TECHNICAL EVALUATION REPORT

Duane Arnold Energy Center
IES Utilities Inc.
Pump and Valve Inservice Testing Program
Revision 13, Third Ten-Year Interval

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ENCLOSURE 3

ABSTRACT

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

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1.0 INTRODUCTION

Contained herein is a technical evaluation report (TER) of Revision 13 of the ASME Section XI Third Ten Year Program for pump and valve inservice testing (IST) submitted to the U.S. Nuclear Regulatory Commission (NRC) by IES Utilities Inc. for its Duane Arnold Energy Center on January 30, 1995 (Ref. 1). The program for this third ten year interval is based on the requirements of Section XI of the ASME Boiler and Pressure Vessel Code, 1989 Edition (Ref. 2). The 1989 Edition of Section XI provides that the rules for inservice testing of pumps and valves are as specified in ASME/ANSI OMa-1988, Parts 1, 6 and 10 (Refs. 3, 4, 5).

This program revision supersedes all previous submittals. The Duane Arnold Energy Center is a General Electric Boiling Water Reactor (BWR) which began commercial operation on February 1, 1975. The third ten year inspection interval is defined for the Duane Arnold Energy Center as beginning February 1, 1995 and ending January 31, 2005.

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 and applicable addenda, except where specific relief has been requested by the licensee and granted by the Commission pursuant to §50.55a ¶(a)(3)(i), (a)(3)(ii), or (f)(6)(i). IES Utilities Inc. has requested relief from certain ASME Section XI testing requirements. A review of the relief requests was performed using Section 3.9.6 of the Standard Review Plan (Ref. 7), Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," (Ref. 8), the Minutes of the Public Meeting on Generic Letter 89-04, dated October 25, 1989 and September 26, 1991 (Refs. 9, 10), and Supplement 1 to Generic Letter 89-04 which contains NUREG-1482, "Guidelines for Inservice Testing Programs at Nuclear Power Plants," (Ref. 11). 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. As discussed in NUREG-1482, Section 2.2, relief requests for non-Code components do not require NRC evaluation and approval and, therefore, are not included in this TER.

Section 2.0 of this report presents the evaluation of four of seven pump relief requests submitted. Section 3.0 presents the evaluations of seven of twenty-one valve relief requests submitted. Two pump relief requests and seven of the fourteen other valve relief requests are for non-ASME Code classified components and NRC approval is not required in accordance with the regulations. The remaining pump relief request was previously evaluated (Ref. 12). The seven other valve relief requests are authorized by Generic Letter 89-04 and, consequently,

are not specifically evaluated in this Technical Evaluation Report. However, any anomalies associated with these relief requests are addressed in Section 5 of the report. The evaluation of justifications for deferring quarterly valve testing are presented in Section 4.0. Section 5.0 summarizes the actions required of the licensee resulting from the TER evaluations of the relief requests, the deferral justifications, a systems review, and programmatic aspects, while Section 6.0 lists the references.

2.0 PUMP RELIEF REQUESTS

In accordance with §50.55a, IES Utilities Inc. has submitted five relief requests for pumps at the Duane Arnold Energy Center which are subject to inservice testing under the requirements of OMa-1988, Part 6. Relief Request PR-07 was previously evaluated by the staff (Ref. 12). The other four relief requests have been reviewed to verify their technical basis and determine their acceptability. These relief requests, along with the technical evaluation by BNL, are summarized below.

2.1 Pump Relief Request No. PR-02, River Water, Core Spray and RHR Pumps

Relief Request: The licensee has requested relief from the requirements of Part 6, ¶5.2 which requires measurement of test parameters at a given reference value(s), and ¶5.6, which requires test parameters to be measured two minutes after stable conditions are achieved, for the river water, core spray and residual heat removal (RHR) pumps.

Proposed Alternate Testing: The licensee has proposed measuring differential pressure (ΔP) at a flowrate above and below the reference flowrate, and calculating the ΔP at the reference flowrate by linear interpolation. The licensee will bound the flowrates where data is taken to ensure that the linear interpolation is valid.

Licensee's Basis for Relief: The licensee states: "Operating experience has shown that flow rates (independent variables during inservice performance testing) for these pumps cannot be readily duplicated with the present flow control systems. Flow control for these systems can only be accomplished through the operation of large valves as throttling valves. Because these valves are not generally equipped with position indicators which reflect percent open, the operator must repeatedly "jog" the associated motor or air operator to make minor adjustments in flow rate. These efforts to exactly duplicate the reference flowrate require excessive valve manipulation which could ultimately result in damage to valves and their operators.

Since using this method precludes operating the pumps at the "established" reference conditions for any appreciable period of time, the 2-minute run time (interpreted to be at reference conditions) can only be applied at those points where data is taken.

The method described... is essentially equivalent to that required per Part 6, Paragraph 5.2 and will provide an equal measure of assurance of pump operability to that of the Code."

Evaluation: The licensee has stated that it is impractical to comply with the Code requirements, based on the difficulty of configuring the system to replicate the reference flowrate at every test and the potential for valve damage due to throttling (i.e., jogging) valves

that are not designed for throttling nor equipped with position indication. It is suggested that the licensee review NUREG-1482, Section 5.3. The staff has recognized that certain designs do not allow the setting of flowrates at an exact value, and allows a ±2 percent tolerance of the reference value without approval from the NRC. The licensee has stated that the flowrates where data is taken will be bounded, to ensure that the linear interpolation is valid, but, has not provided specific information on the range of data. If the licensee's procedures restrict the data to ±2 percent, relief is not required.

If the licensee determines that setting the reference value to ±2% of the reference flow is impractical for these pumps, the licensee's proposed method of determining the differential pressure at the reference flowrate based on interpolation of two data points provides an acceptable means of determining pump degradation. The calculated ΔP will be equal to or lower than the actual ΔP, based on the concavity of a pump curve, and, therefore, will cause the pump to enter the lower required action range sooner. In general, degraded pumps will not get better, i.e., have a higher ΔP. The intent of the Code, as documented in a paper given by J. Zudans on the technical differences between Part 6 and Section XI, Subsection IWP at the First ASME/NRC Pump and Valve Symposium (Ref. 13), is that the high alert range is provided to assure test repeatability and to identify instrument fluctuations. Therefore, the lower than actual ΔP should not impede the determination of pump degradation. The licensee should ensure that the calculation method meets quality assurance requirements and is included in a procedure.

The Code, ¶5.6, requires test parameter measurement to be taken after the pump is run at least two minutes after pump conditions are stable. The licensee's proposal to apply the 2-minute run time at those points where data is taken complies with these requirements and relief from ¶5.6 is not required.

Provided the licensee reviews the testing for these pumps and documents the impracticality of performing inservice testing at the reference flowrate ±2 percent, and proceduralizes the calculation, it is recommended that the alternative proposed by the licensee be authorized in accordance with 10CFR50.55a(a)(3)(i), as the alternative provides an acceptable level of quality and safety.

2.2 HPCI Pump

2.2.1 Relief Request No. PR-03, Instrumentation

Relief Request: The licensee has requested relief from the instrument accuracy and range requirements of Part 6, ¶4.6.1.1 and 4.6.1.2 for the HPCI pump.

Proposed Alternate Testing: "During inservice testing of the HPCI pump, suction pressure will be measured with the installed instrumentation. During testing a digital Multimeter will be inserted into the instrument loop, yielding readings equivalent to a 0-60 psi, 2% of Full-Scale pressure gauge."

Licensee's Basis for Relief: The licensee states: "The instrumentation loop accuracy for HPCI pump suction pressure is ±2.06 percent (excluding calibration) and the range is -30" Hg - 85 psig.

The installed HPCI suction pressure gauge is sized to accommodate post accident torus pressures (85 psig); however, during testing the only source of pressure for the HPCI suction line comes from the head of the condensate storage tank (approximately 20 psig). Given the installed instrument loop, the maximum reading error is less than 2.5 psi. Considering that the typical HPCI pump differential pressure during inservice testing is approximately 1,100 psid, an additional error of 2.5 psi in reading the pump suction pressure is inconsequential with respect to evaluating pump operability or degradation.

During the first and second ISI inspection intervals the test results obtained using this instrumentation have proven to be satisfactory and consistent providing reliable information."

Evaluation: The Code, ¶4.6.1, requires pressure instrumentation to have an accuracy of ±2% of the full range, which can be up to three times the reference value for analog instruments. Based on discussions between Mr. William Huffman, NRC, with Mr. William Connoley, IES, the HPCI suction pressure is normally measured with a electro-mechanical transmitter, which is connected to an analog gauge. This arrangement yields an accuracy of 2.06%. During inservice testing, however, the electro-mechanical transmitter will be connected to a digital multimeter. The Code requires the reference value, when using digital instruments, not to exceed 70% of the calibrated range of the instrument and an accuracy of ±2 percent over the calibrated range. The licensee stated that the proposed instrument loop to be used for IST yields an accuracy of 0.7%. Based on the information provided, the Code accuracy and range requirements for digital instruments are met and no relief is required.

2.2.2 Relief Request No. PR-04, Test at Reference Value

Relief Request: The licensee has requested relief from the requirements of Part 6, ¶5.2, which requires measurement of test parameters at a given reference value(s) for the HPCI pump, and ¶5.6, which requires test parameters to be measured two minutes after stable conditions are achieved.

Proposed Alternate Testing: The licensee proposes to use a pump reference curve. The pump will be run for 2 minutes before any data is taken. However, at each data point on the curve, the pump will only be run until stable conditions are achieved.

> "Pump differential pressure and flow rate will be evaluated using a reference value test derived pump curve over a limited range of pump operation. This reference value test pump curve will be restricted to an operating regime that is representative of the pump operation under accident conditions or conditions that are the most sensitive indicator of pump degradation.
>
> Based on the reference value test pump curve, acceptance criteria curves will be established for the upper and lower required action and alert range limits.
>
> Detailed Technical Description:
>
> The reference value curve will be established by measuring a minimum of five (5) sets of differential pressure/flowrate data when the pump combination is

known to be operating acceptably. The measurements will be distributed across the expected range of potential inservice test conditions.

The equation for the reference value curve will then be computed using a third order polynomial regression technique that employs a least-squares fit of the data by successive polynomials of orders 1 through 3. The standard deviation about the regression line will be evaluated for each case. The resulting reference value curve is expressed as a third order polynomial in the general form:

$y=a_3x^3+a_2x^2+a_1x+a_0$, where y is the dependent variable and x is the independent variable.

The Required Action and Alert Range Curves will be scaler multiples of the reference value curve.

The measurements taken during inservice testing will be restricted to only those falling within the envelope of reference value test measurements. The inservice test differential pressure/flowrate test results will be plotted on a typical pump curve or evaluated by an equivalent tabular method and the results included in the permanent test records.

Finally, the combined differential pressure/flowrate test results will be evaluated for variation from test-to-test to identify any pump degradation. In addition, the results of all IST testing will be evaluated with respect to operability criteria for flowrate and differential pressure set forth in the DAEC Technical Specifications and UFSAR.

Pump vibration values will be measured at the highest and lowest points used for constructing the pump curve. From this data the vibration acceptance criteria will be derived in accordance with Part 6, Paragraph 6.1 and Relief Request PR-07 using the most conservative vibration data.

When the reference curve may have been affected by repair, replacement, or routine service, a new reference curve will be established or the previous curve will be revalidated by conducting an inservice test.

Pump operating run time is limited by torus temperature limitations, thus allowing the pump to stabilize for 2 minutes at each data point may cause torus temperature to rise to a point where the test may be prematurely terminated. To alleviate this concern during reference value tests, initially the pump will be operated under nominal conditions for at least 2 minutes to allow instrument stabilization. Following this, the flowrate will be adjusted as required to obtain the required number of data points. At each data point readings will be taken as soon as conditions stabilize; however, the 2-minute operation time at each data point will not be imposed."

Licensee's Basis for Relief: The licensee states: "Operating experience has shown that flow rates (independent variables during inservice performance testing) for the HPCI pump cannot be readily duplicated with the present flow control systems. Efforts to exactly duplicate the reference values would require excessive valve manipulation which could ultimately result in damage to valves or operators. In order to perform accurate trending and data analysis, the use of an accurate reference value is very important. The complexities of the flow control systems found within these systems makes it extremely difficult to exactly duplicate the reference values.

Current NRC policy promulgated via NUREG-1482 allow using a 'graphical' method of test result interpretation."

Evaluation: The licensee states that exactly duplicating the reference flowrate during inservice testing requires excessive valve manipulation due to a lack of precise means of throttling the HPCI pump flow rate. The potential exists for valve damage due to throttling (i.e., jogging) valves that are not designed for throttling. As discussed in NUREG-1482, however, exact duplication of the reference value is not necessary. Section 5.3 of the NUREG explains that a tolerance of ±2 percent of the reference value is acceptable and relief is not required to use this tolerance. The licensee should evaluate this guidance and determine if relief is still necessary. Other BWR plants have not requested relief from these requirements for the HPCI and RCIC pumps. If relief is necessary, the licensee should discuss the range of flowrates experienced.

The staff in NUREG-1482, Section 5.2, provides guidance for utilizing pump curves when it is impractical to establish a fixed set of reference values. The licensee complies with the seven elements identified in Section 5.2, except for element 6. The licensee states that "Pump vibration values will be measured at the highest and lowest points used for constructing the pump curve. From this data the vibration acceptance criteria will be derived in accordance with Part 6, Paragraph 6.1 and Relief Request PR-07 using the most conservative vibration data." Pump vibration readings may vary widely with changes in pump flowrate. The highest and lowest flowrates may not yield the most conservative vibration readings. The licensee should evaluate vibration levels at each point on the curve before determining the acceptance criteria. Provided the licensee evaluates the vibration levels over the range of pump conditions and determines that it is impractical to attain the reference value ±2%, relief in accordance with 10CFR50.55a(f)(6)(i) may be recommended.

The licensee has also requested relief from OMa-1988, Part 6, ¶5.6 which requires that after the pump conditions are as stable as the system permits, each pump shall be run at least two minutes. At the end of this time, measurement of the required parameters shall be made. The licensee has proposed to run the pump for 2 minutes before any data is taken when constructing the reference curve. However, at each of the five data points on the curve, the pump will only be run until stable conditions are achieved. The licensee has based the justification on the increase in suppression pool temperature. However, no specific information on the suppression pool temperature increase experienced during testing has been provided. The licensee must provide additional information before a recommendation to approve the alternate in accordance with 10CFR50.55a(a)(3)(ii) can be made. The licensee should revise and resubmit the request with the additional information discussed above.

2.2.3 Relief Request No. PR-05, Test Each Pump

Relief Request: The licensee has requested relief from the requirements of Part 6, ¶4 and 5 which require an inservice test to be run on each HPCI pump.

Proposed Alternate Testing: The licensee has proposed to measure the differential pressure of the HPCI pump combination (i.e., the booster and main pump).

Licensee's Basis for Relief: The licensee states: "There are no suitable provisions for measuring the pressure in the cross-over piping between the HPCI booster and main pumps. Since these pumps are driven by a common driver and are connected in tandem, they are necessarily tested together, simultaneously, under the same operating conditions (flowrate and turbine speed). Therefore measuring the inlet pressure of the booster pump and calculating the differential pressure of the pump combination will effectively verify operability and serve to monitor the performance of the pair."

Evaluation: The HPCI main and booster pumps are driven by the same turbine. They are coupled together on the same shaft and act as a unit to provide high pressure reactor coolant makeup. The flowrate through both pumps is essentially the same (There is a small amount of flow from the booster pump discharge that is diverted to the barometric condenser for condensate). There is no provision for measuring the pressure at the discharge of the booster pump, which is the suction of the main pump. It is not practical to test these pumps for hydraulic degradation independently. The licensee has proposed to measure and evaluate the differential pressure across both pumps and apply the Code acceptance criteria. This proposal provides an acceptable level of quality and safety to determine pump hydraulic degradation as any degradation in the performance of either or both pumps would be seen as a change in the differential pressure across the combination. Therefore, it is recommended that relief be granted in accordance with 10CFR50.55a(f)(6)(i).

3.0 VALVES IST PROGRAM RELIEF REQUESTS

In accordance with §50.55a, IES Utilities Inc. has submitted fourteen relief requests for valves at the Duane Arnold Energy Center which are subject to inservice testing under the requirements of OMa-1988, Part 10. Seven of these relief requests have been reviewed to verify their technical basis and determine their applicability. These relief requests, along with their technical evaluation by BNL, are summarized below. The other seven relief requests (i.e., VR-03, 5, 6, 13, 18, 19, and 21) propose alternate testing as discussed in NRC Generic Letter 89-04, Positions 1, 2, or 7, and have not been specifically evaluated. Duane Arnold's IST Program was written to comply with the 1989 Edition of Section XI. This edition references OMa-1988 Part 10 for valve testing. Generic Letter 89-04 does not address Part 10. Part 10 has not been revised to address control rod drive (CRD) valve testing nor full-stroke check valve exercising, and the guidance provided in Generic Letter 89-04 remains valid. Part 10, unlike earlier versions of Section XI, discusses disassembly and inspection in lieu of check valve exercising with flow. Part 10, however, does not discuss a sampling technique and requires that disassembly be performed each refueling outage. The NRC, as documented in Generic Letter 89-04 Position 2, recognized that disassembling all applicable valves each refueling outage may be burdensome and allowed grouping of similar valves and a

sampling plan such that one valve of the group is inspected each refueling outage, with any one valve disassembly not to exceed once every six years. The ASME Code Committees have since revised the OM Code to allow a sampling technique (i.e., in the 1994 Addenda). However, this code has not been endorsed by the NRC in §50.55a. The relief is granted in accord with Generic Letter 89-04, Position 2, pursuant to 10 CFR 50.55a(g)(6)(i) [now 10 CFR 50.55a(f)(6)(i)] provided the alternative is in compliance with all of the guidance delineated in Position 2. The relief requests indicate that the disassembly and inspection program is in compliance with such guidance.

3.1 Generic Valve Relief Requests

3.1.1 Relief Request No. VR-01, Solenoid Valves

Relief Request: The licensee has requested relief from the requirements of Part 10,¶4.2.1.6, which requires valves with fail-safe actuators to be tested by observing the operation of the actuator upon loss of valve actuating power, and ¶4.2.1.4(b), which requires the stroke time of all power operated valves to be measured.

Proposed Alternate Testing: The licensee has proposed that normal stroking of the air-operated valves or the associated solenoid valve to its safety position constitutes a fail-safe test as required. Proper operation of the main valve (stroke time) will be used to assure that the associated solenoid pilot valve is also operating satisfactorily. No additional testing of these valves will be performed.

Licensee's Basis for Relief: The licensee states: "Solenoid valves which control the air supply to air-operated valves typically stroke to their fail-safe position upon interruption of their electric power. De-energizing the solenoid valve has the same effect as a loss of electrical power or control air, therefore, the normal stroke constitutes a fail-safe test. In addition, these pilot valves have no position indication making stroke time measurements impractical."

Evaluation: The Code, OMa-1988, Part 10, ¶4.2.1.6, requires valves with fail-safe actuators be tested by observing the operation of the actuator upon loss of valve actuating power. If normal stroking of a valve to its fail-safe position has the same affect as the loss of actuator power (e.g., the control switch deenergizes an electrically-operated valve, or operates a solenoid valve which isolates and vents the motive gas from a pneumatically-operated valve), then a normal exercise to the fail-safe position would satisfy the requirements of ¶4.2.1.6 and relief is not required. The licensee has stated that normal stroking of the air-operated valve or associated solenoid valve to its safety position constitutes a fail-safe test, therefore, relief is not required.

The licensee has proposed that testing the air-operated valves adequately assures the satisfactory operation of the associated solenoid valves. The staff in NUREG-1482, Section 3.4, addresses testing skid-mounted components and component subassemblies (e.g., solenoid valves for the main steam isolation valves). In this guidance, the staff has determined that the testing of the major component is an acceptable means for verifying the operational readiness of the skid-mounted and component subassemblies, provided the licensee documents this approach in

the IST program. Relief is not required to use this guidance. The licensee should continue to document this position in the IST program.

3.1.2 Relief Request No. VR-02, Excess Flow Check Valves

Relief Request: The licensee has requested relief from the requirements of Part 10,¶ 4.1, which requires position indication to be locally verified at least once every 2 years; ¶4.2.2.3(a), which requires Category A valves to be seat leakage rate tested at least once every 2 years; and ¶4.3.2.1, which requires check valves to be exercised nominally every 3 months.

Proposed Alternate Testing: The licensee has proposed to exercise these valves during each reactor refueling outage in accordance with DAEC Technical Specifications, Section 4.7.D. During these tests, downstream tubing will be vented and drained and valve performance monitored by individual valve position indication and the cessation of flow from the instrument tubing. Following testing, each valve is opened by actuating a solenoid-operated bypass valve that equalizes pressure and allows the valve to reset (open).

Licensee's Basis for Relief: The licensee states: "Exercising of these valves during normal plant operation is impractical since it requires isolating instrumentation downstream of the excess flow check valves. Much of this instrumentation is related to safety functions and isolation is thereby undesirable due to the potential for creating a plant transient or trip. Normally, testing of these valves is performed during the shutdown evolution period when the cooldown is halted and an elevated reactor pressure is available to close the valves. If this were done at each cold shutdown per Part 10, Para. 4.3.2.2 it would result in a severe negative impact on outage time and plant availability.

It should be noted that these valves see little or no flow and function essentially only during the exercise testing. Also, the significant internal components are fabricated from corrosion-resistant materials that are not expected to degrade during the plant lifetime. For these reasons, general seat degradation is highly unlikely.

The testing required per the DAEC Technical Specifications is inclusive of exercising, leakage testing and position indication verification; thus it is not practical to perform the various tests at different frequencies (2 years vs. refueling outage)."

Evaluation: These are Category A/C valves installed in instrument sensing lines penetrating containment. These valves are normally open and close following an instrument line break. The only test method available to stroke them closed is to isolate the instrumentation, and vent the line downstream of the valve. The valves are then stroked open by opening a solenoid-operated bypass valve, which equalizes the pressure. The licensee has proposed deferring exercise testing of all excess flow check valves to during shutdowns for refueling outages based on the impracticality of testing at cold shutdowns or quarterly. The licensee has stated generically that isolating the instrumentation during operation increases the potential for a plant transient or trip. The licensee has stated that it is impractical to test these valves during the cooldown to cold shutdowns due to the "negative impact on outage time and plant availability." The licensee should review the function and effect of isolating each excess flow check valve to ensure that the statement that isolating the instrument could cause a plant

transient is accurate for all the subject valves. If isolating some of the valves will not jeopardize continued plant operation, the licensee should perform testing quarterly or revise the request to justify the burden of complying with the Code. Specific information must be provided. For those valves whose isolation could cause a transient or plant trip, it is impractical to perform testing quarterly. Additionally, it is impractical to perform testing at cold shutdowns due to the delay in shutting down or starting up the reactor. The Technical Specification requirements provide an adequate level of quality and safety. Therefore, it is recommended that relief for these valves be granted in accordance with §50.55a(f)(6)(i).

Although the licensee has requested relief from the requirements of 4.1 and 4.2.2.3(a) which require position indication to be verified and leak rate testing to be performed every two years, based on the 18 month refueling cycle, relief is not required. Testing at refueling outages, or every 18 months, will satisfy the Code requirement to test every two years.

3.2 Relief Request No. VR- 04, CRD Accumulator Rupture Disks

Relief Request: The licensee has requested relief from the requirements of Part 1,¶ 1.3.4.2, which requires Class 2 and 3 non-reclosing pressure relief devices to be replaced every 5 years, for the CRD accumulator rupture disks, PSE-1848-HCU#.

Proposed Alternate Testing: The licensee has not proposed any alternate.

Licensee's Basis for Relief: The licensee states: "These rupture discs protect the CRD accumulators from bursting thereby creating a personnel hazard. There is no specific reactor safety function associated with these components."

"Each of the 89 CRD accumulators is provided with a rupture disk to ensure that a tank is protected from shattering and becoming a personnel hazard. The failure of a rupture disc to relieve or to rupture prematurely is not expected to impact reactor plant safety in any manner since it is unlikely that:

- more than one disc would fail simultaneously; or
- a disc would fail coincidentally with a reactor accident.

There is no history of failure of these rupture discs throughout the industry, thus there is little gain in expending the significant plant resources that would be required for wholesale replacement of these discs. In addition, there is the possibility that the disturbance of the components may ultimately result in leakage and future maintenance problems."

Evaluation: OM Part 10, ¶4.4.2 requires rupture disks, that protect systems which perform a required function in shutting down the reactor, in maintaining the cold shutdown condition, or in mitigating the consequences of an accident from overpressure, to meet the requirements of Part 1 for non-reclosing pressure relief devices. Part 1, ¶1.3.4.2, requires Class 2 and 3 non-reclosing pressure relief devices to be replaced every 5 years, unless historical data indicates a requirement for more frequent replacement.

The licensee states that there is no specific reactor safety function associated with these components. At the March 1995 ASME O&M Committee Meeting, it was reported to the OM-1 Working Group that the BWR Owner's Group has reviewed the function of these rupture disks and determined that they are not safety related. As discussed in Section 4.3.1 of NUREG-1482, if the rupture disks do not perform a necessary safety or overpressure protection function, they may be removed from the scope of the IST program.

Additionally, these rupture disks are installed on the nitrogen side of the accumulators. The licensee has not discussed in Section 3 of the IST Program how the ISI-class boundaries were developed. The licensee should review the Code classification of the nitrogen system per the guidance in Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," to evaluate if these rupture disks are within the scope of 10CFR50.55a (Ref. 14).

If the licensee has determined that these disks are within the scope of the regulations (i.e., are ASME Code Class) and are necessary for the protection of the nitrogen system from overpressure, then additional information is required to support the request. It appears that the licensee is seeking approval under 10CFR50.55a(a)(3)(ii), which states that alternatives may be authorized when compliance with the requirements of the Code would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee must provide additional information concerning the hardship of complying with the Code, before the request could be authorized. As stated by the licensee, there is no industry experience with these rupture disk failures. A review of the INPO NPRDS database by BNL revealed only one CRD rupture disk failure, which occurred at Browns Ferry Unit 3 in 1984.

3.3 Relief Request No. VR-14, HPCI Barometric Condenser Relief Valve

Relief Request: The licensee has requested relief from the requirements of Part 1,¶1.3.4.1(d) and 1.3.4.1(e), which requires the limiting as-found set-pressure for safety/relief valves to be equal to 1.03 times the stamped set pressure, for the HPCI Barometric Condenser Relief Valve, PSV-2223.

Proposed Alternate Testing: The licensee has proposed to establish the upper limit for this valve's set point, as it applies to Paragraph 1.3.4.1, at 17 psig.

Licensee's Basis for Relief: The licensee states: "For this valve the stamped set pressure is 15 psig which requires that the limiting setpoint would be 15 times 1.03 or 15.45 psig. Meeting this requirement on a consistent basis would not be practical and, as result, this valve would be subjected to repeated unnecessary adjustments and maintenance.

Assigning an upper limit for this valve's set point of 17 psig will not significantly affect the reliability of the HPCI system nor endanger any equipment."

Evaluation: As discussed in NUREG-1482, Section 4.3.9, the 1994 Addenda of the OM Code (Ref. 15) has provided clarification on testing relief valves. This includes clarification to the requirements for testing additional valves. The 1994 Addenda of the OM Code requires when the

as-found set pressure exceeds the greater of either the ± tolerance limit of the Owner specified set-pressure acceptance criteria or ±3% of valve nameplate set pressure, two additional valves shall be tested from the same valve group (i.e., same manufacturer, type, service, application, and service , media). If the as-found set pressure of any of the additional valves exceeds the criteria noted therein, then all the remaining valves of the same valve group shall be tested. The Owner is required to evaluate the cause and effect of valves that fail to comply with the Owner specified acceptance criteria or other required tests. Based upon this evaluation, the Owner is required to determine the need for testing, in addition to the minimum tests specified, to address any generic concerns which could be applied to valves in the same or other valve groups. The Owner is also responsible for establishing the acceptance criteria, based upon system and valve design basics or technical specifications, and documenting the acceptance criteria (OM Code, Appendix I, ¶¶ 1.3.1(e) and ¶ 1.3.2(c)).

As discussed in the NUREG, relief is not required to use this clarification. The licensee should ensure that, in addition to establishing, documenting, and using Owner specified acceptance criteria, the required actions if a valve fails that acceptance criteria, as discussed above, are also met. Use of this clarification should be documented in the licensee's IST Program.

3.4 Relief Request No. VR-16, Vacuum Breaker Valves

Relief Request: The licensee has requested relief from the requirements of Part 1,¶1.3.4.1(d) and 1.3.4.1(e), which requires the limiting as found set pressure for safety/relief valves to be equal to 1.03 times the stamped set pressure, for the vacuum breaker valves, PSV-4439A through F.

Proposed Alternate Testing: The licensee has proposed to establish the upper limits for determining the operability of vacuum breakers based on system and component functional requirements.

Licensee's Basis for Relief: The licensee states: "For these vacuum breakers with .5 psig setpoints, compliance with this requirement is beyond the capability of test equipment. Meeting this requirement on a consistent basis would not be practical and, as a result, these valves would be subjected to repeated unnecessary adjustments and maintenance.

Assigning upper limits for these valves' set points based on system design and functional requirements will not significantly affect the reliability of the affected systems nor endanger any equipment."

Evaluation: As discussed in NUREG-1482, Section 4.3.9, the 1994 Addenda of the OM Code has provided clarification on testing relief valves. This includes clarification to the requirements for testing additional valves. The 1994 Addenda of the OM Code requires when the as-found set pressure exceeds the greater of either the ± tolerance limit of the Owner specified set-pressure acceptance criteria or ±3% of valve nameplate set pressure, two additional valves shall be tested from the same valve group (i.e., same manufacturer, type, service, application, and service , media). If the as-found set pressure of any of the additional valves exceed the criteria noted therein, then all the remaining valves of the same valve group shall be tested. The Owner is required to evaluate the cause and effect of valves that fail to comply with the

Owner specified acceptance criteria or other required tests. Based upon this evaluation, the Owner is required to determine the need for testing, in addition to the minimum tests specified, to address any generic concerns which could be applied to valves in the same or other valve groups. The Owner is also responsible for establishing the acceptance criteria, based upon system and valve design basics or technical specifications, and documenting the acceptance criteria (OM Code, Appendix I, ¶I 1.3.1(e) and ¶ 1.3.2(c)).

As discussed in the NUREG, relief is not required to use this clarification. The licensee should ensure that, in addition to establishing, documenting, and using Owner specified acceptance criteria, the required actions if a valve fails that acceptance criteria, as discussed above, are also met. Use of this clarification should be documented in the licensee's IST Program.

3.5 Relief Request No. VR-22, MSIVs

Relief Request: The licensee has requested relief from the requirements of Part 10,¶4.2.1.8(d), which requires corrective action in accordance with ¶4.2.1.9 when the stroke time of the MSIVs, CV-4412 through 4416 and 4418 through 4421, exhibits more than ±50 percent change in stroke time when compared to the reference value.

Proposed Alternate Testing: The licensee has proposed to establish the acceptance criteria for these valves based on the DAEC Technical Specifications, 3-5 seconds. No reference values will be established, nor will the acceptance criteria of Part 10, Para. 4.2.1.8(d) be applied to the test results.

Licensee's Basis for Relief: The licensee states: "The stroke times of these valves are adjusted within an acceptable band of 3-5 seconds by adjusting orifices associated with hydraulic dashpots attached to each operator. Thus, the stroke time performance of each valve operator is more a function of the dashpot setting than the material condition of the valve.

The strict acceptable band of ±1 second is restrictive enough to ensure that each of the valves remains operable within the established limits of the plant safety analyses.

Elimination of the ±50 percent limit on deviation will have no significant impact on the reliability of these valves nor on the health and safety of the public."

Evaluation: The licensee has not provided information on the expected reference stroke time for the MSIVs. The Code, OMa-1988, Part 10, ¶3.3, requires establishment of the reference value based on preservice or inservice test results, when the valve is known to be operating acceptably. Based on the licensee's request, however, the reference value would have to be somewhere between 3 and 5 seconds. Paragraph 4.2.1.8(d) would require corrective action when the stroke time exceeded 1.5 to 4.5 or 2.5 to 7.5 seconds, based on the reference value. The licensee has implied that the valve will be declared inoperable and adjusted when the valve stroke time does not fall within 3-5 seconds. It appears that the licensee's proposal provides an equivalent level of quality and safety to the Code, and it is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

3.6 Relief Request No. VR-23, Emergency Service Water Valves

Relief Request: The licensee has requested relief for the emergency service water valves, CV-1956A and B, CV-2080, and CV-2081, from the requirements of Part 10, ¶4.2.1.8(d), which specifies the acceptance criteria for air-operated valves with reference stroke times less than or equal to 10 seconds.

Proposed Alternate Testing: The licensee has proposed to exercise these valves every three months. During this testing, valve operation will be observed, and a stroke time "estimated based on valve stem movement. Because the stroke time is estimated, the results of this test will be evaluated with respect to the maximum allowable stroke time of Part 10, Para. 4.2.1.4 (a). The acceptance criteria of Part 10, Para. 4.2.1.8.(d) will not be applied to the test results."

Licensee's Basis for Relief: The licensee states: "CV-1956A & B are actuated by the starting logic of the associated emergency service water pump, with no individual control handswitch. Also, there are no position indicators for these valves. The test sequence requires an operator to be stationed at the valves, which are physically separated from the pumps, to measure the stroke time of the valve. The operator starts timing upon announcement of the ESW pump start and stops timing based upon the cessation of valve stem movement. For these reasons, precise stroke time measurements are impractical. CV-2080 and CV-2081 do not have position indication. To measure the stroke times of these valves the operator starts timing upon operation of the handswitch for the valve and stops timing based upon cessation of valve stem movement. Thus precise stroke time measurements are impractical."

Evaluation: These emergency service water valves are not provided with position indication. Valve obturator movement is determined by an operator observing the stem movement once the pumps are started (CV-1956A & B) or the handswitch is operated (CV-2080 and 2081). Precise stroke time measurement is difficult. The Code, however, only requires stroke times to be measured to the nearest second. The licensee has not provided information on the normal range of stroke times for these valves (although they must be operated under 10 seconds based on the request).

The licensee has proposed declaring the valve inoperable only when the valve exceeds the limiting stroke time. The licensee has not provided information on this limit. Corrective action in accordance with ¶4.2.1.9(b) will not be taken when the stroke time exceeds more than ±50% of the reference value. Paragraph 4.2.1.9(b) allows, when the valve exceeds the acceptance criteria of ¶4.2.1.8, the valve to be retested, and, if the second test fails the acceptance criteria of ¶4.2.1.8, an analysis may be performed to verify that the valve is operating acceptably. The Code requirements do not appear to be excessively burdensome. Based on the lack of sufficient information to determine the burden or impracticality of complying with the Code requirements, relief cannot be recommended. The licensee should comply with the Code requirements or revise the request to include information on the normal and limiting stroke times, including the basis. The proposed alternative must provide a means for detecting and correcting valve degradation before a valve cannot perform its intended safety function.

4.0 DEFERRED TESTING JUSTIFICATIONS

IES Utilities Inc. has submitted 38 justifications which document the impracticality of testing valves quarterly, during operation, as required by OMa-1988, Part 10. Of the 38 deferral requests, 13 deal with testing deferred to cold shutdowns and 25 deal with testing deferred to refueling outages. Eleven of the justifications dealt with non-Code Class valves and were not evaluated. The justifications are listed in Table 4.1 and the remaining twenty-seven justifications were reviewed to verify their technical basis. Any anomalies associated with the specific justifications are presented in Section 5 of this TER. Generally, those tests involving a plant trip, damage to a system or component, or excessive personnel hazards are not considered practical. Removing one train for testing, or entering into a limiting condition of operation is not sufficient basis alone for not performing required tests, unless some other justification is provided, such as that the testing renders systems inoperable for extended periods of time (Reference Generic Letter 87-09 (Ref. 16)). As discussed in Generic Letter 91-18 (Ref. 17), it is not the intent of IST to cause unwarranted plant shutdowns or to unnecessarily challenge other safety systems. Other factors, such as the effect on plant safety or risk, and the difficulty of the test may be considered.

Table 4.1-Evaluation of DAEC's Deferral Justifications

ITEM NO.	VALVE IDENTIFICATION	LICENSEE'S JUSTIFICATION FOR DEFERRED TESTING	EVALUATION
CSJ-01	CV-4428, 4429, Reactor Vessel Head Vent Air-operated Valves	"These valves cannot be cycled during reactor operation. To do so would cause an unnecessary reactor transient which would affect continued reactor operation."	From the information presented in the justification it is not apparent why cycling each of the two valves in series would cause a reactor transient. The licensee should clarify why quarterly testing is impractical and review the safety function of these valves. Per the deferral justification, the safety function is to only provide reactor coolant pressure boundary. The licensee should evaluate whether these valves have an active safety function.
CSJ-02	MO-4841A & B, RBCCW Drywell Isolation Valves	"During plant operation, these valves are open to supply (and return) cooling water to (and from) reactor recirculation pump components inside the drywell. These include the pump motor windings, seal water coolers and lube oil coolers. Closing these valves interrupts cooling water flow and could result in damage to pump and motor components."	Based on the potential for damage to the recirculation pumps, exercising these valves during power operation is impractical. The alternate provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).
CSJ-03	MO-4441 and 4442, Feedwater Outboard CIVs	"During plant operation at power, reactor feedwater must be supplied through both these valves to maintain reactor coolant inventory and reactor vessel water level. Closing either of these valves will isolate two of the four supplies of feedwater into the reactor vessel. This could result in thermal shock to the reactor vessel feedwater nozzles and spargers upon resumption of flow and a plant trip due to the potential for severe reactor vessel water level and power transients."	Based on the potential for damage to the nozzles and a reactor trip, exercising these valves during power operation is impractical. The alternate provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).
CSJ-04	MO-4627 and 4628, Reactor Recirculation Pump Discharge Valves	"Closing either of these valves during power operation places the recirculation system in a "single loop" configuration. Although single loop operation is possible, routinely entering into this configuration is undesirable and contrary to the prudent and safe operation of the reactor plant. In addition, operation in a single loop configuration requires a severe power reduction."	Based on the potential for reactor power transients, exercising these valves during power operation is impractical. The alternate provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

Table 4.1-Evaluation of DAEC's Deferral Justifications

ITEM NO.	VALVE IDENTIFICATION	LICENSEE'S JUSTIFICATION FOR DEFERRED TESTING	EVALUATION
CSJ-05	MO-4629 and 4630, Reactor Recirculation Pump Discharge Bypass Valves	"During normal plant operation these valves remain open to eliminate undesirable thermal stresses across the valves. (Reference GE SIL No. 104) If during testing, either of these valve were to fail in the closed position, prudency would require a plant shutdown to correct the problem and reopen the valve(s)."	The licensee states that the testing cannot be performed because of consequences if the valve failed during testing. The licensee should not base the justification simply on an assumed failure, unless the failure could cause a loss of a safety system function or the probability and risk associated with a test induced failure warrants it. For example, the NRC staff has concluded that quarterly testing of PORVs in PWRs is impractical because PORVs have shown a high probability of causing a small LOCA by sticking open. Typical valves, whose failure in a non-conservative position during exercising would cause a loss of system function, include the RHR pump discharge crossover valves for plants whose licensing bases assumes that all four cold legs are being supplied by water from at least one pump (Reference NRC Information Notice 87-01 (Ref. 18)). 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. The licensee is referred to NUREG-1482, Sections 2.4.5 and 3.1.1 for the staff's guidance on impractical conditions.
CSJ-06	Reserved		

Table 4.1-Evaluation of DAEC's Deferral Justifications

ITEM NO.	VALVE IDENTIFICATION	LICENSEE'S JUSTIFICATION FOR DEFERRED TESTING	EVALUATION
CSJ-07	MO-1908 &1909, RHR Shutdown Cooling Supply Valves	"Under normal conditions these valves could experience a differential pressure of 900 psid. Exercising these valves under these conditions could result in valve or actuator damage. In addition, with one of these valves in the open position, pressure isolation protection for the RHR system is limited to a single valve. Note also that these valves are electrically interlocked to prevent opening with reactor pressure greater than 135 psig."	Based on the potential for equipment damage and the valve interlocks, exercising these valves during power operation is impractical. The alternate provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).
CSJ-08	V-19-149 and V-20-082, RHR/LPCI Injection Check Valves	"These are simple check valves with no means of operation except other than system flow. With the reactor at operating pressures the RHR pumps cannot develop sufficient discharge pressure to open these valves."	Based on the discharge head of the RHR pumps, exercising these valves open during power operation is impractical. The alternate provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c).
CSJ-09	V-22-021 and 22, HPCI Condensate Drain Valves	"Exercising these valves to their closed position requires closing V-22-022 and performance of a seat leakage test. If HPCI were to initiate while this testing was in process, condensate could backup into the turbine exhaust piping and casing resulting in potential damage to critical components or adverse affects with respect to system performance."	As discussed in NUREG-1482, Section 3.1.2, entering a LCO is not sufficient justification alone for deferring testing. The licensee should provide additional justification or perform testing quarterly.
CSJ-10	V-22-063 and 64, HPCI Exhaust Line Vacuum Breakers	"If HPCI should initiate during the period when these valves are isolated for testing, they would not function and the operation of the HPCI system could be adversely impacted."	As discussed in NUREG-1482, Section 3.1.2, entering a LCO is not sufficient justification alone for deferring testing. The licensee should provide additional justification or perform testing quarterly.
CSJ-11	V-22-016, HPCI Turbine Exhaust Check Valve	"During plant operation this valve must be capable of opening to allow turbine exhaust steam to exit into the suppression chamber. Testing of this valve to the closed position requires downstream valves to be closed when air used to verify valve closure (sic). While the tests are in progress, the respective pump is inoperable since there is no path for exhaust steam."	As discussed in NUREG-1482, Section 3.1.2, entering a LCO is not sufficient justification alone for deferring testing. The licensee should provide additional justification or perform testing quarterly.
CSJ-12	V-24-046 and 47, RCIC Exhaust Line Vacuum Breakers	"If RCIC should initiate during the period when these valves are isolated for testing, they would not function and the operation of the RCIC system could be adversely impacted."	Not Code Class.

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
CSJ-13	V-25-036, RCIC Pump Discharge Check Valve	"Opening this valve with RCIC system flow is not practical during plant operation due to the potential for severe reactor vessel water level and temperature transients as well as possible contamination of the reactor feedwater. For these reasons the valve is provided with a local mechanical exercise capability; however, the location of the valve in the steam tunnel makes it inaccessible during power operation."	Based on plant transients or personnel hazards, exercising these valves during power operation is impractical. The alternate provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c).
CSJ-14	V-25(sic)-023, RCIC Turbine Exhaust Check Valve.	"During plant operation this valve must be capable of opening to allow turbine exhaust steam to exit into the suppression chamber. Testing of this valve to the closed position requires downstream valves to be closed when air pressure is used to verify valve closure. While the tests are in progress, the respective pump is inoperable since there is no path for exhaust steam."	Not Code Class. The valve is identified on the P&ID and in the IST Program as V-24-023.
RRJ-01	V-43-503, TIP System Purge Check Valve	"This is a simple check valve with no disk position indication and the only practical method of verifying closure is by performing a leak test. The method of leak testing for this valve requires separation of the containment penetration flange which constitutes a breach of primary containment integrity and thus not practical during plant operation. Furthermore, the testing requires approximately 20 manhours to complete. Taking into account the typical general area radiation dose rate in the vicinity of these valves at cold shutdown of 200 Mr/hour, the estimated total exposure per test is approximately 4 man-Rem. Based on the foregoing discussion, the costs and burden on the plant staff associated with cold shutdown testing of this valve is not justified by the little potential gain in plant safety afforded by this test."	Not code class.

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
RRJ-02	CV-4412, 13, 15, 16, 18, 19, 20, 21; MSIVs	"These valves have two fail-safe modes. One is loss of electric power. This mode is tested on-line (quarterly) by normal closure of each valve where the closure signal de-energizes the solenoid valves which control the actuator pilot valves. The second mode is loss of nitrogen gas pressure to the actuator. In this case the nitrogen pressure on the underside of the actuator piston, which keeps the valve open, is exhausted to atmosphere upon the failure of the supply system. The closure time is 3 to 5 seconds, after the nitrogen pressure has decayed to the point at which the air-valves reposition (internal spring force overcomes the pneumatic force). Exercising the MSIV's by closing utilizing spring force only, complies with the recommendations of General Electric Service Information Letter 477. During refueling shutdowns, the MSIV's are also cycled utilizing the accumulators only (non-safety grade nitrogen makeup is isolated) in accordance with NRC Information Notice 85-84, Inadequate Inservice Testing of Main Steam Isolation Valves. Both of these tests requires access to the drywell and a considerable expenditure of plant staff resources. This, the scope of these tests precludes testing during cold shutdown periods."	As discussed in NUREG-1482, Section 3.1.1.3, it is acceptable to extend the test interval for those valves which cannot be tested unless the containment is de-inerted, as is the case with fail-safe testing the MSIVs at Duane Arnold. Therefore, the alternate provides fail-safe exercising during refueling outages in accordance with OMa-1988, Part 10, ¶4.2.1.2(e).
RRJ-03	Reserved		

Table 4.1-Evaluation of DAEC's Deferral Justifications

ITEM NO.	VALVE IDENTIFICATION	LICENSEE'S JUSTIFICATION FOR DEFERRED TESTING	EVALUATION
RRJ-04	PSV (SV)-4400, 1, 2, 5, 6, 7; Reactor Relief Valves and Associated Solenoid Valves	"Due to the obvious potential for plant transients these valves can only be tested at very low reactor power levels with primary system pressure greater than 50 psig. The test sequence requires: a. Opening at least one turbine bypass valve discharging main steam in to the main condenser; b. Actuating the relief valve while observing the corresponding closure of the turbine bypass valve (pressure control on the turbine bypass valve is fairly quickly to respond, 1-1/2 seconds), and the response of pressure switches and thermocouples downstream of the relief valve. c. Closing the relief valve while observing the corresponding opening of the turbine bypass valve and the response of pressure switches and thermocouples downstream of the relief valves. Each relief valve actuation transmits hydrodynamic loading to the torus. The Duane Arnold Mark I Containment Plant Unique Analysis Report (PUAR) fatigue evaluation is based on 740 relief valve actuations with normal operating conditions (i.e., 740 actuations for testing purposes). Quarterly testing of each of these valves would result in 960 test actuations over plant life, which could exceed the approved design basis. Finally, the failure of any relief valve to close would cause an uncontrolled rapid de-pressurization of the primary system and plant shutdown. Testing during cold shutdowns contradicts the policy of reducing the number of challenges to safety/relief valves as recommended by NUREG-0737 and the BWR Owners Group Evaluation of NUREG-0737 Item II.K.3.16, Reduction of Challenges and Failures of Relief Valves."	As discussed in NUREG-1482, Section 4.3.4, the staff recommends reducing the number of challenges to the ADS valves by deferring testing to refueling outages, because failure in the open position is equivalent to a small break LOCA. Therefore, the alternate provides exercising during refueling outages in accordance with OMa-1988, Part 10, ¶4.2.1.2(e).

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
RRJ-05	V-14-001 and 3, Feedwater Inboard Check Valves	"These are simple swing check valves with no positive indication of disk position, thus the only means of determining closure of these valves is by performing a leak test. Such a test requires drywell and steam tunnel entry plus extensive preparations of the feedwater system including draining approximately 2000 gallons of water. Furthermore, testing of V-14-001 requires shutdown of the cleanup system which is undesirable during operations or cold shutdown. Performance of these leaktests is impossible during plant operation and impractical at cold shutdown due to the unreasonable burden on plant staff."	As discussed in NUREG-1482, Section 4.1.4, setup and performance limitations render leak testing during power operation or cold shutdowns impractical. Therefore, the alternate provides closure verification during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).
RRJ-06	V-14-009, 14, 15, 16, 32, 100, 104, 108, 112, 116, 120, 124; ADS and MSIV Accumulator Check Valves	"The position of these valves cannot be verified during normal operation since they are simple check valves and have no position indicators. The location of these valves and test isolation valves in the drywell and steam tunnel precludes testing at other than cold shutdown conditions. Due to the complexity of performing leaktests of these valves, testing at cold shutdowns would result in an unreasonable burden on the plant staff and is not justified by the little apparent gain from such testing."	Not code class.
RRJ-07	SV-1840A and B, Backup Scram Valves	"Individual testing of the backup scram valves SV-1840A and SV-1840B requires modifying the electrical configuration of the reactor protection system by jumpers, etc. and inserting a scram signal to each valve. Furthermore, testing of these valves also requires depressurization of the SCRAM air header and initiation of a full SCRAM signal. This is impractical to accomplish on a quarterly basis since testing would result in a plant trip. During cold shutdown periods the complexity and resources required to perform this testing would result in an unreasonable burden on the plant staff that is not justified by the little gain in plant safety provided by the testing. Note that per DAEC Letter NG-84-0825 the commitment to test these valves was on a refueling outage frequency."	Not code class.

Table 4.1-Evaluation of DAEC's Deferral Justifications

ITEM No.	VALVE IDENTIFICATION	LICENSEE'S JUSTIFICATION FOR DEFERRED TESTING	EVALUATION
RRJ-08	V-17-052, 53; CRD Return to Reactor Vessel Check Valves	"These are simple check valves with no positive indication of disk position thus the only means of determining closure of these valves is by performing a leak test. Such testing requires drywell entry plus extensive system preparations. Performance of these leaktests is impossible during plant operation and impractical at cold shutdown due to the unreasonable burden on plant staff. Note that this line is normally isolated and valve degradation during operation is unlikely."	As discussed in NUREG-1482, Sections 4.1.4 and 3.1.1.3, setup and performance limitations render leak testing during power operation or cold shutdowns impractical. Therefore, the alternate provides closure verification during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).
RRJ-09	V-17-062, Backup Scram Bypass Check Valve	"Testing of this valve is incorporated in the testing for the individual backup scram valves, SV-1840A and SV-1840B. (See discussion of RRJ-07 for detailed justification)	Not code class.
RRJ-10	V-17-083 & 96, Reactor Recirculation Mini Purge Check Valves	"These are simple check valves with no positive indication of disk position, thus the only means of determining closure of these valves is by performing leak tests. Such testing requires drywell entry plus extensive system preparations. Performance of these leaktests is impossible during plant operation due to the inaccessibility of the drywell and impractical at cold shutdown due to the unreasonable burden on plant staff."	As discussed in NUREG-1482, Sections 4.1.4 and 3.1.1.3, setup and performance limitations render leak testing during power operation or cold shutdowns impractical. Therefore, the alternate provides closure verification during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).
RRJ-11	CV-1849 & 1850, SV-1855 & 1856; CRD Scram Inlet and Exhaust Valves and Pilot Valves	"These valves can only be tested by verifying control rod drive performance while scramming each individual control rod. Due to the obvious operational restraints and extensive effort associated with scram testing, this is impractical to accomplish other than on a refueling outage frequency. Control rod scram testing is a normal routine test performed during each reactor refueling outage."	Generic Letter 89-04, Position 7, provides the requisite relief to perform scram testing at refueling outages in lieu of the Code required tests. The licensee has requested relief from measuring the stroke times of these valves in Relief Request No. VR-13.

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
RRJ-12	SV-1868A & B, 1869A & B; Air Pilot Valves for CV-1859A & B and CV-1867A & B, SDV Vent and Drain Valve Pilot Valves	"Testing these valves requires a considerable set-up time and initiation of a full reactor scram. During plant operation this would result in a plant trip. At cold shutdown, the expenditure of the resources and time required to test these valves is not justified by the little apparent gain in plant safety afforded by the testing."	Not code class.
RRJ-13	V-18-0118-HCU#, Charging Water Header Check Valves	"Verifying closure of these valves requires shutdown of the CRD pumps and de-pressurization of the charging header. During plant operation this is not possible as it would result in securing cooling water to the CRD's. During cold shutdown a CRD pump normally remains in operation (headers pressurized) to ensure flushing of the CRD's and prevent deposits of foreign matter in the drive mechanism."	As described in Generic Letter 89-04, Position 7, it is impractical to test these valves during operation or cold shutdowns due to the potential for equipment damage. Therefore, the alternate provides closure verification during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).
RRJ-14	V-18-1453-HCU#, Scram Exhaust Check Valves	"These valves can only be tested by verifying control rod drive performance while scramming each individual control rod. Due to the obvious operational restraints and extensive effort associated with scram testing, this is impractical to accomplish other than on a refueling outage frequency. Control rod scram testing is a normal routine test performed during each reactor refueling outage."	Generic Letter 89-04, Position 7, provides the requisite relief to perform scram testing at refueling outages in lieu of the Code required tests.

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
RRJ-15	V-19-149 and V-20-082, RHR LPCI Injection Check Valves	"These valves cannot be opened with system flow during power operation because the RHR pumps cannot develop sufficient head to overcome recirculation system pressure. They also cannot be manually stroked during operation due to their location in the drywell. In-situ testing has determined that these check valves fully open at approximately 10,000 gpm. To ensure compliance with Part 10, Paragraph 4.3.2.4, positive verification of the valve operation is required. To achieve this verification, a mechanical indicator is attached to the rotating disk pin (shaft). This testing cannot be conducted at cold shutdown because the containment is inerted with nitrogen and thus inaccessible. In order to gain personnel assess to the drywell, the nitrogen must be de-inerted (normally a 16-24 hour operation) and subsequently re-inerted before the plant is restarted (another 16-24 hour operation). Inerting and de-inerting the drywell solely for the purpose of valve testing is excessively burdensome. Additionally, a full stroke test of these valves cannot be performed with flow at cold shutdown because it would be necessary to test two channels/loops of a safety system (RHR) at the same time. Current guidance only allows the operation of one train of a safety system for surveillance purposes. One of these valves is partially stroked during cold shutdown during operation of the RHR system in the shutdown cooling mode. This is only a partial stroke test since the normal flowrate in this mode is only 4000 gpm versus the required accident flowrate of 14,400 gpm. Exercising (partial) both valves requires shifting the cold shutdown RHR system lineup. While shifting system operation to the idle loop is possible, it is a time consuming operation involving more than 8 hours of preparation and lineup work by operations personnel. This would result in an unreasonable burden on the plant staff that is not commensurate with any gain in plant safety provided by such testing."	It is impractical to exercise these valves quarterly due to the insufficient discharge head of the RHR pumps. It is also impractical to full-stroke exercise these valves during cold shutdown because access to the inerted containment is required. The licensee has proposed to part-stroke exercise only one valve each cold shutdown based on the burden of realigning the RHR system to allow testing of the other valve. Although it may be impractical to exercise both valves every cold shutdown, there may be shutdown periods of sufficient length to allow realignment of the system. If the licensee can only exercise one valve at a cold shutdown period, they should ensure that the other valve is exercised at the next cold shutdown. Therefore, the alternate provides full-stroke exercising during refueling outages and partial-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(d).

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
RRJ-16	V-21-072 & 73, Core Spray Injection Check Valves	"The only means of determining closure of these valves is by performing a leak test. Such a test requires drywell entry plus extensive preparations. Performance of these leaktests is impossible during plant operation and impractical at cold shutdown due to the unreasonable burden on plant staff."	As discussed in NUREG-1482, Sections 4.1.4 and 3.1.1.3, setup and performance limitations render leak testing during power operation or cold shutdowns impractical. Therefore, the alternate provides closure verification during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).
RRJ-17	V-21-072 & 73, Core Spray Injection Check Valves	"In order to open these valves, the core spray pumps must be operated at rated flow discharging directly into the reactor vessel. This cannot be done during normal operation because the core spray pumps are not capable of overcoming reactor pressure. Core spray injection during cold shutdown with the reactor head in place is impractical due to the difficulty of controlling reactor vessel water level. Core spray injection at rated flow would result in a vessel level increase of approximately 30" per minute. with the injection going into the vessel shroud region and high rate of change in water level and a possible difference in level between the shroud region and the main vessel, it would very easily be possible to flood the main steam lines or over-pressurize the reactor vessel if this test were performed at cold shutdown with the head in place. In addition, the extensive scope of preparations required to inject water via the core spray pumps (approximately 24 hours) would result in a significant burden on the plant operating staff."	It is impractical to exercise these valves quarterly due to the insufficient discharge head of the core spray pumps. It is also impractical to full-stroke exercise these valves during cold shutdown periods because of operational constraints with the RPV water level. The licensee has not specifically described the impracticality of partial-stroke exercising the valves at cold shutdown, but has stated that preparations to inject water via the core spray pumps are excessive and burdensome. The core spray pumps are tested quarterly. It is not apparent why a partial-stroke exercise is so burdensome. The licensee should partial-stroke exercise the valves at cold shutdown, or revise the deferral justification accordingly.
RRJ-18	Reserved		
RRJ-19	Reserved		
RRJ-20	V-26-008 & 9, SBLC Injection Valves	"These are simple check valves with no positive indication of disk position, thus the only means of verifying closure of these valves is by performing a leak test. Such a test requires drywell access and extensive system preparations and is impractical during plant operation or at cold shutdown due to the unreasonable burden on plant staff."	As discussed in NUREG-1482, Sections 4.1.4 and 3.1.1.3, setup and performance limitations render leak testing during power operation or cold shutdowns impractical. Therefore, the alternate provides closure verification during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).

Table 4.1-Evaluation of DAEC's Deferral Justifications

ITEM NO.	VALVE IDENTIFICATION	LICENSEE'S JUSTIFICATION FOR DEFERRED TESTING	EVALUATION
RRJ-21	V-26-008 & V-24 (sic)-009, SBLC Injection Check Valves	"The only practical means of exercising these valves to the open position requires operation of the SBLC pumps discharging into the reactor vessel. This cannot be done during normal operation or cold shutdown since the SBLC system must be drained and flushed to prevent contamination of the reactor coolant with sodium pentaborate. In addition, extensive testing and maintenance is required to replace the explosive charges in the isolation valves."	Full-stroke exercising during operation or cold shutdowns is impractical due to the extensive test set up and system restoration. The licensee should evaluate the practicality of partial-stroke exercising these valves at cold shutdowns utilizing test connections. Other BWRs, such as Quad Cities, perform testing in this manner. The licensee should note that valve V-24-009 is identified on the P&ID and in IST Program as V-26-009.
RRJ-22	CV-4357, Containment Hard Vent Valve	"Because the hard vent system is not intended to be used to mitigate events considered in the Final Safety Analysis Report, components other than those provided for primary containment isolation are not within the scope of the Inservice Test (IST) Program, as discussed in Part 10, Para. 1.1. These components have been added to the IST Program for testing on an augmented basis. The intent of including these components in the Program is to provide a reasonable level of operational readiness for the hard vent system and this is satisfied by testing at a refueling frequency."	Not code class.
RRJ-23	V-43-214, Drywell Instrument Nitrogen Header Supply Check Valve	"This is a simple check valve, thus the only practical means of determining closure is by performing a leak test. Performing a leaktest of this valve requires containment access, isolation of nitrogen to the containment, and an extensive valve re-alignment. The resources and time required to complete such a test places an undue burden on the plant staff and is not justified by the little gain in plant safety afforded by this test."	Not code class.
RRJ-24	V-43-441, CV-4357, Air Accumulator Check Valve	"This is a simple check valve, thus the only practical means of determining closure is by performing a leak test. Because the hard vent system is not intended to be used to mitigate events considered in the Final Safety Analysis Report, components other than those provided for primary containment isolation are not within the scope of the Inservice Test (IST) Program, as discussed in Part 10, Para. 1.1. These components have been added to the IST Program for testing on an augmented basis. The intent of including these components in the Program is to provide a reasonable level of operational readiness for the hard vent system and this is satisfied by testing at a refueling frequency."	Not code class.

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
RRJ-25	Reserved		
RRJ-26	V-22-017, HPCI Turbine Steam Exhaust Stop-Check valve	"This is a lift stop check valve with no positive means of determining disk position. Determining closure by performing a leak test is not practical since there is no means of isolating the torus from the downstream piping and reverse flow testing would merely lift the valve and relieve pressure to the torus. Non-obtrusive acoustical methods would probably result in inconclusive results. Thus, the only available method of verifying disk position is radiography. Radiography of these valves requires extensive preparations including system draining and scaffold erection. During cold shutdown conditions, performance of this testing is impractical due to the extensive resources and time needed to complete testing."	The test setup and system limitations makes testing during operation or cold shutdowns impractical. The alternate provides full-stroke exercising during refueling outage in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).
RRJ-27	V-24-023, RCIC Turbine Steam Exhaust Check Valve	"This is a lift stop check valve with no positive means of determining disk position. Determining closure by performing a leak test is not practical since there is no means of isolating the torus from the downstream piping and reverse flow testing would merely lift the valve and relieve pressure to the torus. Non-obtrusive acoustical methods would probably result in inconclusive results. Thus, the only available method of verifying disk position is radiography. Radiography of these valves requires extensive preparations including system draining and scaffold erection. During cold shutdown conditions, performance of this testing is impractical due to the extensive resources and time needed to complete testing."	Not code class.
RRJ-28	V-13-037 and 52, Emergency Service Water/Well Water Isolation Check Valves	"These are simple check valves with no positive means of determining disk position. Determining closure by performing a backleakage test requires depressurization and draining of the associated well water train as well as realignment of the ESW train. The extensive preparations and operational impact on the plant precludes performing the backleakage test during operation or cold shutdown periods."	As discussed in NUREG-1482, Section 4.1.4, due to the extensive setup and performance limitations, leak testing during operation or cold shutdowns is impractical. The alternate provides full-stroke exercising during refueling outage in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).

Table 4.1-Evaluation of DAEC's Deferral Justifications

Item No.	Valve Identification	Licensee's Justification for Deferred Testing	Evaluation
RRJ-29	CV-1859A & B, 1867A & B, CRD Scram Discharge Header Vent and Drain Valves	"Fail safe testing of these valves is typically performed with the testing of the associated reactor protection system. During operation this is not practical since such testing could result in a scram and plant trip. Testing of the reactor protective system is normally beyond the scope of work normally performed during short duration outages."	The licensee has not provided adequate justification for not exercising these valves at cold shutdown. The licensee should discuss if fail-safe testing can be performed without testing the RPS and why the normal exercising of these valves quarterly does not fulfill the requirements of ¶4.2.1.6. Other BWRs, such as Oyster Creek perform this testing at cold shutdowns.

There is no flow instrumentation installed to measure flow through each of these valves. The installed flow instrumentation on these lines is upstream of piping that cross-connects the two feedwater trains. The licensee has referred to calculation M93-12 which will be used to verify that the valves will full-stroke open. Specific details of the test method have not been provided in the request. Therefore, no determination of the acceptability of the test method has been made. As discussed in Generic Letter 89-04, Position 1 and in NUREG-1482, Appendix A, Group Question 2 Current Considerations, knowledge of total flow through multiple paths does not provide verification of flowrates through the individual valves and is not a valid full-stroke exercise. The licensee is referred to the January 24, 1992 Safety Evaluation on the Beaver Valley Inservice Testing program, referenced in Appendix A of NUREG-1482. The licensee should review these documents and ensure that the test method is both sufficient to indicate that the check valves are full-stroke exercised, and repeatable.

5.7 It is not apparent from the information detailed in the justification why cycling each of the two reactor vessel head vent valves in series would cause a reactor transient. The licensee should clarify why quarterly testing is impractical and review the safety function of these valves. Per the deferral justification (CSJ-01), the safety function is to only provide reactor coolant pressure boundary. The licensee should evaluate whether these valves have an active safety function.

5.8 The licensee states that the testing of the recirculation pump discharge bypass valves cannot be performed because of consequences if the valve failed during testing (CSJ-05). The licensee should not base the justification simply on an assumed failure, unless the failure could cause a loss of a safety system function or the probability and risk associated with a test induced failure warrants it. For example, the NRC staff has concluded that quarterly testing of PORVs in PWRs is impractical because PORVs have shown a high probability of causing a small LOCA by sticking open. Typical valves, whose failure in a non-conservative position during exercising would cause a loss of system function, include the RHR pump discharge crossover valves for plants whose licensing bases assumes that all four cold legs are being supplied by water from at least one pump (Reference NRC Information Notice 87-01). 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. The licensee is referred to NUREG-1482, Sections 2.4.5 and 3.1.1 for the staff's guidance on impractical conditions.

5.9 As discussed in NUREG-1482, Section 3.1.2, entering a LCO is not sufficient justification alone for deferring testing. The licensee should provide additional justification in CSJ-09, 10 and 11, or perform testing of the subject valves quarterly.

5.10 It is impractical to exercise the LPCI injection check valves quarterly due to the insufficient discharge head of the RHR pumps. It is also impractical to full-stroke exercise these valves during cold shutdown because access to the inerted containment is required. The licensee has proposed to part-stroke exercise only one valve each cold shutdown based on the burden of realigning the RHR system to allow testing of the other

5.0 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.

5.1 Relief is recommended for the licensee to calculate the river water, core spray, and RHR pumps' differential pressure at the reference flow rate, and for the licensee to utilize a reference curve for the HPCI pump, provided the licensee reviews the procedures and documents the impracticality of measuring the differential pressure after achieving the reference flowrate ±2%, and proceduralizes the ΔP calculation. (TER Sections 2.1 and 2.2.2)

5.2 The licensee must provide additional information justifying the burden of running the HPCI pump for two minutes at each of the points on the reference curve (i.e., the suppression pool increase experienced during the test period and the limiting suppression pool temperature). (TER Section 2.2.2)

5.3 The licensee must verify that for all excess flow check valves tested in accordance with Relief Request VR-02, isolating the associated instrumentation has the potential for causing a plant trip or transient. If isolating the valves will not jeopardize continued plant operation, the licensee should perform testing quarterly or revise the relief request. (TER Section 3.1.2)

5.4 The licensee should review the code classification and safety function of the CRD rupture disks. If the disks are within the scope of the regulations and Code, the licensee must provide additional information concerning the hardship of replacing these disks every five years, before relief can be recommended. Additionally, the licensee should provide an alternate means or schedule for monitoring degradation commensurate with their safety significance. (TER Section 3.2)

5.5 The licensee has proposed an exception to the requirements of ¶4.2.1.8(d) for four emergency service water valves based on the variance of stroke times. The licensee has not provided the normal range of stroke times nor the maximum limiting stroke time that will be applied. Additional information on the burden of complying with the Code and assurance that the proposed alternate will provide an adequate means for detecting valve degradation prior to failure is necessary before relief can be recommended. The licensee should revise and resubmit the request. (TER Section 3.6)

5.6 The licensee has proposed to exercise the HPCI and RCIC to feedwater valves (V-14-001 and 3) with feedwater flow quarterly, when practical (i.e., when operating above 90 percent power and pressure instruments are available). Based on the request (VR-03), it is not apparent how pressure instrumentation will be used to verify the full-stroke of the valves, and why the unavailability of pressure instruments and power levels less than 90% make testing impractical. The licensee should provide additional information why testing quarterly is impractical.

valve. Although it may be impractical to exercise both valves every cold shutdown, there may be shutdown periods of sufficient length to allow realignment of the system. If the licensee can only exercise one valve at a cold shutdown period, they should ensure that the other valve is exercised at the next cold shutdown. (RRJ-15)

5.11 It is impractical to exercise the core spray injection valves quarterly due to the insufficient discharge head of the core spray pumps. It is also impractical to full-stroke exercise these valves during cold shutdown periods because of operational constraints with the RPV water level. The licensee has not specifically described the impracticality of partial-stroke exercising the valves at cold shutdown, but has stated that preparations to inject water via the core spray pumps are excessive and burdensome. The core spray pumps are tested quarterly. It is not apparent why a partial-stroke exercise is so burdensome. The licensee should partial-stroke exercise the valves at cold shutdown, or revise the deferral justification accordingly. (RRJ-17)

5.12 Full-stroke exercising of the SBLC injection check valves during operation or cold shutdowns is impractical due to the extensive test set up and system restoration. The licensee should evaluate the practicality of partial-stroke exercising these valves at cold shutdowns utilizing test connections. Other BWRs, such as Quad Cities, perform testing in this manner. The licensee should either partial-exercise these valves at cold shutdown or revise the justification. Additionally, the licensee should correct the justification to reflect the correct valve number, i.e., V-26-009. (RRJ-21)

5.13 The licensee has not provided adequate justification for not exercising the CRD scram discharge header vent and drain valves at cold shutdown. The licensee should discuss if fail-safe testing can be performed without testing the RPS and why the normal exercising of these valves quarterly does not fulfill the requirements of ¶4.2.1.6. Other BWRs, such as Oyster Creek perform this testing at cold shutdowns. (RRJ-29)

5.14 The licensee in Section 5.4 of the IST Program states that an extension of +25% may be applied to the test intervals, as allowed by the Technical Specifications. The Technical Specifications do not however address the test intervals for relief valves, and as discussed in NUREG-1482, Section 3.1.3, the extension should not be applied to valves tested in accordance with OM Part 1.

5.15 The licensee in Section 5.6 of the IST Program states that when quarterly testing is "undesirable," Part 10 allows deferral to cold shutdowns or refueling periods. Part 10, ¶4.2 and 4.3, allow testing to be deferred only when quarterly testing is impractical. If testing is practical, but undesirable, the licensee is required to submit a relief request. The licensee is requested to review and IST Program and revise the deferral justifications as necessary based on this clarification.

5.15 Note 2 to Table A states that the pump suction pressure will be derived indirectly from level. As discussed in Section 5.5.3 of NUREG-1482, the calculation must be included in the implementing procedure and the accuracy must comply with the Code requirements, i.e., ±2%. The licensee should verify that the Code requirements are met, or submit a

relief request. Additionally, Note 4 discusses test frequency, however, this note is not applied to any of the pumps in the table.

5.16 Relief Requests VR-07 and 8 discuss rupture disks and state that there is no history of failure of these disks. Although these requests concern disks that are not ASME Code classified and staff approval is not required, the licensee is referred to NRC Information Notice 93-067 (Ref. 19), NUREG/CR-6014 (Ref. 20), and AEOD Report E402 (Ref. 21) for documentation of failures of these components.

5.17 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 residual heat removal and service water-pumphouse systems were reviewed against OMa-1988, Part 6 and 10 requirements. The review results showed compliance with the Code, except for the following items. The licensee should review these items and make changes to the IST Program, where appropriate. The licensee should also consider generically the types of omissions noted here and where necessary, review and revise the IST Program for other systems, as well.

•Valves AV-4926E and F, and 4929C and D, in the service water system are only tested closed. These valves generally have a function to open to allow the air to be vented, thereby preventing air binding. The licensee should review the function for these valves, and revise the IST Program as necessary.

•Air-operated strainer bypass valves CV-4939A & B and 4940A & B in the service water system fail closed. These valves are not, however, included in the IST Program. The licensee should review the function for these valves, and revise the IST Program as necessary.

•The licensee has not included the RHR/Core Spray fill pump in the IST Program, nor has specified exercising the associated check valves open (they are only exercised closed). The licensee should review the function of this pump that maintains these systems full of water to prevent a water hammer, and revise the IST Program as necessary.

•Appendix C indicates that valve MO-2010 will be exercised at cold shutdown. However, there is no justification referenced or contained in Appendix E. This valve should be tested quarterly or a justification must be prepared.

•Appendix C indicates that valve V-20-008 will be disassembled and inspected at refueling outages. However, no relief request or deferral justification is noted. It appears that VR-05 also applies to this valve. Appendix C and D should be revised as appropriate.

•Valve V-20-010 is only exercised closed per the IST Program. This valve must open to allow service water to be injected into the reactor vessel, via the RHR system. The

licensee should review the safety analysis report and evaluate whether this valve has a safety function in the open direction, and revise the IST program accordingly.

5.18 The licensee has stated via Note 3 in Appendix A, that the RCIC, screenwash, diesel fuel oil, and standby liquid control pumps are located outside the ISI-code boundaries. The licensee has not discussed in Section 3 of the IST Program how the ISI-class boundaries were developed. The licensee should ensure that the code classification is consistent with the commitments contained in the plant's safety analysis report. The licensee is referred to NUREG-1482, Sections 2.2 and 2.3 for the staff's guidance concerning the scope of the IST Program.

6.0 REFERENCES

1. Letter NG-95-2071, "Third Ten-Year Inservice Testing (IST) Program Plan," J.F. Franz, IES, to W.T. Russell, USNRC, January 30, 1995.

2. ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection," 1989 Edition.

3. ASME/ANSI OMa-1988, Part 1, "Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices."

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

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

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

7. Standard Review Plan, NUREG-0800, Section 3.9.6, "Inservice Testing of Pumps and Valves," Rev. 2, July 1992.

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

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

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

11. NRC Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," Supplement 1, which includes NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," P. Campbell, April 1995.

12. Safety Evaluation of Relief Requests for Pump Inservice Testing, Duane Arnold Energy Center, TAC No. M91182, March 21, 1995.

13. NUREG/CP-0111, "Proceedings of the NRC/ASME Symposium on Inservice Testing of Pumps and Valves," Washington, D.C., August 1989.

14. Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," Revision 3, February 1976.

15. American Society of Mechanical Engineers (ASME), Code for Operation and Maintenance of Nuclear Power Plants, New York, 1990 Edition including addenda up to and including the 1994 Addenda.

16. NRC Generic Letter 87-09, "Sections 3.0 and 4.0 of the Standard Technical Specifications (STS) on the Applicability of Limiting Conditions for Operation and Surveillance Requirements," May 4, 1987.

17. 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.

18. NRC Information Notice 87-01, "RHR Valve Misalignment Causes Degradation of ECCS in PWRs," January 6, 1987.

19. NRC Information Notice, IN 93-067, "Bursting of High Pressure Coolant Injection Steamline Rupture Discs Injures Plant Personnel."

20. NUREG/CR-6014, "High Pressure Coolant Injection System Risk-Based Inspection Guide for Hatch Nuclear Power Station," A. M. DiBiasio, May 1993.

21. NRC AEOD Report E402, "Water Hammer in BWR High Pressure Coolant Injection Systems," January 1984.