ATTACHMENT 2

TECHNICAL EVALUATION REPORT

Arkansas Nuclear One
Unit 1
Entergy Operations, Inc.
Third Ten-Year Interval Pump and Valve Inservice Testing Program

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ABSTRACT

This report presents the results of Brookhaven National Laboratory's evaluation of the relief requests, cold shutdown and refueling outage justifications and, for selected systems, a review of the scope of ANO Unit 1's ASME Section XI Pump and Valve Inservice Testing Program.

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1.0 INTRODUCTION

Contained herein is a technical evaluation of American Society of Mechanical Engineers (ASME) Section XI pump and valve inservice testing (IST) program relief requests and deferral justifications submitted by Entergy Operations, Inc. for its Arkansas Nuclear One (ANO), Unit 1. Additionally, this technical evaluation report contains, for selected systems, a review of the scope of ANO Unit 1's ASME Section XI Pump and Valve Inservice Testing Program. ANO Unit 1 is a Babcock and Wilcox Pressurized Water Reactor (PWR) that began commercial operation in December 1974.

Entergy submitted the Third Ten-Year Interval Inservice Testing Program on December 1, 1997 (Ref. 1). The licensee states that this program is based on the requirements of the 1989 Edition of the ASME Section XI Code. This program revision supersedes all previous submittals. The licensee states that the third ten year interval extends from December 2, 1997 to December 19, 2007. Based on the date of commercial operation, the third ten-year interval should extend from December 1994 to December 2004. However, Entergy requested an extension of the second ten year interval program in a letter dated April 14, 1994 (Ref. 2). The NRC staff authorized an extension to December 1, 1996 in a safety evaluation dated August 2, 1994 (Ref. 3), provided that a decrease in the subsequent interval be made to adjust for the period beyond the one year allowed by the Code (Section XI, ¶IWA-2430(c)). Entergy then submitted a request July 12, 1996 (Ref. 4) to allow one year beyond the beginning of the third ten year interval to complete the update (i.e., December 1, 1997). The NRC authorized the one year delay to complete and implement the updated program in a Safety Evaluation dated August 27, 1996 (Ref. 5). No additional extension of the interval end date was authorized. Based on these two safety evaluations, ANO-1's third ten year interval should extend from December 2, 1997 to December 1, 2005. Additionally, in accordance with Section XI, IWA-2430(c) which states that "adjustments shall not cause successive intervals to be altered by more than 1 year from the original pattern of intervals," no additional extensions are allowed. The fourth ten year interval must start December 2, 2005 or earlier. Any delay in this start date must be authorized by the NRC.

Title 10 of the Code of Federal Regulations, §50.55a ¶(f) (Ref. 6) requires that inservice testing of 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 (Ref. 7) and applicable addenda, except where specific relief has been requested by the licensee and granted by the Commission pursuant to §50.55a ¶(f)(6)(i), or where an alternate has been requested and authorized pursuant to §50.55a ¶(a)(3)(i) or (a)(3)(ii). Section 50.55a ¶(f)(4)(iv) provides that inservice testing of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in paragraph (b) of §50.55a, subject to the limitations and modifications listed, and subject to Commission approval. In rulemaking to 10CFR50.55a, effective September 8, 1992 (see Federal Register, Vol. 57, No. 152, page 34666), the 1989 Edition of ASME Section XI was incorporated into paragraph (b) of § 50.55a. The 1989 Edition provides that the rules for inservice testing of pumps and valves are as specified in ASME/ANSI OMa-1988 Part 6 and 10, and OM-1987 Part 1 (Refs. 8-10).

The review of the IST Program was performed utilizing the Standard Review Plan, Section 3.9.6; Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," the Minutes of the Public Meeting on Generic Letter 89-04, and Supplement to the Minutes; NUREG-1482; NUREG/CR-6396; and the recently published summary of the public workshops held in January and February 1997 on IST (References 11-17). The IST Program requirements apply only to component (i.e., pump and valve) testing, and are not intended to provide a basis to change the licensee's current Technical Specifications for system test requirements.

Section 2 of this report presents the two pump relief requests and Brookhaven National Laboratory's (BNL) evaluation. Similar information is presented in Section 3 for the ten relief requests for the valve testing program. Section 4 and Appendix A contain the evaluation of Entergy's justifications to defer valve testing to cold shutdowns or refueling outages. Results of the IST scope review for selected systems is presented in Section 5. Section 6 summarizes the recommended actions for the licensee, resulting from the relief request and deferred testing justification evaluations, and the review of the IST Program scope for selected systems. BNL recommends that the licensee resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

2.0 PUMP IST PROGRAM RELIEF REQUESTS

In accordance with §50.55a, Entergy has submitted two relief requests for pumps at ANO Unit 1 which are subject to inservice testing under the requirements of ASME Section XI. The relief requests have been reviewed to verify their technical basis and determine their acceptability. The relief requests, along with the technical evaluation by BNL, are summarized below.

2.1 Relief Request 6, Service Water Pumps, P-4A, B, and C

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶ 5.2 which requires an inservice test to be conducted with the pump operating at specified test reference conditions.

Proposed Alternate Testing: The licensee has proposed to utilize pump curves for each pump.

Licensee's Basis for Relief: "The service water system provides a continuous supply of cooling water to the two safety-related (essential) service water headers as well as the non-essential header related to main turbine generator and other plant support auxiliaries. During normal plant operation at power, the heat removal demands of the service water system require the operation of at least two and frequently three pumps. After the system operation reaches a degree of stability, perturbation of flow to any of the on-line heat exchangers could have a severe adverse impact on plant operation with the potential for unacceptable flow and temperature transients. This situation precludes flow adjustments on specific heat loads and certainly throttling of pump or header isolation valves. As such, returning the system operating parameters to a prescribed unique reference value (either flow or differential pressure) is impractical and could result in an unreasonable and unwarranted risk to plant operation with little or no apparent gain in plant safety or reliability.

The prescribed alternate testing for these pumps meets or exceeds the requirements as set forth in NUREG-1482, Section 5.3.

Historical test data indicates that over the operating range of interest there is little or no variation in pump vibration characteristics (e.g., vibration levels are independent of flowrate over the allowed range of flows).

The alternate testing will provide adequate test information and assurance equivalent to that of the Code requirement needed to assess the operational readiness of the subject pumps and adequately detect significant pump degradation."

Evaluation: As discussed in NUREG-1482, Section 5.2, in cases where the establishment of a fixed set of reference values is impractical, the use of pump curves for reference values of flowrate and differential pressure is acceptable. In the case of these service water pumps, it would be impractical to throttle the system in order to achieve a fixed reference value, as the resistance is varied in response to the heat loads of the plant. Varying the flowrate presents the potential for loss of adequate flow and cooling to the heat exchangers, resulting in a plant transient or trip.

The licensee has provided the seven elements required to develop the pump curve, as discussed in NUREG-1482. The licensee has verified that vibration levels do not vary significantly over the range of pump flowrates and one reference value has been established for vibration. The acceptance criteria proposed by the licensee is equivalent to that specified in Part 6 Table 3b for vertical line shaft pumps, and the associated corrective action is in accordance with ¶6.1.

Due to the system design, compliance with the Code requirements is impractical. Compliance with the Code would require major system redesign, or given the current design plant, would result in a transient/trip. This would be burdensome considering that the alternate provides an adequate level of assurance of operational readiness of the subject pumps. Therefore, it is recommended that relief be granted in accordance with 10CFR50.55a(f)(6)(i).

2.2 Relief Request 7, High Pressure Injection Pumps, P-36A, B, and C

Relief Request: The licensee has requested relief from OM Part 6, ¶5.1 and 5.2 which requires the measurement of flowrate quarterly.

Proposed Alternate Testing: The pumps will be tested quarterly with flowrate to the RCS, differential pressure and vibration measured. However, a portion of the flowrate (i.e., through the mini-flow line) is unmeasured. During cold shutdowns, the mini-flow line will be isolated and the total flow, differential pressure and vibration will be measured.

Licensee's Basis for Relief: "During the quarterly pump test a portion of the high pressure injection flow is directed through a non-instrumented mini-flow path. If the mini-flow path was isolated during the quarterly pump test and the normal injection path was inadvertently isolated then the potential exists to damage the pump."

Evaluation: During quarterly pump testing, flow is routed through the mini-flow line and the normal injection line. There is no instrumentation on the mini-flow line. The Code requires the total flow through the pump to be measured. During cold shutdowns the licensee states that total pump flow is directed through instrumented flow paths (i.e., the mini-flow line is isolated). It is impractical to comply with the code requirements quarterly based on the potential for pump damage with the mini-flow line isolated and an inadvertent isolation of the normal flow path. Compliance with the Code would require the installation of flow instrumentation which would be burdensome on the licensee considering that the NRC has determined that an increased interval is an acceptable alternate in cases where flow can only be established through an uninstrumented path during quarterly pump testing (Generic Letter 89-04, Position 9). The licensee's proposed alternate complies with the provisions in Position 9. Therefore, it is recommended that relief be granted in accordance with 10CFR50.55a(f)(6)(i).

3.0 VALVE IST PROGRAM RELIEF REQUESTS

In accordance with §50.55a, Entergy has submitted ten valve relief requests for specific and generic valves at ANO Unit 1 that are subject to inservice testing under the requirements of ASME Section XI. These relief requests have been reviewed to verify their technical basis and determine their acceptability. The relief requests are summarized below, along with the technical evaluation by BNL.

3.1 Safety and Relief Valves

3.1.1 Relief Request 8, Set Pressure Measurement Accuracy, BWST and Sodium Hydroxide Storage Tanks' Relief Valves, PSV-1412 and 1617

Relief Request: The licensee requests relief from OM-1987, Part 1, ¶1.4.1.2 which requires the set pressure test equipment and readability accuracy to have "an overall combined accuracy within +2% to -1% at the pressure of interest. The measured set pressure must comply with the tolerance limits...(i.e., +3% of stamped set pressure or set pressure acceptance criteria)....The effect of the overall combined accuracy specified above is that the limits of the actual set pressure may be 1% above to 2% below the indicated (measured) set pressure."

Proposed Alternate Testing: The licensee has proposed establishing the "target setpoint" and instrument accuracy such that the overall combined accuracy specified in the procedure will limit the actual set pressure to 2% above the stamped set pressure.

Licensee's Basis for Relief: "Characteristically, vacuum breakers are set to relieve at very low differential pressures. In these cases the set pressure are:

PSV-1412- 0.127 in. Hg (0.062 psig)
PSV-1617- 0.382 in. Hg (0.187 psig)

In order to meet the Code accuracy requirements for testing these valves, the maximum allowable deviation from setpoint would be 0.0006 psig and 0.00187 psig, respectively. Pressure measurement instrumentation providing this level of accuracy and resolution is not typically maintained in a power plant facility."

Evaluation: The Code, OM-1987, Part 1, ¶1.4.1.2 requires the set pressure test equipment and readability accuracy to have "an overall combined accuracy within +2% to -1% at the pressure of interest. The measured set pressure must comply with the tolerance limits specified in the appropriate acceptance criteria sections: paras. 1.3.3.1(d), 1.3.4.1(d), 4.1.1.9, 4.1.2.9, 4.1.3.8, 8.1.1.9, 8.1.2.9, and 8.1.3.8. The effect of the overall combined accuracy specified above is that the limits of the actual set pressure may be 1% above to 2% below the indicated (measured) set pressure." Paragraphs 1.3.3.1(d) and 1.3.4.1(d) address acceptance criteria and require an evaluation of the cause and the need for additional tests if the valves fail to meet the acceptance criteria. If the valves exceed the stamped set pressure by 3% or greater, additional valves are required to be tested. Paragraphs 4.1.1.9, 4.1.2.9, 4.1.3.8, 8.1.1.9, 8.1.2.9, and 8.1.3.8 address the number of tests, and not tolerance limits. The purpose of the reference to these paragraphs in ¶ 1.4.1.2 is unclear.

The code committees recognized that there were significant problems with the implementation of Appendix I. The OM Code, Appendix I was significantly revised in the OMc-1994 Addenda and now states that the overall combined accuracy is not to exceed +/-1% of the indicated (measured) set-pressure (¶I 1.4). It should also be noted that the 1994 Addenda also revised the requirements for testing additional valves, and now requires in ¶ I 1.3.5(c)(1) additional tests to be performed if the valve exceeds the greater of either the owner established set-pressure acceptance criteria or +/-3% of valve nameplate set-pressure. "The Owner, based upon system and valve design basics or technical specification, shall establish and document acceptance criteria" per ¶ I 1.3.1(e). The cause shall be evaluated (per ¶ I 1.3.5(c)(3)) to determine the need for testing in addition to the minimum tests specified in ¶ I 1.3.5(c)(1). NUREG-1482, Section 4.3.9, allows the use of the clarifications provided in the 1994 Addenda regarding the requirements for testing additional valves.

However, it is not clear in either the 1987 or later Codes whether the test acceptance criteria must be adjusted to account for instrument inaccuracies. The ASME was requested to provide an interpretation of the intent of the Code and responded as follows (ASME Reference OMI# 98-01, to be included in OMa-1999 Code):

> **Inquiry:** Is it the intent of OM-1987, Part 1, ¶1.4.1.2 or OM-1996, Appendix I ¶1.4, that the test acceptance criteria must be determined by adjusting the code specified tolerance limits (e.g., +3% of stamped setpoint (for 1987), +/-3% (for 1996)) to account for instrument inaccuracies?
>
> **Reply:** No.

The licensee has not provided in the basis for relief a discussion of the set pressure acceptance criteria for these valves. Provided that the licensee does not have an owner-established acceptance criteria, based on system and valve design basics (basis) or technical specifications, more stringent than +/- 2% of stamped set pressure and given the ASME's interpretation that instrument accuracy is considered separately from the valve acceptance criteria, the licensee's proposal to establish the "target setpoint" and instrument accuracy such that the overall combined accuracy specified in the procedure will limit the actual set pressure to 2% above the stamped set pressure will provide a level of quality and safety greater than that required by the Code (1989 Section XI). With no owner-established acceptance criteria, the Code would require a licensee to use +3% as the criteria to determine the need for testing additional valves. Therefore, it is recommended that the alternate be authorized in accordance with 10CFR50.55a(a)(3)(i), provided that there are no owner-established acceptance criteria for these valves, based on system and valve design basics (basis) or technical specifications, more stringent than +/- 2% of stamped set pressure.

3.1.2 Relief Request 9, Seat Tightness Testing, BWST and Sodium Hydroxide Storage Tanks' Relief Valves, PSV-1412 and 1617

Relief Request: The licensee requests relief from the requirements of the OM-1987, Part 1, ¶8.2 which requires valves to be seat tightness tested in accordance with the Owner's test procedure.

Proposed Alternate Testing: The licensee has proposed not to perform the seat tightness test.

Licensee's Basis for Relief: "These vacuum breaker valves have no significant safety function in the closed position. Furthermore, seat leakage is irrelevant since, in effect, the valves are normally bypassed by a line with either a normally-open valve or no closure device whatsoever."

Evaluation: The Code, Part 1, ¶7.3 requires for Class 2 and 3 relief valves, a seat tightness determination, and following the set pressure determination, a determination of compliance with the Owner's seat tightness criteria. For Class 2 and 3 vacuum valves, the Code requires determination of compliance with the Owner's seat tightness criteria. Paragraph 8.2 provides requirements for the seat tightness test methods.

As discussed by the licensee, these valves open to relieve pressure in the BWST and sodium hydroxide storage tanks (PSV-1412 and 1617, respectively). These valves however, based on the installation of open bypass lines, have no seat tightness acceptance criteria. Therefore, the performance of the seat tightness determination in accordance with the Code would represent a hardship without a compensating increase in the level of quality and safety. It is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(ii).

3.1.3 Relief Request 10, Test Accumulators

Relief Request: The licensee requests generic relief from the requirements of the OM-1987, Part 1, ¶8.1.2.2 which requires that a minimum accumulator volume be used for set pressure testing various safety and relief valves used for compressible fluid service, other than steam, and specifies the formula to calculate this minimum volume.

Proposed Alternate Testing: The licensee has proposed to use the requirements in the 1990 Edition of the OM Code, including the 1994 Addenda, which requires the volume of the accumulator drum and the pressure source flow rate be sufficient to determine the valve set pressure.

Licensee's Basis for Relief: "The accumulator volume requirement is not required for simple determination of the valve set pressure. This was recognized by the Code working group and committees and is corrected in more recent versions of the OM Code. (Ref. ASME OM Code-1990, OMc-1994 Addenda, Paragraph I 8.1.2, and OMa Code 1996, Paragraph 8.1.2(b).)"

Evaluation: The licensee states that this request applies to all safety and relief valves used for compressible and non-fluid services other than steam. Paragraph 8.1.2.2 only applies to safety and relief valves used for compressible fluid service, other than steam. It is unclear what valves are used for "non-fluid services." The licensee should revise the request accordingly.

OM-1987, Part 1, ¶8.1.2.2 requires the set point test accumulator have a minimum volume equal to the valve capacity (cubic feet/second) multiplied by the time open (seconds), divided by 10. Unlike ASME Section III, Part 1 and the OM Code do not require the verification of valve capacity, only the set pressure. Based on a request, the OM Part 1 Code Committee reviewed the requirements of ¶8.1.2.2 and its basis. The Code Committee considered the requirements to be overly conservative and unnecessarily prescriptive. The Code was revised in the 1994 Addenda (OMc) to delete the prescriptive requirements and to require that the volume and the pressure source flow rate be sufficient to determine the valve set-pressure. Compliance with the Part 1 requirements would require a calculation for each valve and possibly requiring resizing the accumulator drum. The use of the OM Code, OMc-1994, ¶I8.1.2(b) provides an acceptable means of performing set pressure tests. Therefore, it is recommended that the licensee's alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

3.1.4 Relief Request 11, Thermal Equilibrium

Relief Request: The licensee requests generic relief from the requirements of the OM-1987, Part 1, ¶8.1.2.4 and 8.1.3.4 for all safety and relief valves tested under ambient conditions using a test medium at ambient conditions. These paragraphs require that the test method be such that the temperature of the valve body be known and stabilized before commencing set pressure testing, with no change in measured temperature of more than 10 degree-F in 30 minutes.

Proposed Alternate Testing: The licensee has proposed not to perform verification of thermal equilibrium for valves that are tested at ambient temperature (<150 deg.-F) using a test medium at or near the prevailing ambient temperature. The test temperature will be recorded prior to each test.

Licensee's Basis for Relief: "For testing under normal prevailing ambient conditions with the test medium at approximately the same temperature, the requirement for verifying temperature stability is inappropriate and a waste of time and resources. Based on discussions with valve vendors, there is no significant effect on valve setpoint at pressure below 150 deg.-F. Thus, there is little or no consequence of any minor changes in ambient temperature.

This has been identified by the OM-1 Code Working Group and the ASME Code Committees and is reflected in the latest version of the Code (ASME OM Code-1996) Paragraphs I 4.1.2(d) and I 4.1.3(d). In addition, for liquid service valves, this is consistent with the NRC recommendation in NUREG-1482, Paragraph 4.3.9(6)."

Evaluation: As discussed in NUREG-1482, Section 4.3.9, the clarification provided in the 1994 Addenda to the 1990 OM Code (or 1995 Edition) concerning the requirement for thermal equilibrium for valves tested at ambient temperature using a test medium at ambient temperature, may be used without NRC approval; relief is not required. The licensee should, however, continue to reference the use of this position (i.e., NUREG-1482, Section 4.3.9) in the IST Program.

The licensee has defined ambient temperature as less than 150 deg.-F. Part 1 defines ambient temperature in ¶1.2 as "the temperature of the environment surrounding a pressure relief device at its installed plant location during the phase of plant operation for which the device is required for overpressure protection." There may be cases, e.g., valves in service water buildings during winter, where the valve's ambient temperature may be significantly lower than 150 deg.-F. As discussed in Ref. 17, Question 2.4.6, a correlation is required if the test temperature is other than that for which it is designed. The Code does not provide a tolerance. Reference 17, states that "The limited data received from valve manufacturers to date does not indicate a limit or tolerance. Therefore, at this time it is left to the engineering judgement of licensees, subject to NRC inspector review." The licensee should employ the Code definition of ambient temperature, or develop additional information supporting the use of 150 deg.-F for the specific valve applications, which would be subject to NRC inspector review. The licensee is also referred to TER Section 3.1.5, on the use of alternate media.

3.1.5 Relief Request 12, Alternate Ambient Temperature

Relief Request: The licensee requests relief from the requirements of the OM-1987, Part 1, ¶8.1.2.5 and 8.1.3.5 for all safety and relief valves tested under ambient conditions using a test medium at ambient conditions. These paragraphs require safety and relief valves in compressible service, other than steam, and liquid service, to be tested with the ambient temperature of the operating environment simulated during the test. Alternate ambient temperatures may be used provided the requirements of ¶8.3 are met.

Proposed Alternate Testing: The licensee has proposed to test these valves at test ambient temperatures. The cold differential test pressure provided by the manufacturer or cognizant engineer will be used without a temperature correlation as required by ¶8.3.

Licensee's Basis for Relief: "At the time the ANO-1 plant systems were designed, valve specifications were determined by the cognizant design engineer who then established the respective technical purchasing specification for each valve. Typically this includes a "cold differential test pressure" that is documented for each valve. Inherent in this effort is the correlation performed by the engineer or the valve manufacturer. Thus, adjustment of the set pressure during the periodic testing could result in compensating twice for the temperature difference."

Evaluation: The licensee has requested generic relief for 20 valves that are "tested under ambient conditions using a test medium at ambient conditions." OM Part 1, ¶8.1.2.1 and 8.1.3.1 require valves to be tested with their normal system operating fluid and temperature for which they are designed. Alternate media may be used, provided the requirements of ¶8.3 are met. Additionally, Part 1, ¶8.1.2.5 and 8.1.3.5, require the ambient temperature of the operating environment surrounding the valve at its installed plant location during the phase of plant operation for which the device is required for overpressure protection be simulated during the set pressure test. Alternate ambient temperatures may be used, but the requirements of ¶8.3.2 and 8.3.3 must be met. Part 1, ¶8.3 requires the establishment of a correlation and certification of the correlation procedure. The certification requires actual test data. It would appear that the licensee is requesting relief from ¶8.1.2.1 and 8.1.3.1, as well as ¶8.1.2.5 and 8.1.3.5 identified in the request.

This issue has been the subject of a recent Code interpretation that will be published with the 1998 OM Code Addenda (reference OMI #94-10). The Code Committee determined that the requirements of ANSI/ASME OM Part 1 paragraph 4.3 (or 8.3), Alternate Test Media, are not met if the cold differential test pressure, as marked on the nameplate provided by the manufacturer, is used as an alternate test pressure, as permitted by paragraphs 4.1 (or 8.1) and no other qualification exists. Additionally, the Committee clarified that the requirements of ANSI/ASME OM Part 1 paragraph 4.3 (or 8.3), Alternate Test Media, are met if the documentation required by paragraph 4.3.2 (8.3.2) and the written procedure required by paragraph 4.3.3 (8.3.3) are prepared by the valve manufacturer and accepted/certified by the Owner.

The licensee's basis for requesting relief is that inherent in the design engineer's or manufacturer's establishment of the cold differential test pressure is the correlation. However, without certification and documentation of the correlation procedure including specific requirements for instrumentation, assist equipment (if any), test operating conditions, test parameters and a description of the test setup, and the tests required to support the correlation; the correlation previously performed may not be valid. Additionally, the licensee states that "adjustment of the set pressure during the periodic testing could result in compensating twice for the temperature difference." The design set pressure would be adjusted and not the cold differential test pressure, therefore, it is not apparent how the set pressure would be compensated twice.

The NRC has provided some guidance on this issue in their minutes to the 1997 IST workshops (Ref. 17). As discussed in the reply to Question 2.4.7, if the licensee does not have a correlation performed in accordance with the Code, the licensee should contact the valve vendor to determine if a correlation is available. Alternatively, the licensee should develop the correlation or evaluate sending valves to a test lab in order to comply with the Code. If the licensee has determined that testing in accordance with the Code is impracticable, the licensee should revise the relief request to include for each valve, as a minimum, a discussion of the safety significance of the valve, the test and design process and ambient temperatures, discussions with the valve vendor, and why the valve cannot be bench tested at design conditions or why a correlation cannot be developed by the licensee. Generic relief from these requirements would not be appropriate.

The ASME OM Part 1 Working Group has also evaluated establishing a lower limit for which correlations would not be necessary or establishing a rule of thumb. However, they could not validate the commonly held assumption that safety valve setpoints vary inversely with the temperature of the valve, based on input from at least one valve manufacturer, nor determine a minimum temperature for which correlations were not necessary on a generic basis.

In conclusion, relief cannot be recommended. The licensee should comply with the Code requirements or resubmit the request providing the specific information discussed above for each valve.

3.2 Relief from Code Leak Test Requirements

3.2.1 Relief Request 1, LPI PIVs, DH-13A and B, 17, and 18

Relief Request: The licensee requests relief from the requirements of OMa-1988, Part 10, ¶4.2.2.3(c)(1), which the licensee states requires valves to be tested in a manner to determine the amount of individual leakage through each valve.

Proposed Alternate Testing: The licensee has proposed to measure parallel valve leakage and apply the Technical Specification acceptance criteria for the valve combination. If a valve pair leakage rate exceeds the acceptance criteria, then both valves will be declared inoperable and will not be returned to service until the condition is corrected.

Licensee's Basis for Relief: "Valves DH-13A and DH-17 are arranged in a parallel configuration in that one valve is located in each of the two lines which originate as a single line from one pump. No isolation capability is available for separation upstream of the two valves prior to the line split. DH-13B and DH-18 are arranged identically. Therefore, leakage rate measurements always reflect the combined leakage of two valves. Because the total leakage measured is applied to each valve, this methodology insures that the allowable pathway leakage per the Technical Specifications is not exceeded and that the valves are capable of fulfilling their safety function of maintaining reactor coolant system integrity."

Evaluation: Generic Letter 89-04, Position 4 discusses testing of pressure isolation valves. In this position, the NRC states that licensees should review their testing procedures to ensure that Event V PIVs are individually tested, i.e., not tested in series. Event V PIVs are defined as two check valves in series at a low pressure/RCS interface whose failure may result in a LOCA that bypasses containment. The ANO-1 Technical Specifications, 3.1.6.9, address these Event V PIVs in the low pressure injection lines, and specify individual leakage rates for the inboard PIVs (DH-14A and B) and the two downstream valve groups (DH-13A and 17, and 13B and 18), such that the valves are not tested in series.

The licensee has requested relief from Part 10, ¶4.2.2.3(c), citing that it requires valves to be tested in a manner to determine the amount of individual leakage through each valve. Section XI ¶IWV-3426 previously required licensees to assign permissible leakage rates for each valve. However, OMa-1988 Part 10 requirements for leak testing allow for testing valves in groups. Part 10, ¶ 4.2.2.3(c)(2) and (3) allow the determination of leakage by measuring the feed rate or pressure decay in the volume, "provided the total apparent leakage rate is charged to the valve or valve combination or gate valve seat being tested..." Paragraph 4.2.2.3(c)(1) allows the measurement of leakage "through a downstream test connection while maintaining test pressure on one side of the valve." Although this paragraph does not specifically address valve groups, considering the requirements in para. (e) and (f) to establish acceptance criteria with limits for a specific valve or a group of valves, and take corrective action if the individual or group leakage limit is exceeded, testing of valve groups is allowed by the Code. The licensee is referred to NUREG-1482, Section 4.4.3.

The licensee's proposal complies with the requirements of OM Part 10. Therefore, relief from the Code is not required in order to test these valve pairs. This request may be deleted. The IST test procedures would typically describe the test method discussed.

3.3 Relief from Code Exercise Frequency Requirements

3.3.1 Relief Request 2, Reactor Building Spray Pumps' Discharge Check Valves, BS-4A and B

Relief Request: The licensee requests relief from the requirements of OMa-1988, Part 10, ¶4.3.2.1, which requires check valves to be exercised nominally every three months, except as provided by ¶4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.4.

Proposed Alternate Testing: The licensee has proposed to perform disassembly and inspection on one of the two valves each refueling cycle.

Licensee's Basis for Relief: "These are check valves with no external means for exercising and no external position indication mechanism. Non-intrusive testing (open) of these valves is impractical during any mode of plant operation. Full-stroke exercising these valves to the open position would require operating each containment spray pump at nominal accident flowrate. Since no recirculation flowpath exists downstream of these valves, the only flowpath available for such a test would result in injecting borated water into the containment building via the spray nozzles.

At five year intervals, the building spray nozzles are tested with air to verify no blockage. The test consists of connecting a compressor to the building spray system, pumping the heated air through the spray headers, and using thermography to detect a temperature rise in the spray nozzles. It would be a hardship to perform this test at any other frequency due to the amount of coordination and difficulty in performing the test.

Each of these valves has been disassembled and inspected in the past and they have not displayed any indication of degradation that would impede their capability to perform their safety function to open. The alternate testing proposed below meets the intent of NRC Generic Letter 89-04, Position 2 for sample inspection programs."

Evaluation: These tilting disc check valves are located inside containment. It is impractical to full stroke exercise these valves with flow during any mode of operation because this test would require spraying borated water into the containment, resulting in extensive cleanup activities and possible equipment damage. The licensee states that partial stroke exercising using thermography is burdensome to perform other than once every five years. However, the test required to demonstrate partial-stroke exercising of the check valves would not require thermography, as is required to verify each nozzle is clear. Other licensees have proposed to test these valves with air at refueling outages (e.g., Turkey Point). Generic Letter 89-04, Position 2, if used, requires partial valve stroking quarterly or during cold shutdowns, or after reassembly, if possible. The licensee should evaluate the practicality of performing a partial-stoke exercise quarterly, at cold shutdowns and refueling, and after reassembly, using a less rigorous test than that required for the nozzles. This is commonly performed by other licensees. Provided the licensee complies with Generic Letter 89-04, Position 2 and performs partial-stroke exercising quarterly or at cold shutdowns and following reassembly, if possible, it is recommended that relief be granted in accordance with 10CFR50.55a(f)(6)(i). The licensee should revise the request to discuss partial-stroke exercising.

3.3.2 Relief Request 3, Main Steam To EFW Pump Turbine Steam Supply Header Check Valves, MS-271 and 272

Relief Request: The licensee requests relief from the requirements of OMa-1988, Part 10, ¶4.3.2.1, which requires check valves to be exercised nominally every three months, except as provided by ¶4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.4.

Proposed Alternate Testing: The licensee has proposed to full stroke exercise these valves open quarterly and to verify closure of both valves at least once during each refueling cycle using nonintrusive testing methods.

Licensee's Basis for Relief: "These are check valves with no external means for exercising and no external position indication mechanism. Reverse flow (closure) testing of these valves is impractical during power operation and under cold shutdown conditions. Non-intrusive techniques can be used during power operation to confirm valve closure, however concerns related to interpreting the test results and an unacceptable burden on the plant staff causes it to be impractical on a quarterly basis."

"These valves remain closed during normal plant power operation except for those periods when EFW Pump P-7A is being tested. The only means of verifying the closure of these valves while the plant is at power or under steaming conditions, other than by non-intrusive means, would be to establish a differential pressure between the two steam generators. If such a differential pressure were to be established, an associated imbalance in reactor cold leg temperatures as well as other undesirable plant conditions would be created.

During cold shutdown periods there is no steam pressure by which a differential pressure could be produced. Pressurizing with other sources (e.g., compressed air) is impractical due to the large volumes involved.

Although non-intrusive testing can be performed quarterly during pump testing to confirm check valve closure, the following issues provide justification for deferring non intrusive testing to once per refueling cycle.

a. Non-intrusive testing not only satisfies the requirements of the Code to demonstrate either full open or full closed (depending on the application), the health of the valve internals is also evaluated. This information can be used to predict future valve degradation and trending is also possible.

b. Quarterly testing using non-intrusive testing methods could provide indeterminate results caused by unrelated system dynamic conditions which could, in turn, result in unnecessary additional testing or disassembly or possibly an unnecessary plant shutdown.

c. Each of these valves has been disassembled several times with no unexpected service related deterioration identified during these inspections.

d. These valves only operate during pump testing, thus valve degradation due to wear factors is not likely.

e. These valves are full-stroke (open) exercised on a quarterly frequency.

f. As stated in NUREG-1482, Section 4.1.4 and the Summary of Public Workshops Held in NRC Regions on Inspection procedure 73759, "Inservice Testing of Pumps and Valves and Answers to Panel Questions on Inservice testing Issues, reference question 2.3.19, it is a burden to setup special test equipment on a quarterly basis to monitor the closed stroke of these valves."

Evaluation: OM Part 10, ¶ 4.3.2 requires check valves to be exercised to their safety position(s) quarterly, if practicable, otherwise at cold shutdowns. If this is also impracticable, testing may be deferred to refueling outages. These valves are full-stroke exercised open quarterly during the emergency feedwater pump test. There is no position indication to allow verification of the valves' return to the normally closed position. There are no test connections to allow leak testing to verify the closed position and the only method available is to use non-intrusive techniques. As discussed in NUREG-1482, Section 4.1.4 and in the response to comment 2.3.19 (Ref. 17), the need to set up test equipment is adequate justification to defer testing to a refueling outage frequency as allowed by the Code, based on the impracticality of testing quarterly or at cold shutdowns. The licensee is however, proposing to verify the closure of each valve using nonintrusive techniques during operation on a once per refueling cycle basis, i.e., testing during operation is practical. Requiring the performance of non-intrusive techniques on both valves quarterly would create a hardship, given the need to set up test equipment and maintain the system in a stable state so that the results are conclusive. Verifying closure of each valve once per refueling cycle using non-intrusive techniques provides reasonable assurance of the valves' operational readiness, considering the Code allows deferrals to once per refueling outage. Therefore, it is recommended that the alternate proposed be authorized in accordance with 10CFR50.55a(a)(3)(ii).

3.3.3 Relief Request 4, EFW Pump Suction from CST Check Valves, CS-293 and 294

Relief Request: The licensee requests relief from the requirements of OMa-1988, Part 10, ¶4.3.2.1, which requires check valves to be exercised nominally every three months, except as provided by ¶4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.4.

Proposed Alternate Testing: The licensee has proposed to partial stroke exercise these valves open quarterly and to full-stroke exercise them open at least once during each refueling cycle using nonintrusive testing methods.

Licensee's Basis for Relief: "These are check valves with no external means for exercising and no external position indication mechanism. The system configuration with these two valves in parallel with no isolation valves prevents testing them individually. During plant operation at power both emergency feedwater pumps cannot be operated due to limitations in the flowrate capability of the test/recirculation line. Under cold shutdown conditions only the motor-operated emergency feedwater pump can be operated since steam is unavailable for operating the steam-driven unit. It is therefore not practical to pump at a flowrate greater than twice that required for accident mitigation and, presumably, verify that both valves open to the extent to satisfy their safety function. In addition, it would be impossible to verify that flow would be balanced in the parallel lines. Consequently, the only available means of verifying full stroke open for these valves is with the application of non-intrusive testing methods.

These valves remain closed (idle) during normal plant power operation except for those periods when an emergency feedwater pump is being tested.

Although non-intrusive testing can be performed quarterly during pump testing to confirm the ability of the valves to open, the following issues provide justification for deferring non intrusive testing to once per refueling cycle.

a. Non-intrusive testing not only satisfies the requirements of the Code to demonstrate either full open or full closed (depending on the application), the health of the valve internals is also evaluated. This information can be used to predict future valve degradation and trending is also possible.

b. Quarterly testing using non-intrusive testing methods could provide indeterminate results caused by unrelated system dynamic conditions which could, in turn, result in unnecessary additional testing or disassembly or possibly an unnecessary plant shutdown.

c. Each of these valves has been disassembled several times with no unexpected service related deterioration identified during these inspections.

d. These valves only operate during pump testing, thus valve degradation due to wear factors is not likely.

e. These valves are full-stroke exercised (open) without monitoring individual flowrates on a quarterly frequency.

f. As stated in NUREG-1482, Section 4.1.4 and the Summary of Public Workshops Held in NRC Regions on Inspection Procedure 73759, "Inservice Testing of Pumps and Valves and Answers to Panel Questions on Inservice testing Issues, reference question 2.3.19, it is a burden to setup special test equipment on a quarterly basis to monitor the open stroke of these valves."

Evaluation: OM Part 10, ¶ 4.3.2 requires check valves to be exercised to their safety position(s) quarterly, if practicable, otherwise at cold shutdowns. If this is also impracticable, testing may be deferred to refueling outages. As discussed in Generic Letter 89-04, Position 1, the staff considers passing the maximum required accident flowrate through the valve a valid full-stroke exercise. This flowrate must be known. These valves are stroked open quarterly during the emergency feedwater pump tests, however, the flow through each valve cannot be determined, and is therefore considered a partial-flow test. Non-intrusive techniques can be used to verify the full-open position of the valve. As discussed in NUREG-1482, Section 4.1.4 and in the response to comment 2.3.19 (Ref. 17), the need to set up test equipment is adequate justification to defer testing to a refueling outage frequency as allowed by the Code, based on the impracticality of testing quarterly or at cold shutdowns. The licensee is however, proposing to verify the full-stroke open of each valve using nonintrusive techniques during operation on a once per refueling cycle basis, i.e., testing during operation is practical. Requiring the performance of non-intrusive techniques on both valves quarterly would create a hardship, given the need to set up test equipment and maintain the system in a stable state so that the results are conclusive. Verifying the full-stroke open position of each valve once per refueling cycle using non-intrusive techniques provides reasonable assurance of the valves' operational readiness, considering the Code allows deferrals to once per refueling outage. Therefore, it is recommended that the alternate proposed be authorized in accordance with 10CFR50.55a(a)(3)(ii). If at a later time, quarterly testing using non-intrusive techniques becomes less difficult (e.g., through use of permanently installed equipment), the licensee should reevaluate and resubmit this request.

3.3.4 Relief Request 5, Sodium Hydroxide Storage Tank to Reactor Building Spray Pump Stop Check Valves, CA-61 and 62

Relief Request: The licensee requests relief from the requirements of OMa-1988, Part 10, ¶4.3.2.4(c), which requires, if selected as an alternate, check valves to be disassembled every refueling outage to verify operability.

Proposed Alternate Testing: The licensee has proposed to partial stroke exercise the valves quarterly, and to perform disassembly and inspection on one of the two valves each refueling outage. Following valve reassembly, the valve will be partial-stroke exercised open.

Licensee's Basis for Relief: "These are stop-check valves with no external means for exercising (open) and no external disc position indication mechanism. Due to the system configuration it is impractical to induce a significant flow in the line or a meaningful reverse flow/differential pressure, thus both reverse flow (closure) and non-intrusive testing (open) of these valve is impractical during any mode of plant operation. Full-stroke exercising these valves to the open position would require system operation that would result in the unacceptable introduction of sodium hydroxide into the Borated Water Storage Tank (BWST) outlet header, the BWST and connected systems. Sodium hydroxide contamination of these systems is extremely undesirable for chemistry and piping integrity concerns.

Partial stroking of these valves can be achieved by limited flow via the condensate flush line to each header. This can be done to a limited extent without unduly diluting the boric acid concentration in the BWST."

"Each of these valves has been disassembled and inspected in the past and they have not shown any indication of degradation that would impede their capability to perform their safety functions to open or close.

The alternate testing proposed below meets the intent of NRC Generic Letter 89-04, Position 2 for sample inspection programs.

These valves only operate during quarterly partial flow exercising, thus valve degradation due to wear factors is not likely.

The INPO SOER 86-03 Check Valve Program at ANO-1 has included these valves on a ten-year inspection interval based on valve design and service conditions. This reflects the low probability of an emergent problem over the relatively short interval between inspections based on the proposed inspection plan."

Evaluation: OM Part 10, ¶ 4.3.2 requires check valves to be exercised to their safety position(s) quarterly, if practicable, otherwise at cold shutdowns. If this is also impracticable, testing may be deferred to refueling outages. As discussed in Generic Letter 89-04, Position 1, the staff considers passing the maximum required accident flowrate through the valve a valid full-stroke exercise. As discussed by the licensee it is impractical to full-stroke exercise these stop-check valves with flow during any mode of operation. Testing would result in contamination of the BWST discharge header and the potential of damaging piping due to the addition of highly caustic NaOH. The licensee has proposed to partial stroke exercise the valves quarterly using the condensate flush line. This one inch line is not adequate to full-stroke exercise the four inch valves. The licensee has proposed to perform sample disassembly and inspection as an alternate for both the full-stroke exercise open and closure verification.

The licensee provides justification that "due to the system configuration it is impractical to induce... a meaningful reverse flow/differential pressure, thus both reverse flow (closure) and non-intrusive testing (open) of these valve is impractical during any mode of plant operation." After the partial-stroke exercise, these valves are returned to their normally closed position. There are drain connections upstream of the check valves that could be utilized to verify valve closure. Therefore, there is not sufficient justification to defer the closure verification. There is sufficient basis describing the impracticality of full flow testing, therefore it is recommended that the licensee's proposal to use sample disassembly and inspection in accordance with Generic Letter 89-04, Position 2 be granted in accordance with 10CFR50.55a(f)(6)(i). The licensee should perform closure verification quarterly or revise and resubmit the request.

4.0 VALVE TESTING DEFERRAL JUSTIFICATIONS

Entergy has submitted thirty-one justifications for deferring valve testing to cold shutdowns and nine justifications for deferring testing to refueling outages. These justifications document the impracticality of testing 105 valves quarterly, during power operation. These justifications were reviewed to verify their technical basis.

As discussed in Generic Letter 91-18 (Ref. 18), it is not the intent of IST to cause unwarranted plant shutdowns or to unnecessarily challenge other safety systems. Generally, those tests involving the potential for a plant trip, or damage to a system or component, or excessive personnel hazards are not considered practical. Removing one train for testing or entering a Technical Specification limiting condition of operation is not sufficient basis for not performing the required tests, unless the testing renders systems inoperable for extended periods of time (Reference NUREG-1482, Section 3.1.1). Other factors, such as the effect on plant safety and the difficulty of the test, may be considered.

Valves, whose failure in a non-conservative position during exercising would cause a loss of system function, such as non-redundant valves in lines (e.g., a single line from the RWST or accumulator discharge), or the RHR pump discharge crossover valves for plants whose licensing basis assumes that all four cold legs are being supplied by water from at least one pump , should not be exercised during conditions when the system is required to be operable. Other valves may fall into this category under certain system configurations or plant operating modes, e.g., when one train of a redundant ECCS system is inoperable, non-redundant valves in the remaining train should not be cycled because their failure would cause a total loss of system function, or when one valve in a containment penetration is open and inoperable, the redundant valve should not be exercised during this system configuration.

BNL's evaluation of each deferral justification is provided in Appendix A. The anomalies associated with the specific justifications are provided in Section 6.0 of this TER.

5.0 IST SYSTEM SCOPE REVIEW

The review performed for this TER did not include verification that all pumps and valves within the scope of 10 CFR 50.55a and Section XI are contained in the IST Program, and did not ensure that all applicable testing requirements have been identified. The IST Program's scope was, however, reviewed for selected systems. The pumps and valves in the emergency feedwater, intermediate cooling, service water, and makeup and purification systems were reviewed against the requirements of Section XI and the regulations. The UFSAR was used to determine if the specified valve categories and valve functions were consistent with the plant's safety analyses. The review results showed compliance with the Code, except for the following items regarding the makeup and purification and emergency feedwater systems. The licensee should review these items and make changes to the IST Program, where appropriate. Additionally, the licensee should verify that there are not similar problems with the IST Program for other systems.

- M-231, Sh. 1-The valves in the reactor coolant pump (RCP) seal injection flowpaths are not included in the IST Program. Valves CV-1206 and MU-29A-D are containment isolation valves per Table 5-1 in the SAR. Valve CV-1206 also has position indication. Although these valves are not required to be leak tested in accordance with Appendix J, they do have a safety function to close in accordance with General Design Criterion 54 and 57, and as discussed in SAR Section 5.2.5.1. The licensee should review the basis for not including these valves in the IST Program, and revise as necessary. Additionally, pumps and valves in the Makeup Pumps' lube oil system are not included in the IST Program. The licensee should verify the code classification of these valves. If they are Code Class 3, they must be included in the IST Program. The licensee is referred to NUREG-1482, Section 3.4 which includes a discussion of skid-mounted components.

- M-231, Sh. 2-Solenoid valves SV-1270 through 1273 are required to open per SAR 9.1.2.1 to allow bleed off from the RCP seals to the reactor coolant quench tank after a containment isolation signal. These valves are not in IST Program.

- M-231, Sh. 3.- Check valves in makeup (HPI) pump discharge to reactor coolant system only have an open safety function. The licensee should evaluate whether these valves have a function to close, e.g., when the other HPI pump is inoperable to prevent diversion of flow. Additionally, these lines penetrate containment. Although valves CV-1219, 1220, 1284, 1285, 1278, 1279, 1227, and 1228 are not Appendix J leak tested, per SAR Table 5-1, they do have a safety related function to isolate containment. The IST Program should be revised accordingly.

- M-204, Sh. 3-Motor-operated valves CV-2868 and 2870 are identified in the IST Program as passive-closed. These valves are routinely opened to perform the quarterly emergency feedwater (EFW) test and are required to close on an EFW initiation signal. It does not appear that these valves, or the associated check valves FW-57, 58, 59 or 60, are passive. Additionally, check valves CS-98, 99, 262, and 261 in the suction from non-safety grade CST Tank 41 are not in the IST Program. The SAR, Section 10.4.8 states that "For extended EFW operation, operators have the ability to align T-41 to the EFW system. Safety grade check valves CS-99 and CS-262, which have passive safety functions, would prevent the loss of EFW should the non-safety grade CST and its associated pressure boundaries be breached." These valves appear to have a safety related function to close. As discussed in NUREG-1482, Section 4.1, the NRC considers check valves, for which flow is not blocked (e.g., when valve CS-275 is open), as "active valves." The licensee should review the valves' function and revise the IST Program as appropriate.

- M-204, Sh. 6-Relief valves PSV-6600 and 6605 are not included in the IST Program. The function and code classification should be reviewed and the program revised if they are Code Class 2 or 3. They protect a system that is required for safe shutdown. MOV CV-2666 is not included in the IST Program. This valve has position indication, and if passive, at least requires a position indication verification in accordance with the Code. Additionally, motor-operated valve CV-2663 is also not included in the IST Program. This valve opens to allow steam to the EFW turbine on a Channel A EFW initiation signal. MOV CV-2613, which opens on the B channel signal is included in the IST Program. The licensee should review the valves' function and revise the IST Program as appropriate.

6.0 IST PROGRAM RECOMMENDED ACTION ITEMS

Inconsistencies, omissions, and required licensee actions identified during the review of the licensee's third interval Inservice Testing Program are summarized below. The licensee should resolve these items in accordance with the evaluations presented in this report.

6.1 As discussed in the TER Introduction, based on two previous safety evaluations, ANO-1's third ten year interval should extend from December 2, 1997 to December 1, 2005. The IST Program states that the interval is December 2, 1997 to December 19, 2007. This should be revised. Additionally, in accordance with Section XI, IWA-2430(c) which states that "adjustments shall not cause successive intervals to be altered by more than 1 year from the original pattern of intervals," no additional extensions are allowed. The fourth ten year interval must start December 2, 2005 or earlier. Any delay in this start date must be authorized by the NRC.

6.2 It is recommended that the licensee's proposal in Relief Request 8 to set the "target setpoint" and instrument accuracy such that the overall combined accuracy specified in the procedure will limit the actual set pressure to 2% above the stamped set pressure for valves PSV-1412 and 1617 be authorized in accordance with 10CFR50.55a(a)(3)(i), provided that there are no owner-established acceptance criteria for these valves, based on system and valve design basics (basis) or technical specifications more stringent than +/- 2% of stamped set pressure. The licensee should verify this. If there are owner-established acceptance criteria for these valves more stringent than +/- 2% of stamped set pressure, the request would need to be resubmitted with this information and additional justification provided.

6.3 The licensee states that Relief Request 10 applies to all safety and relief valves used for compressible and non-fluid services other than steam. Paragraph 8.1.2.2 only applies to safety and relief valves used for compressible fluid service, other than steam. It is unclear what valves are used for "non-fluid services." The licensee should revise the request accordingly.

6.4 The clarification provided in the 1994 Addenda to the 1990 OM Code (or 1995 Edition) concerning the requirement for thermal equilibrium for valves tested at ambient temperature using a test medium at ambient temperature, may be used without NRC approval; relief is not required (Relief Request 11). The licensee, however, has defined ambient temperature as less than 150 deg.-F. Part 1 defines ambient temperature in ¶1.2 as "the temperature of the environment surrounding a pressure relief device at its installed plant location during the phase of plant operation for which the device is required for overpressure protection." There may be cases, e.g., valves in service water buildings during winter, where the valve's ambient temperature may be significantly lower than 150 deg.-F. As discussed in Ref. 17, Question 2.4.6, a correlation is required if the test temperature is other than that for which it is designed. The Code does not provide a tolerance. Reference 17, states that "The limited data received from valve manufacturers to date does not indicate a limit or tolerance. Therefore, at this time it is left to the engineering judgement of licensees, subject to NRC inspector review." The licensee should employ the Code definition of ambient temperature, or develop additional information supporting the use of 150 deg.-F for the specific valve applications, which would be subject to NRC inspector review.

6.5 In Valve Relief Request 12, the licensee has proposed to test safety and relief valves at test ambient temperatures. The cold differential test pressure provided by the manufacturer or cognizant engineer will be used without a temperature correlation as required by ¶8.3. The NRC has provided some guidance on this issue in their minutes to the 1997 IST workshops (Ref. 17). As discussed in the reply to Question 2.4.7, if the licensee does not have a correlation performed in accordance with the Code, the licensee should contact the valve vendor to determine if a correlation is available. Alternatively, the licensee should develop the correlation or evaluate sending valves to a test lab in order to comply with the Code. If the licensee has determined that testing in accordance with the Code is impracticable, the licensee should revise the relief request to include for each valve, as a minimum, a discussion of the safety significance of the valve, the test and design process and ambient temperatures, discussions with the valve vendor, and why the valve cannot be bench tested at design conditions or why a correlation cannot be developed by the licensee. Generic relief from these requirements would not be appropriate.

6.6 In Valve Relief Request 2, the licensee states that partial stroke exercising using thermography is burdensome to perform other than once every five years for the reactor building spray pumps' discharge check valves. However, the test required to demonstrate partial-stroke exercising of the check valves would not require thermography, as is required to verify each nozzle is clear. Other licensees have proposed to test these valves with air at refueling outages (e.g., Turkey Point). Generic Letter 89-04, Position 2, if used, requires partial valve stroking quarterly or during cold shutdowns, or after reassembly, if possible. The licensee should evaluate the practicality of performing a partial-stoke exercise quarterly, at cold shutdowns and refueling, and after reassembly, using a less rigorous test than that required for the nozzles. This is commonly performed by other licensees. The licensee should revise the request to discuss partial-stroke exercising.

6.7 The use of non-intrusive techniques once per refueling cycle was recommended to be approved for Relief Request 3 and 4 based on the hardship of setting up test equipment and stabilizing the system. If at a later time, quarterly testing using non-intrusive techniques becomes less difficult (e.g., through use of permanently installed equipment), the licensee should reevaluate and resubmit this request.

6.8 The licensee has proposed in Valve Relief Request 5 to perform sample disassembly and inspection as an alternate for both the full-stroke exercise open and closure verification of the NaOH Storage Tank to Reactor Building stop check valves. After the quarterly partial-stroke exercise, these valves are returned to their normally closed position. The licensee should expand the justification that "due to the system configuration it is impractical to induce... a meaningful reverse flow/differential pressure." There are drain connections upstream of the check valves that could be utilized. There is not sufficient justification to defer the closure verification. The licensee should perform closure verification following the quarterly partial-stroke exercise or revise the request.

6.9 In CSJ-2, the licensee has stated that both trains of EFW would have to be disabled during testing of the EFW pump discharge check valves, and provided a description of the test using a test jumper. There is inadequate information to determine how the testing is performed, such as where the test jumper is installed and why both trains are disabled. This justification should be revised and is subject to NRC inspector reviews.

6.10 The justification for CSJ-7 should contain more information on what is required for providing an alternate means of cooling to the reactor building on a quarterly interval and why it is impractical. Per the SAR, by design, the reactor building coolers are cooled by the service water system during an accident, in lieu of the chilled water system used during normal operation. Additionally, it appears from the drawing that isolating CV-6202 and opening the test connection in between the valves to verify that AC-60 closed would not require an "extended outage" of the reactor building coolers, or securing the main chillers. The licensee should review this justification, and revise it as necessary. It will be subject to NRC inspector reviews.

6.11 In CSJ-8, the licensee has stated that testing chilled water systems CIVs CV-6202, 6203, 6205, requires that an alternate means of cooling to the reactor building be provided. The licensee should evaluate if this is necessary for the short duration of air-operated or motor-operated valve tests. Also see evaluation above for CSJ-7. The licensee should revise this justification. It will be subject to NRC inspector reviews.

6.12 In CSJ-17, high pressure injection check valves MU-66A, B, C, and D are identified in Table 5-1 of the SAR as containment isolation valves, they are, however, only exercised open. Based on their containment isolation safety function, they must be exercised closed also. The IST Program should be revised to reflect the valves' required testing.

6.13 In CSJ-24, the licensee has not provided sufficient basis for deferring testing intermediate cooling water system to RCP coolers containment isolation valve ICW-26 to cold shutdowns. The licensee should further discuss why temperature transients of the RCP seals are undesirable (e.g., it could result in potentially damaging the pump seal which could lead to an unisolatable LOCA). The licensee is referred to NUREG-1482 Section 2.4.5 for examples of impractical conditions justifying test deferrals, and also to

Section 3.1.1.4 on stopping RCPs for cold shutdown testing (If this section is used, it must be referenced in the IST program).

6.14 It is not apparent from CSJ-31's justification why exercising valve CV-1404 quarterly is impractical. There are two pressure isolation valves located upstream to isolate the DHR from RCS. The licensee should provide additional information why this valve is locked closed and why it would be impractical to reenergize the valve for testing. The licensee should revise the IST Program accordingly.

6.15 In ROJ-1, the licensee has stated that the core flooding system to reactor vessel check valves CF-1A and B will be reverse flow tested at least once every two years using a leak test. The Code allows deferral to cold shutdowns or refueling. The closure test must be performed once every refueling outage or the licensee must submit a relief request.

6.16 The IST Submittal, Section 3.5 implies that check valve full-stroke exercise is demonstrated using non-intrusive techniques on a sample basis. As discussed in NUREG-1482, Section 4.1.2, if sample non-intrusive testing is implemented, the licensee must describe implementation in the IST Program document. In ROJ-1 and 2, non-intrusive testing on a sample basis is proposed, however no details of the sample plan are provided (i.e., sample group composition, confirmation that use of non-intrusives on one valve will be performed each refueling outage on a rotating schedule, confirmation that all valves in a group have been initially verified to be open with the specified minimum flowrate to ensure the valves are open to the position necessary to fulfil their safety function, and actions to be taken if problems with the sample valve are detected). The IST Program should be revised accordingly and it will be subject to NRC inspector reviews. It does not appear that the guidance provided in the NUREG was used for Relief Requests 3 or 4.

6.17 In ROJ-5, the licensee states that the BWST to LPI and reactor building spray pumps check valves BW-4A and B "... cannot be full flow tested during cold shutdowns since during decay heat removal operations, the low pressure injection pumps cannot be aligned to the BWST." The licensee should provide additional information on why this is impractical (e.g., the pumps must be aligned to remove decay heat. Interruption of decay heat removal could cause...Additionally, injection of water from the BWST would cause..."). The revised document will be subject to NRC inspector reviews.

6.18 In ROJ-7, the licensee states that the makeup and purification system isolation check valve CZ-46 has a "passive status", however the valve is identified in the Table as an active valve. The licensee should clarify or correct the justification.

6.19 As discussed in Generic Letter 89-04, Position 1, "A check valve's full-stroke to the open position may be verified by passing the maximum required accident condition flow through the valve...A valid full-stroke exercise by flow requires that the flow through the valve be known." In ROJ-9, the licensee's proposal to use temperature does not meet the Code requirements for a full-stroke open for the EFW pump bearing cooling water discharge check valves CS-1196 and 1198. The licensee should prepare and submit for review a relief request. Position 1 provides six elements that should be included when proposing an alternate technique. The licensee is also referred to NUREG-1482, Appendix A, Question Group 1, on alternate techniques, and Section 3.4, on skid-mounted components. Although these valves are not mounted on the EFW pump skid, they may be able to be treated as skid-mounted.

6.20 The IST system scope review identified the following items regarding the makeup and purification system. The licensee should review these items and make changes to the IST Program, where appropriate. Additionally, the licensee should verify that there are not similar problems with the IST Program for other systems.

- M-231, Sh. 1-The valves in the reactor coolant pump (RCP) seal injection flowpaths are not included in the IST Program. Valves CV-1206 and MU-29A-D are containment isolation valves per Table 5-1 in the SAR. Valve CV-1206 also has position indication. Although these valves are not required to be leak tested in accordance with Appendix J, they do have a safety function to close in accordance with General Design Criterion 54 and 57, and as discussed in SAR Section 5.2.5.1. The licensee should review the basis for not including these valves in the IST Program, and revise as necessary. Additionally, pumps and valves in the Makeup Pumps' lube oil system are not included in the IST Program. The licensee should verify the code classification of these valves. If they are Code Class 3, they must be included in the IST Program. The licensee is referred to NUREG-1482, Section 3.4 which includes a discussion of skid-mounted components.

- M-231, Sh. 2-Solenoid valves SV-1270 through 1273 are required to open per SAR 9.1.2.1 to allow bleed off from the RCP seals to the reactor coolant quench tank after a containment isolation signal. These valves are not in IST Program.

- M-231, Sh. 3.- Check valves in makeup (HPI) pump discharge to RCS only have an open safety function. The licensee should evaluate whether these valves have a function to close, e.g., when the other HPI pump is inoperable to prevent diversion of flow. Additionally, these lines penetrate containment, however, no containment isolation valves are identified. The SAR containment isolation valve table will be required in order to ensure the CIVs are tested in accordance with the Code.

- M-204, Sh. 3-MOVs CV-2868 and 2870 are identified in the IST Program as passive-closed. These valves are routinely opened to perform the quarterly EFW test and are required to close on an EFW initiation signal. It does not appear that these valves, or the associated check valves FW-57, 58, 59 or 60, are passive.

Additionally, check valves CS-98, 99, 262, and 261 in the suction from non-safety grade CST tank 41 are not in the IST Program. The SAR, Section 10.4.8 states that "For extended EFW operation, operators have the ability to align T-41 to the EFW system." "Safety grade check valves CS-99 and CS-262, which have passive safety functions, would prevent the loss of EFW should the non-safety grade CST and its associated pressure boundaries be breached." These valves appear to have a safety related function to close. As discussed in NUREG-1482, Section 4.1, the NRC considers check valves, for which flow is not blocked (e.g., when valve CS-275 is open), as "active valves." The licensee should review the valves' function and revise the IST Program as appropriate.

- M-204, Sh. 6-Relief valves PSV-6600 and 6605 are not included in the IST Program. The function and code classification should be reviewed and the program revised if they are Code Class 2 or 3. They protect a system that is required for safe shutdown. MOV CV-2666 is not included in the IST Program. This valve has position indication, and if passive, at least requires a position indication verification in accordance with the Code. MOV CV-2663 is also not included in the IST Program. This valve opens to allow steam to the EFW turbine on a Channel A EFW initiation signal. MOV CV-2613, which opens on the B channel signal is included in the IST Program.

6.21 The ANO-1 IST program does not identify the revision on each page. The IST Program or page revision and/or date should be listed on each page, with a summary sheet enclosed.

6.22 Section 3.2 of the IST Program submittal states that containment isolation valves shall be in accordance with the requirements of Appendix J, in lieu of the Category A requirements of Section XI. As discussed in NUREG-1482, Appendix A, Current Considerations for Position 10, the NRC while endorsing the 1989 Edition of Section XI created an exemption to the requirements for containment isolation valves in paragraph 4.2.2.2 of OM Part 10. Although it is recognized that there is a proposed rulemaking that would delete this exemption, compliance with the current regulations is required until such time as the final rulemaking is approved. Leakage rates for containment isolation valves are required to be monitored in accordance with paragraph 4.2.2.3.

In addition, this section of the IST Program submittal states that all CIVs performing a containment isolation safety function will, as a minimum, be leak tested per Appendix J. There are some CIVs, e.g., in ECCS systems required post accident, that are not required to be leak tested in accordance with Appendix J. These valves, however, have a safety related function to close and, therefore, are required to be exercised closed. See TER Section 6.20, above.

7.0 REFERENCES

1. D.C. Mims, Entergy Operations Inc. to USNRC, "ANO-1 Third Ten Year IST Program Submittal," December 1, 1997.

2. Entergy Operations, Inc. to USNRC, Request for Extension of Current 120-Month Interval for ANO-1, Grand Gulf, and Waterford, April 14, 1994.

3. USNRC to R.P. Barkhurst, Entergy Operations, Inc., "Interim Extension of 120-Month Interval for Inservice Inspection and Inservice Testing (ISI/IST) Programs For Waterford Steam Electric Station, Unit 3, (TAC No. M89544)," August 2, 1994.

4. Entergy Operations, Inc. to USNRC, Request One-Year Delay To Complete Updated Program, July 12, 1996.

5. USNRC to M. Meisner, Entergy Operations, Inc., "Update of Inservice Testing Programs for ANO, Units 1 and 2, Grand Gulf Nuclear Station, River Bend Station, and Waterford Steam Electric Station, Unit 3 (TAC Nos. M94471, M94472, M94452, M94473, M94488)," August 27, 1996.

6. Title 10, Code of Federal Regulations, Section 50.55a, Codes and Standards.

7. ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1989 Edition.

8. ASME/ANSI OM-1987, Part 1, "Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices."

9. ASME/ANSI OMa-1988, Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants."

10. ASME/ANSI OMa-1988, Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants."

11. Standard Review Plan, NUREG 0800, Section 3.9.6, Inservice Testing of Pumps and Valves, Rev. 2, July 1981.

12. NRC Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," April 3, 1989.

13. Minutes of the Public Meetings on Generic Letter 89-04, October 25, 1989.

14. Supplement to the Minutes of the Public Meetings on Generic Letter 89-04, September 26, 1991.

15. NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," April 1995.

16. NUREG/CR-6396, "Examples, Clarifications, and Guidance on Preparing Requests for Relief from Pump and Valve Inservice Testing Requirements," February 1996.

17. Memo to File, "Summary of Public Workshops held in NRC Regions on Inspection Procedure 73756, 'Inservice Testing of Pumps and Valves,' and Answers to Panel Questions on Inservice Testing Issues," from J. Colaccino, NRC, July 18, 1997.

18. NRC Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability," November 7, 1991.

19. NRC Generic Letter 90-06, "Resolution of Generic Issue 70, 'Power-Operated Relief Valve and Block Valve Reliability' and Generic Issue 94, 'Additional Low-Temperature Overpressure Protection for Light-Water Reactors,' Pursuant to 10CFR50.54(f)," June 25, 1990.

20. T.G. Campbell, AP&L Co. To H. Denton, NRC, "Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves (Generic Letter 87-06)," July 30, 1987.

Appendix A-Evaluation of ANO-1's Valve Testing Deferral Justifications

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-1	CV-2691, 2692 Main Steam Isolation Valves (MSIVs)	"Closure of either of these valves under power conditions effectively isolates the associated steam generator. This, in turn, would result in an extreme power transient and a plant trip. There is a valve control mechanism that allows a partial stroke (approximately 10%) during power operation."	These valves are full-stroke exercised closed and fail safe tested at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves quarterly because testing would result in a plant trip. The alternative provides full-stroke exercising to the closed position and fail safe testing during cold shutdowns and partial-stroke exercising quarterly in accordance with OM Part 10, ¶4.2.1.2 (b).
CSJ-2	FW-55A and B, 56A and B EFW Pump Discharge Check Valves	"Reverse flow closure testing of these check valves during operation is not possible because it requires the disablement of both emergency feedwater trains. Testing evolutions which disable multiple trains of a safety system are not considered prudent in any mode in which that safety system is required to be operable. Specifically, the suction isolation valves to one train of emergency feedwater are required to be isolated in conjunction with the connection of a test jumper to the opposite train from the condensate transfer header for the performance of this test."	These valves are full-stroke exercised open quarterly and exercised closed at cold shutdowns.	The licensee has stated that both trains of EFW would have to be disabled during testing and provided a description of the test using a test jumper. There is inadequate information to determine how the testing is performed, such as where the test jumper is installed and why both trains are disabled. This justification should be revised and is subject to NRC inspector reviews.
CSJ-3	CV-2630, 2680 Steam Generator Feedwater Supply Isolation Valves	"Closure of either of these valves during power operation results in the loss of feedwater to the associated steam generator. This in turn, would cause a loss of steam generator level control, severe plant transient, and ultimately a plant trip. There is, however, a valve control mechanism that allows a partial stroke (approximately 10%) during power operation."	These valves are full-stroke exercised closed at cold shutdowns, and partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves quarterly because testing would result in a plant trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns and partial-stroke exercising quarterly in accordance with OM Part 10, ¶4.2.1.2 (b).

ATTACHMENT 3

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-4	SW-1A, B, and C Service Water Pump Discharge Check Valves	"These are check valves with no external means of moving the obturator or any external position indication devices. The service water system provides a continuous supply of cooling water to the two safety-related (essential) service water headers as well as the non-essential header related to the main turbine generator and other plant support auxiliaries. During normal plant operation at power the heat removal demands of the service water system require the operation of at least two and sometimes three pumps. After the system operation reaches a degree of stability, perturbation of flow to any of the online heat exchangers could have a severe adverse impact on plant operation with the potential for unacceptable flow and temperature transients. This situation also precludes any major flow adjustments on specific heat loads. As such, there is no assurance that, under certain heat load requirements, a pump can be secured to reverse-flow test its associate discharge check valve."	These valves are full-stroke exercised closed at cold shutdowns, or more frequently when practical.	It is impractical to exercise these normally open valves closed quarterly during power operation because this would result in a plant transient with the potential for a plant trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2(c).
CSJ-5	SW-9 ICW Heat Exchanger Discharge Isolation Check Valve	"This is a check valve with no external means of moving the obturator or any external position indication devices, thus reverse flow testing of this valve requires an extended shutdown of cooling water to the ICW coolers. During normal plant operation at power the heat removal demands of the ICW system requires the supply of cooling water to the ICW coolers. Perturbation of flow to any of the on-line heat exchangers served by ICW (including reactor plant auxiliaries) could have a severe adverse impact on plant operation with the potential for unacceptable flow and temperature transients, equipment damage and a plant trip."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise these normally open valves closed quarterly during power operation because this has the potential to result in a plant shutdown and damage to components. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2(c).
CSJ-6	CV-3643 ACW Isolation Valve	"Closing this valve requires a shutdown of cooling water to various coolers supplied by the ACW cooling line. During normal plant operation at power the heat removal demands of the ACW system requires the supply of cooling water to the various coolers. Perturbation of flow to any of the on-line heat exchangers served by ACW (including main turbine generator auxiliaries) could have a severe adverse impact on plant operation with the potential for unacceptable flow and temperature transients, equipment damage and a plant trip."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise these normally open valves closed quarterly during power operation because this has the potential to result in a plant shutdown and damage to components. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-7	AC-60, Chilled water system CIVs	"This is a check valve with no external means of moving the obturator or any external position indication devices, thus reverse flow testing of this valve requires an extended shutdown of the reactor building coolers, and since these coolers are the only significant chilled water heat load, the main chillers would also be secured. Performing the evolutions of securing the main chillers and of providing an alternate means of cooling to the reactor building on a quarterly interval is not practical. The demands of plant staff and temperature effects on other parts of the plant are not commensurate with any gain in safety resulting from performing this test every three months."	These valves are full-stroke exercised closed at cold shutdowns.	The justification should contain more information on what is required for providing an alternate means of cooling to the reactor building on a quarterly interval and why it is impractical. Per the SAR, by design, the reactor building coolers are cooled by the service water system during an accident, in lieu of the chilled water system used during normal operation. Additionally, it appears from the drawing that isolating CV-6202 and opening the test connection in between the valves to verify that AC-60 closed would not require an extended outage of the reactor building coolers, or securing the main chillers. The licensee should review this justification, and revise it as necessary. It will be subject to NRC inspector reviews.
CSJ-8	CV-6202, 6203, and 6205; Chilled Water System CIVs	"Testing of these valves requires a shutdown of the reactor building coolers, and since these coolers are the only significant chilled water heat load, the main chillers would also be secured. Performing the evolutions of securing the main chillers and of providing an alternate means of cooling to the reactor building on a quarterly interval is not practical. The demands of plant staff and temperature effects on other parts of the plant are not commensurate with any gain in safety resulting from performing this test every three months."	These valves are full-stroke exercised closed at cold shutdowns.	The licensee has stated that testing these valves requires that an alternate means of cooling to the reactor building be provided. The licensee should evaluate if this is necessary for the short duration of air-operated or motor-operated valve tests. Also see evaluation above for CSJ-7. The licensee should revise this justification. It will be subject to NRC inspector reviews.

Appendix A (Continued)

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-9	SV-1077, 1079 Pressurizer Vent Valves	"These valves connect directly to the reactor coolant system (RCS) and are the Class 1 isolation valves for the system, forming part of the RCS boundary. Opening any of these valves during power operation exposes the plant to the possibility of a valve failure in the open position and the potential of developing a significant reactor coolant leak. Although the maximum leakage potential from this line is less than that defined as a loss of coolant accident, it could be of sufficient magnitude as to exceed ANO-1 Technical Specification limits and force an expedited plant shutdown and cooldown. In addition, historical data and operational experience related to these valves indicate a high potential for seat leakage-a problem that would be exacerbated by repeated (quarterly) operation at RCS operating pressure."	Per the Valve Table, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because testing during power operation could jeopardize the integrity of the RCS pressure boundary. The alternative provides full-stroke exercising to the open and closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-10	SV-1071, 1072, 1073, 1074 Reactor Vessel Vent Valves	"These valves connect directly to the reactor coolant system (RCS) and are the Class 1 isolation valves for the system, forming part of the RCS boundary. Opening any of these valves during power operation exposes the plant to the possibility of a valve failure in the open position and the potential of developing a significant reactor coolant leak. Although the maximum leakage potential from this line is less than that defined as a loss of coolant accident, it could be of sufficient magnitude as to exceed ANO-1 Technical Specification limits and force an expedited plant shutdown and cooldown. In addition, historical data and operational experience related to these valves indicate a high potential for seat leakage-a problem that would be exacerbated by repeated (quarterly) operation at RCS operating pressure."	Per the Valve Table, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because testing during power operation could jeopardize the integrity of the RCS pressure boundary. The alternative provides full-stroke exercising to the open and closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-11	SV-1081, 1082, 1083, 1084, 1091, 1092, 1093, 1094 Reactor Coolant Loop High Point Vent Valves	"These valves connect directly to the reactor coolant system (RCS) and are the Class 1 isolation valves for the system, forming part of the RCS boundary. Opening any of these valves during power operation exposes the plant to the possibility of a valve failure in the open position and the potential of developing a significant reactor coolant leak. Although the maximum leakage potential from this line is less than that defined as a loss of coolant accident, it could be of sufficient magnitude as to exceed ANO-1 Technical Specification limits and force an expedited plant shutdown and cooldown. In addition, historical data and operational experience related to these valves indicate a high potential for seat leakage-a problem that would be exacerbated by repeated (quarterly) operation at RCS operating pressure."	Per the Valve Table, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because testing during power operation could jeopardize the integrity of the RCS pressure boundary. The alternative provides full-stroke exercising to the open and closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-12	PSV-1000 Power-Operated Relief Valve	"This valve is part of the Class 1 isolation for the RCS, forming part of the RCS boundary. Opening this valve during power operation exposes the plant to the possibility of a valve failure in the open position and the potential of developing a significant reactor coolant leak. In addition, historical data and operational experience related to this valve indicate a high potential for failure of this valve to re-close."	Per the Valve Table, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because testing during power operation could jeopardize the integrity of the RCS pressure boundary. Generic Letter 90-06 (Ref. 19) states that testing of the PORVs should not be performed during power operation due to the risk associated with challenging these valves in this condition. The alternative provides full-stroke exercising to the open position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-13	MU-19A, B, and C Primary Makeup Pumps Discharge Check Valves	"These are check valves with no external means of moving the obturator in the open or closed direction or any external position indication devices. During plant operation at power, the maximum flow that can be directed through these valves is limited to that of the reactor coolant system makeup rate which is substantially less than that required under accident conditions. This limit is based on the following: *With a pump operating at the design accident flow, the flowrate into the reactor coolant system will exceed the letdown capacity and there is insufficient space in the pressurizer to accommodate the influx of water. *At the accident flowrate, normal makeup flow would necessarily be augmented by additional flow directed into the RCS via the high pressure injection nozzles. This would result in additional thermal stress cycles at these critical areas. *The capacity of the normal makeup pump suction source (Reactor Coolant Makeup Tank) is not sufficient to provide flow to the pump suction at the accident flowrate, thus water from the borated water storage tank (BWST) would be needed to supplement this water source. Water in the BWST is maintained at a higher boric acid concentration than that of the RCS and, as a result, injection of BWST water into the RCS would result in an unacceptable power transient that would jeopardize plant operation."	These valves are full-stroke exercised open at cold shutdowns, and are partial-stroke exercised and reverse flow exercised quarterly.	It is impractical to full-stroke exercise these valves open quarterly because the pumps would be required to take suction from the BWST which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (b).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-14	MU-1211, 1212, 1213, 1214, 1215 Primary Makeup Pumps Discharge to HPI Check Valves	"These are check valves with no external means of moving the obturator in the open or closed direction or any external position indication devices. During plant operation at power, flow cannot be directed through these valves to the reactor coolant system based on the following: *With a pump operating at the design accident flow, the flowrate into the reactor coolant system will exceed the letdown capacity and these is insufficient space in the pressurizer to accommodate the influx of water. *At the accident flowrate, water would necessarily be directed into the RCS via the high pressure injection nozzles. This would result in additional thermal stress cycles at these critical areas. *The capacity of the normal makeup pump suction source (Reactor Coolant Makeup Tank) is not sufficient to provide flow to the pump suction at the accident flowrate, thus water from the borated water storage tank (BWST) would be needed to supplement this water source. Water in the BWST is maintained at a higher boric acid concentration than that of the RCS and, as a result, injection of BWST water into the RCS would result in an unacceptable power transient that would jeopardize plant operation."	These valves are full-stroke exercised open at cold shutdowns.	It is impractical to full-stroke exercise these valves open quarterly because the pumps would be required to take suction from the BWST which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-15	MU-1306, 1307, 1308, 1309 Primary Makeup Pumps Discharge to HPI Check Valves	"These are check valves with no external means of moving the obturator in the open or closed direction or any external position indication devices. During plant operation at power, flow cannot be directed through these valves to the reactor coolant system based on the following: *With a pump operating at the design accident flow, the flowrate into the reactor coolant system will exceed the letdown capacity and these is insufficient space in the pressurizer to accommodate the influx of water. *At the accident flowrate, water would necessarily be directed into the RCS via the high pressure injection nozzles. This would result in additional thermal stress cycles at these critical areas. *The capacity of the normal makeup pump suction source (Reactor Coolant Makeup Tank) is not sufficient to provide flow to the pump suction at the accident flowrate, thus water from the borated water storage tank (BWST) would be needed to supplement this water source. Water in the BWST is maintained at a higher boric acid concentration than that of the RCS and, as a result, injection of BWST water into the RCS would result in an unacceptable power transient that would jeopardize plant operation."	These valves are full-stroke exercised open at cold shutdowns.	It is impractical to full-stroke exercise these valves open quarterly because the pumps would be required to take suction from the BWST which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-16	MU-34A, B, C, and D HP Injection Check Valves	"These are check valves with no external means of moving the obturator in the open or closed direction or any external position indication devices. During plant operation at power, full flow cannot be directed through these valves to the reactor coolant system based on the following: *With a pump operating at the design accident flow, the flowrate into the reactor coolant system will exceed the letdown capacity and these is insufficient space in the pressurizer to accommodate the influx of water. *At the accident flowrate, water would be directed into the RCS via the high pressure injection nozzles. This would result in additional thermal stress cycles at these critical areas (applicable to MU-34A/B/C; MU-34D is in normal makeup path). *The capacity of the normal makeup pump suction source (Reactor Coolant Makeup Tank) is not sufficient to provide flow to the pump suction at the accident flowrate, thus water from the borated water storage tank (BWST) would be needed to supplement this water source. Water in the BWST is maintained at a higher boric acid concentration than that of the RCS and, as a result, injection of BWST water into the RCS would result in an unacceptable power transient that would jeopardize plant operation."	These valves are full-stroke exercised open at cold shutdowns.	It is impractical to full-stroke exercise these valves open quarterly because the pumps would be required to take suction from the BWST which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-17	MU-66A, B, C, and D HP Injection Check Valves	"These are stop check valves, their handwheels are secured in the open direction, with no practical means of moving the obturator in the open or closed direction or any external position indication devices. During plant operation at power, full flow cannot be directed through these valves to the reactor coolant system based on the following: *With a pump operating at the design accident flow, the flowrate into the reactor coolant system will exceed the letdown capacity and these is insufficient space in the pressurizer to accommodate the influx of water. *At the accident flowrate, water would be directed into the RCS via the high pressure injection nozzles. This would result in additional thermal stress cycles at these critical areas (applicable to MU-66A/B/C; MU-66D is in normal makeup path). *The capacity of the normal makeup pump suction source (Reactor Coolant Makeup Tank) is not sufficient to provide flow to the pump suction at the accident flowrate, thus water from the borated water storage tank (BWST) would be needed to supplement this water source. Water in the BWST is maintained at a higher boric acid concentration than that of the RCS and, as a result, injection of BWST water into the RCS would result in an unacceptable power transient that would jeopardize plant operation."	These valves are full-stroke exercised open at cold shutdowns.	It is impractical to full-stroke exercise these valves open quarterly because the pumps would be required to take suction from the BWST which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c). These valves are identified in Table 5-1 of the SAR as containment isolation valves, they are, however, only exercised open. Based on their containment isolation safety function, they must be exercised closed also. The IST Program should be revised to reflect the valves' required testing.
CSJ-18	CV-1270, 1271, 1272, 1273, 1274 RCP Seal Water Leakoff CIV	"Isolation of the reactor coolant pump seal bleed off lines or alternate seal bleed off line to the quench tank would subject the seals to severe hydraulic and/or thermal transients, potentially resulting in seal damage or even failure."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise these MOVs closed during operation of the RCPs, due to the potential for seal damage resulting from isolating the seal leakoff lines. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-19	CV-1275 Reactor Coolant Makeup Tank Discharge Stop Check Valve	"Closing this valve would necessitate the shutdown of the running makeup pump due to the loss of suction. This, in turn, would result in a transient of pressurizer level and the loss of seal injection flow to the reactor coolant pump (RCP) seals. The resulting hydraulic and/or thermal transient has the potential to result in damage to the RCP seals."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise this motor-operated stop check valve closed during operation of the RCPs, due to the potential for seal damage resulting from isolating the seal injection flow. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-20	CV-1300 and 1301 Primary Makeup Pump Recirculation Line Isolation MOVs	"These valves remain open during normal operation to provide minimum flow for pump protection to the running pump. Isolation of this flowpath in a non-ES actuated condition places the pump at risk. A small perturbation in makeup flow requirements could reduce pump flow to less than that required to preclude pump damage. The makeup pumps are particularly vulnerable to this phenomenon in a very short time due to their high speed, high head design."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise these MOVs closed during operation, due to the potential for pump damage resulting from isolating the minimum flow lines. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-21	FW-13A and B EFW S/G Supply Check Valves	"These are check valves with no external means of exercising and no external position indication mechanism. The only practical means of exercising is to operate an EFW pump discharging to the steam generators. During plant operation at power this is not practical due to the potential for thermal shock of the steam generator nozzles or internals. During quarterly testing of the EFW pumps, flow is routed through a test recirculation line branching off upstream of these check valves that returns condensate to the respective pump's suction line, thus testing via this flowpath is also impossible."	These valves are full-stroke exercised open at cold shutdowns and reverse flow tested quarterly.	It is impractical to full- or partial-stroke exercise these valves quarterly because relatively cold emergency feedwater flow would be introduced into the steam generators which could potentially result in damage to the steam generator and nozzle connections due to thermal shock. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-22	CV-1050 and 1410 Decay Heat Removal PIVs	"These valves are provided with an interlock feature that prevents opening when reactor coolant pressure exceeds 290 psig. Overriding this interlock and opening either of these valves would subject the low pressure rated portions of the decay heat removal/low pressure coolant injection system to reactor coolant pressures separated only by a single closed valve. This is considered to be imprudent under normal RCS operating pressure."	These valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise the valves open quarterly due to the potential for equipment damage due to over pressurization. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-23	DH-13A and B, 17, and 18 LPI PIVs	"These are check valves with no external means for exercising and no external position indication mechanism. Exercising (open) requires operating a LPI (decay heat removal) pump at full flow and injecting into the reactor coolant system. At power operation this is not possible because the LPI pumps cannot develop sufficient discharge pressure to overcome reactor coolant system pressure."	These valves are full-stroke exercised open at cold shutdowns.	It is impractical to exercise these valves open quarterly because the LPSI pump discharge pressure cannot overcome the RCS pressure. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-24	ICW-26 Intermediate Cooling Water System to RCP Coolers CIV	"This is a check valve with no external means for exercising and no external position indication mechanism. Exercising (closed) requires shutting down the system and performing a back leakage test. Isolation of this cooling water flow at power would result in, at a minimum, undesirable temperature transients of RCP seals and motors."	These valves are full-stroke exercised closed at cold shutdowns.	The licensee has not provided sufficient basis for deferring this test to cold shutdowns. The licensee should further discuss why temperature transients of the RCP seals are undesirable (e.g., it could result in potentially damaging the pump seal which could lead to an unisolatable LOCA). The licensee is referred to NUREG-1482, Section 2.4.5 for examples of impractical conditions justifying test deferrals, and also to Section 3.1.1.4 on stopping RCPs for cold shutdown testing (If this section is used, it must be referenced in the IST program).
CSJ-25	ICW-30 Intermediate Cooling Water System to CRD Coolers CIV	"This is a check valve with no external means for exercising and no external position indication mechanism. Exercising (closed) requires shutting down the system and performing a back leakage test. Subsequent high temperature alarms would require a plant shutdown."	This valve is full-stroke exercised closed at cold shutdowns.	It is impractical to exercise this valve closed quarterly because the test would result in a plant shutdown. The alternative provides reverse flow exercising during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-26	ICW-114 Intermediate Cooling Water System to Reactor Coolant Letdown Coolers CIV	"This is a check valve with no external means for exercising and no external position indication mechanism. Exercising (closed) requires shutting down the system and performing a back leakage test. At power operation this would result in securing letdown flow. Securing letdown flow during power operation would result in thermal transients to nozzles and piping and perturbations to the makeup system which among other effects will result in a transient in RCP seal injection which could result in damage to the RCP seals."	This valve is full-stroke exercised closed at cold shutdowns.	It is impractical to exercise this valve closed quarterly because the test would result in potential damage to the RCP seals. The alternative provides reverse flow exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-27	CV-2234 and IA-775 ICW to RCP Motor Coolers Isolation AOV and Related Air System Check Valve	"Closing CV-2234 isolates cooling water flow to the RCP motor air and lube oil coolers. The loss of cooling water would quickly require shutting off RCP motors as bearing and motor winding temperatures rise. Therefore, closing CV-2234 would jeopardize continue(d) operation of the plant in addition to the actual temperature transient. Likewise, Testing IA-775 would (require) closure of CV-2234."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise these valves closed quarterly because the test would result in a plant shutdown. The alternative provides exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶ 4.2.1.2 (c) and ¶4.3.2.2 (c).
CSJ-28	CV-2235 Intermediate Cooling Water System to CRD Coolers CIV	"Closing this valve requires isolating cooling water to the CRDs. High temperature alarm response for multiple CRDs requires a plant trip."	This valve is full-stroke exercised closed at cold shutdowns.	It is impractical to exercise this valve closed quarterly because the test would result in a plant shutdown. The alternative provides exercising during cold shutdowns in accordance with OM Part 10, ¶4..2.1.2(c).
CSJ-29	CV-2220 and 2221 Intermediate Cooling Water CIVs	"Closing these valves requires isolating cooling water flow to the RCP's and the CRD's. High temperature alarm response for multiple CRD's requires a plant trip."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise this valve closed quarterly because the test would result in a plant shutdown. The alternative provides full-stroke exercising during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-30	CV-2214, 2215, 2233; IA-7657 and 771 ICW to Letdown Coolers Isolation Valves and Related Air System Check Valve	"At power operation closing CV-2214, CV-2215, or CV-2233 would result in securing letdown flow. Securing letdown flow during power operation would result in thermal transients to nozzles and piping and perturbations to the makeup system which among other effects will result in a transient in RCP seal injection which could result in damage to the RCP seals. Likewise, testing IA-767 or IA-771 would require closure of CV-2214 or CV-2233, respectively."	These valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise this valve closed quarterly because the test would result in potential damage to the RCP seals. The alternative provides reverse flow exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c) and ¶4.3.2.2 (c).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-31	CV-1404 RCS to DHR System Isolation MOV	"This valve is deenergized and is locked in its closed position during power operation due to Appendix R motor operated valve (hot short) concerns."	These valves are full-stroke exercised open and closed at cold shutdowns.	It is not apparent from the justification why exercising this valve quarterly is impractical. Pressure isolation valves are located upstream to isolate the DHR from the RCS (See CSJ-22). The licensee should provide additional information why this valve is locked closed and why it would be impractical to reenergize the valve for testing. The licensee should revise the IST Program accordingly.

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
ROJ-1	CF-1A and B, Core Flooding System to Reactor Vessel Check Valves	"These are check valves with no external means of exercising and no external position indication mechanism. The only practical means of exercising is to discharge from the core flooding tanks to the Reactor Vessel. During plant operation at power this is not possible since the pressure in the core flooding tanks cannot overcome the RCS pressure. At cold shutdown with the RCS intact (reactor head in place), the limited volume in the pressurizer is insufficient to accommodate the influx of water if a core flood tank were to be discharged into the RCS in sufficient volume to fully stroke these valves. In addition, there are system limitations related to low temperature over-pressurization (LTOP) concerns that severely limit test conditions. There is not a practical method to establish a differential pressure or reverse flow, i.e., closure testing, across CF-1A or CF-1B during either power operation or cold shutdown periods."	These valves are partial-stroke exercised at cold shutdowns and full-stroke exercised during refueling outages using non-intrusives on a sampling basis. The valves will have their closure verified at least once every 2 years during a seat leak test.	It is impractical to exercise these valves open during operation due to the insufficient system pressure. It is also impractical to full-stroke exercise the valves during cold shutdowns due to the insufficient RCS volume. The alternative provides partial-stroke exercising at cold shutdowns and full-stroke exercising during refueling outages in accordance with OM Part 10, ¶4.3.2.2 (d). The use of sample testing using non-intrusives is acceptable as discussed in NUREG-1482, Section 4.1.2, however, the licensee must describe the implementation of such a program in the IST Program. This justification provides no details of the sampling program. The licensee should revise the IST Program and this will be subject to NRC inspector reviews. Although the licensee's response to Generic Letter 87-06 (Ref. 20) stated that these valves will be verified closed during operation by monitoring tank pressure and level, given the existence of check valves DH-14A and B, downstream of these valves, it appears that the only practical method to verify valve closure is to perform a leak test. As discussed in NUREG-1482, Section 4.1.4, it is acceptable to defer this testing to refueling outages based on the need to setup test equipment. The licensee has stated that the valve will be reverse flow tested at least once every two years using a leak test. The Code allows deferral to cold shutdowns or refueling. The closure test must be performed once every refueling outage or the licensee must submit a relief request.

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
ROJ-2	DH-14A and B, Core Flood/LPI PIVs	"These are check valves with no external means of exercising and no external position indication mechanism. The only practical means of exercising is to discharge from the core flooding tanks to the Reactor Vessel. The capacity of the decay heat removal pumps is insufficient to fully open these valves. During plant operation at power exercising is not possible since the pressure in the core flooding tanks or available pumps cannot overcome the reactor coolant system (RCS) pressure. At cold shutdown with the RCS intact (reactor head in place), the limited volume in the pressurizer is insufficient to accommodate the influx of water if a core flood tank were to be discharged into the RCS in sufficient volume to fully stroke these valves. In addition, there are system limitations and concerns related to low temperature over-pressurization (LTOP) concerns that severely limit test conditions."	These valves are partial-stroke exercised at cold shutdowns and full-stroke exercised during refueling outages using non-intrusives on a sampling basis. The valves will have their closure verified quarterly.	It is impractical to exercise these valves open during operation due to the insufficient system pressure of the core flooding tanks or decay heat removal pumps. It is also impractical to full-stroke exercise the valves during cold shutdowns due to the insufficient RCS volume. The alternative provides partial-stroke exercising at cold shutdowns and full-stroke exercising during refueling outages in accordance with OM Part 10, ¶4.3.2.2 (d). The use of sample testing using non-intrusives is acceptable as discussed in NUREG-1482, Section 4.1.2, however, the licensee must describe the implementation of such a program in the IST Program. This justification provides no details of the sampling program. The licensee should revise the IST Program and this will be subject to NRC inspector reviews.
ROJ-3	RC-1009, 1010, 1011, 1012, 1013, 1014, 1015, and 1016; Reactor Vessel Internal Vent Valves	"These are check valves of a special design located within the Reactor Vessel. They are not equipped with external actuators and do not have position indicators. There is also no practical method whereby system parameters can be used to stroke these valves nor to observe their operation during either power operation or cold shutdowns."	These valves will be manually full-stroke exercised during refueling outages with the reactor vessel head removed.	It is impractical to exercise these RPV internal valves with flow due to their design and location. Access to these valves is only possible during refueling outages. The alternative provides exercising during refueling outages in accordance with OM Part 10, ¶4.3.2.2 (e).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
ROJ-4	BW-2 and 3, BWST to Makeup Pump Stop Check Valves	"These are stop-check valves with no external means of moving the obturators in the open direction. The only practical means of exercising them open during power operation is to pump water from the BWST via the makeup pumps. Because a makeup pump is normally in operation pumping to the reactor coolant system, a flowpath for testing is available, however, adding water in this way is undesirable for the following reasons. a. The boron concentration in the BWST is considerably greater than that of the RCS, thus injecting this water into the RCS would cause an undesirable negative power transient. b. This additional volume of water would cause an undesirable upset in the makeup system flow balance with a transient in the Reactor Coolant Makeup Tank water level. These valves cannot be full-stroke exercised during cold shutdown since operation of the makeup pumps in other than a makeup mode is not permitted due to the possibility of low temperature over-pressure (LTOP) concerns."	These valves are partial-stroke exercised at cold shutdowns and full-stroke exercised during refueling outages.	It is impractical to full-stroke exercise these valves open quarterly because the pumps would be required to take suction from the BWST which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. It is also impractical to full-stroke exercise these valves open during cold shutdowns because of the potential for equipment damage due to LTOP concerns. The alternative provides partial-stroke exercising to the open position during cold shutdowns and full-stroke exercising during refueling outages in accordance with OM Part 10, ¶4.3.2.2 (d).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
ROJ-5	BW-4A and B, BWST to LPI and Reactor Building Spray Pumps Check Valves	"These check valves are in the suction lines to the low pressure injection and reactor building spray pumps from the BWST. They are not equipped with external actuators and do not have position indicators. To provide maximum accident flow in these lines during power operation would require simultaneous operation of a low pressure injection pump and reactor building spray pump. These pumps share common pump discharge test header piping. The first check valve in the reactor building spray pump piping is on the suction side of the pump. Consequently, a trip or failure of the reactor building spray pump would allow the low pressure injection pump to pressurize the failed reactor building spray pump piping back to the first check valve in the reactor building spray system. Therefore, the suction piping of the reactor building spray pump could be over pressurized by an operating low pressure injection pump. These check valves cannot be full flow tested during cold shutdowns since during decay heat removal operations, the low pressure injection pumps cannot be aligned to the BWST."	These valves are partial-stroke exercised quarterly and full-stroke exercised during refueling outages.	It is impractical to full-stroke exercise these valves quarterly because of the potential of damaging the suction piping of the reactor building spray pump. The licensee states that "These check valves cannot be full flow tested during cold shutdowns since during decay heat removal operations, the low pressure injection pumps cannot be aligned to the BWST." The licensee should provide additional information on why this is impractical (e.g., the pumps must be aligned to remove decay heat. Interruption of decay heat removal could cause...Additionally, injection of water from the BWST would cause...).
ROJ-6	SW-11 and 13, Service Water to EFW Pump Suction Check Valves	"These are check valves with no external means for exercising and no external position indication mechanism. The only practical means of exercising them open is to move water from the service water system through each valve. Significant flow through these valves can only be induced by aligning the system for flow to the associated emergency feedwater pumps or attaching a temporary line to an installed flange connection where the water can be directed to an appropriate drain path. Pumping service water into the condensate or feedwater system would result in unacceptable contamination of the piping systems that could catastrophically upset plant chemistry. Installing a temporary connection can be done but the manpower resources required by frequent testing in this way would put an undue burden on the plant staff if this were performed at a frequency more than once each refueling."	These valves are partial-stroke exercised quarterly and full-stroke exercised during refueling outages.	It would be impractical to full-stroke exercise these pumps quarterly or during cold shutdowns because of the need to set up test equipment. The alternative provides partial-stroke exercising quarterly and full-stroke exercising during refueling outages in accordance with OM Part 10, ¶4.3.2.2 (d).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
ROJ-7	CZ-46, Makeup and Purification System Isolation Check Valve	"This is a check valve with no external means for exercising and no external position indication mechanism. Non-code piping upstream of CZ-46 has the same pressure rating as the piping downstream of CZ-46. The upstream piping is isolated by normally closed isolation valves. There are no vents or drains between CZ-46 and these normally closed isolation valves. If these isolation valves were to be open to test CZ-46 and CZ-46 were to fail then a LOCA outside containment could be created. Given the passive status of CZ-46, the remote potential for failure, and the lack of a reasonable way to establish sufficient reverse differential pressure/flow across the valve, the only practical means of confirming the capability of CZ-46 to accomplish its safety function is by disassembly. This valve is in the flowpath from the clean waste system to the makeup and purification system. During cold shutdowns and refueling outages this line typically remains isolated since water in the clean waste system is of insufficient quality to be mixed with makeup water to the RCS."	This valve will be disassembled and inspected each refueling outage to demonstrate the valve's ability to close.	The only practical method to verify the closure capability of this valve is by disassembly and inspection. The proposed alternate testing is in accordance with Part 10, ¶4.3.2.4(c). The licensee states that the valve has a "passive status", however the valve is identified in the Table as an active valve. The licensee should clarify or correct the justification.
ROJ-8	SW-604A and B, Auxiliary Building Electrical Room Emergency Chillers Discharge Check Valves	"These are check valves with no external means for exercising and no external position indication mechanism. There is not any flow instrumentation in these lines. The only means of quantifying flow in these lines would be to use portable flow instrumentation. ANO considers it a hardship to setup the portable flow instrumentation on a quarterly basis."	These valves will be partial-stroke exercised quarterly and full-stroke exercised at refueling outages.	It is impractical to full-stroke exercise these valves quarterly or at cold shutdowns due to the need to set up test equipment. The alternative provides partial-stroke exercising quarterly and full-stroke exercising during refueling outages in accordance with OM Part 10, ¶4.3.2.2 (d).

	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
ROJ-9	CS-1196 and 1198, EFW Pump Bearing Cooling Discharge Check Valves.	"These are check valves with no external means for exercising and no external position indication mechanism. These check valves are in one half inch piping downstream of manual throttle valves. The manual valves were throttled by monitoring the emergency feedwater pump bearing temperature. There is not any flow instrumentation in this piping. There is not any installed temperature indication on the emergency feedwater pump bearings. The only way to monitor emergency feedwater pump bearing temperatures is with a contact pyrometer. Due to the fact that bearing temperature has to stabilize, operator burden, and equipment run time, it is not practical to perform this testing at any frequency other than once per refuel cycle. The piping in which these valves are located does not have sufficient isolation valves to verify the ability of CS-1196 and CS-1198 to open."	These valves will be verified to satisfy their safety function once per refueling cycle by monitoring bearing temperatures with contact pyrometers and comparing the temperature to limits in the pump operating procedures.	As discussed in Generic Letter 89-04, Position 1, "A check valve's full-stroke to the open position may be verified by passing the maximum required accident condition flow through the valve...A valid full-stroke exercise by flow requires that the flow through the valve be known." The licensee's proposal to use temperature does not meet the Code requirements for a full-stroke open. The licensee should prepare a relief request. Position 1 provides six elements that should be included when proposing an alternate technique. The licensee is also referred to NUREG-1482, Appendix A, Question Group 1, and Section 3.4 on skid-mounted components. Although these valves are not mounted on the EFW pump skid, they may be able to be treated as skid-mounted.