testing, the licensee proposes to verify closure of these valves during leakage test at refueling outages.

In rulemaking to 10 CFR 50.55a effective September 8, 1992, (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, full-stroke exercising is to be performed during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan.

Exercising these valves quarterly during power operations is not practical because it would require a containment entry and setup and testing in areas with high radiation levels and other personnel safety hazards. Verifying closure of the subject valves during cold shutdowns is impractical because this testing requires containment entry and performance of time consuming and complex procedures involving draining 3,000 gallons of chilled water, and could delay returning the plant to power. The licensee's proposal to full-stroke exercise the valves during refueling outage is consistent with OMa-1989 Part 10, Paragraph 4.3.2, which allows full-stroke exercising that is not practicable during power operation or cold shutdown to be deferred to refueling outages. This relief request also documents the justification for deferral of stroke testing in accordance with OM-10, Paragraph 6.2(d).

16.4 Conclusion

The proposed alternative is approved pursuant to Section 50.55a ¶ (f)(4)(iv) provided that all related requirements, including Paragraphs 4.3.2 and 6.2(d),

of OM-10 are met. Implementation of related requirements is subject to NRC inspection.

17.0 RELIEF REQUEST VR-25

VR-25 requests relief from the stroke testing requirements of Section XI, ¶ IWV-3522, for 1(2)CS011A and B, the check valves on the discharge of the eductors in the containment spray additive system. The licensee proposes to follow the sample disassembly and inspection program of GL 89-04, Position 2. VR-25 is therefore approved per GL 89-04, Position 2.

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Date: October 24, 1994