ATTACHMENT 2

TECHNICAL EVALUATION REPORT

Calvert Cliffs Nuclear Power Plant
Units 1 and 2
Baltimore Gas and Electric Company
Third Ten-Year Interval Pump and Valve Inservice Testing Program

Docket Number: 50-317 & 318
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ABSTRACT

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

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1.0 INTRODUCTION

Contained herein is a technical evaluation of American Society of Mechanical Engineers (ASME) Section XI pump and valve inservice testing (IST) program relief requests submitted by Baltimore Gas and Electric Company (BGE) for its Calvert Cliffs Nuclear Power Plant. The Calvert Cliffs Plant, Units 1 and 2, are Combustion Engineering (CE) Pressurized Water Reactors (PWR) that began commercial operation in May 1975 and April 1977, respectively.

BGE submitted Revision 0 of the Third Ten-Year Interval Inservice Testing Program on April 30, 1997 (Ref. 1). Revision 1 of the program was submitted on October 1, 1997 in response to a conference call held September 4, 1997 between the NRC, BGE and BNL regarding Revision 0 (Ref. 2). This program revision supersedes all previous submittals. The third ten year interval extends from January 15, 1998 to January 14, 2008. The licensee states that this program is based on the requirements of the 1989 Edition of the ASME Section XI Code.

Title 10 of the Code of Federal Regulations, §50.55a ¶(f) 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). Section 50.55a ¶(f)(4)(iv) provides that inservice testing of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in paragraph (b) of §50.55a, subject to the limitations and modifications listed, and subject to Commission approval. In rulemaking to 10CFR50.55a, effective September 8, 1992 (see Federal Register, Vol. 57, No. 152, page 34666), the 1989 Edition of ASME Section XI was incorporated into paragraph (b) of § 50.55a. The 1989 Edition provides that the rules for inservice testing of pumps and valves are as specified in ASME/ANSI OMa-1988 Part 6 and 10, and OM-1987 Part 1.

The review of the relief requests was performed utilizing the Standard Review Plan, Section 3.9.6; Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs;" the Minutes of the Public Meeting on Generic Letter 89-04, and Supplement to the Minutes; NUREG-1482; NUREG/CR-6396; and the recently published summary of the public workshops held in January and February 1997 on IST (References 8-14). The IST Program requirements apply only to component (i.e., pump and valve) testing and are not intended to provide a basis to change the licensee's current Technical Specifications for system test requirements.

Section 2 of this report presents the eight pump relief requests requiring review, and Brookhaven National Laboratory's (BNL) evaluation. Pump relief request PR-07 was deleted and the tenth pump relief request concerns the use of errata contained in the 1989 Addenda of the ASME Operation and Maintenance (OM) Standards. Approval to use this errata is not required. Similar information is presented in Section 3 for seven relief requests for the valve testing program. Two valve relief requests address valves that are not ASME Code Class or are not required for safe shutdown. As discussed in NUREG-1482, Section 2.2, NRC approval is not required. Three relief requests are authorized by Position 2 of Generic Letter 89-04. Relief requests that are authorized by Generic Letter 89-04 are not specifically evaluated in this Technical Evaluation Report. However, any anomalies associated with the relief requests are addressed in Section 5 of the report. One valve relief request has been withdrawn.

Section 4 and Appendix A contain the evaluation of BGE's justifications to defer valve testing to cold shutdowns or refueling outages. Section 5 summarizes the recommended actions for the licensee, resulting from the relief request and deferred testing justification evaluations, and the review of the IST Program scope for selected systems. BNL recommends that the licensee resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

2.0 PUMP IST PROGRAM RELIEF REQUESTS

In accordance with §50.55a, BGE has submitted ten relief requests for pumps at Calvert Cliffs which are subject to inservice testing under the requirements of ASME Section XI. The relief requests have been reviewed to verify their technical basis and determine their acceptability. Eight relief requests, along with the technical evaluation by BNL, are summarized below. Relief Request No. PR-10 requests relief to use errata to Figure 1 of OMa-1988, Part 6 that was published in OMb-1989. No approval is required to use errata to the 1989 Edition of Section XI. Relief Request PR-07 has been withdrawn by the licensee.

2.1 Safety Injection and Containment Spray Pumps

2.1.1 Relief Request PR-01, LPSI Pumps

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶ 5.1 and 5.2(c) which requires flowrate and pressure to be determined and compared to their respective reference values nominally every three months, where system resistance cannot be varied.

Proposed Alternate Testing: The licensee has proposed to compare measurements of pressure and vibration to their reference values quarterly. Flowrate will only be verified to be greater than the minimum flow requirement. During testing performed at cold shutdowns or refueling; pressure, flowrate, and vibration will be recorded and evaluated in accordance with ¶5.2(b).

Licensee's Basis for Relief: "During quarterly testing of the LPSI pumps, flow is routed through a minimum flow recirculation line returning borated water to the refueling water tank (RWT). This recirculation flowpath is capable of passing a flowrate approximately 1 percent of that at the pump design operating point. A flow instrument is installed on this recirculation piping; however, there is concern regarding the practice of throttling under minimum flow conditions with the potential for causing pump damage. In addition, hydraulic pump test data at or near a pump's shutoff head provides little information as to the mechanical condition of a pump.

NRC Generic Letter 89-04, Position 9, (Reference 2.7), allows elimination of minimum flow test line flowrate measurements providing inservice tests are performed during cold shutdowns or refueling under full or substantial flow conditions where pump flowrate is recorded and evaluated. The proposed alternate testing is consistent with the philosophy and the intent of Position 9.

These pumps are standby pumps and little degradation is expected with respect to hydraulic performance during operational periods when the pumps are idle. Thus, the alternate testing will provide adequate monitoring of these pumps with respect to the applicable Code requirements to ensure continued operability and availability for accident mitigation."

Evaluation: It is impractical to test the low pressure safety injection (LPSI) pumps at full-flow during operation because the low head produced by these pumps cannot overcome the reactor coolant system pressure. These pumps can only be tested during operation utilizing a minimum flow recirculation line.

In Generic Letter 89-04, Position 9, the NRC determined that in cases where flow can only be established through a non-instrumented minimum flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the increased interval is an acceptable alternative to the Code requirements. During the deferred test, pump differential pressure, flow rate, and bearing vibration measurements must be taken and during the quarterly testing at least pump differential pressure and vibration must be measured.

Referring to the licensee's request, it appears that although there is an instrumented flow path during the quarterly testing, the licensee will only measure flowrate quarterly to verify that it is greater than the minimum required. Flowrate will not be evaluated against a reference value and the licensee will not take any corrective actions based on the flowrate. OMa-1988 Part 6, requires flowrate to be measured and corrective actions taken quarterly if the measured value is in the alert or required action range. In the requests' basis, the licensee states that there is a concern for potential pump damage if the pumps are throttled during minimum flow conditions. The subject pumps are tested using a fixed resistance test circuit. The Code, ¶5.2(c), addresses this situation, i.e., where the system resistance cannot be varied, and requires that flowrate and pressure be determined and compared to their respective reference values. Therefore, no throttling would be required.

Although, Generic Letter 89-04, Position 9 only addresses the situation where the minimum flow line is uninstrumented, as discussed in NUREG-1482, Appendix A, Question Group 48, the NRC would prefer a more comprehensive test performed at some reduced test frequency rather than relying only on the minimum flow test that is performed quarterly. Tests employing the minimum flow recirculation lines "produce data of marginal value and provide little confidence in the continued operability of the pump." The pumps are operated in that region of the pump curve near shutoff head conditions where large changes in flow are associated with small changes in differential pressure, and deviations in pump hydraulic parameters may go undetected. Flow measurements taken under these operating conditions are not necessarily a meaningful test for pump operational readiness because the test flow rate is a small fraction of rated pump flow. Measurement of pressure and vibration quarterly should provide adequate indication of these standby pumps' operational readiness quarterly, with a more comprehensive test at full flow conditions performed at cold shutdowns or refueling. The licensee proposed alternative to measure and take corrective action quarterly on differential pressure and vibration, and then at cold shutdowns or refueling, measure and take corrective action on flow rate, as well as differential pressure and vibration, would provide an acceptable level of quality and safety. Therefore, it is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

The 1994 Addenda of the ASME OM Code has not yet been endorsed by the NRC in the regulations, however, it should be noted that the comprehensive pump test revision included in the 1994 Addenda of the OM Code requires standby centrifugal pumps to have their speed and flowrate or differential pressure measured quarterly; and speed, flowrate, differential pressure, and vibration measured every two years. Related to this revision are more restrictive acceptance criteria and instrument accuracy requirements.

When test parameters are in the alert range, the Code requires the test frequency to be doubled. This includes pump testing performed during cold shutdowns or refueling outages. The licensee is referred to Reference 14, Item 3.3.5, regarding the NRC's recommendation on performance of corrective action when pumps are in the alert range during the test at refueling.

2.1.2 Relief Request PR-04, HPSI Pumps

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶ 5.1 and 5.2(c) which requires flowrate and pressure to be determined and compared to their respective reference values nominally every three months, where system resistance cannot be varied.

Proposed Alternate Testing: The licensee has proposed to compare measurements of pressure and vibration to their reference values quarterly. Flowrate will only be verified to be greater than the minimum flow requirement. During testing performed at cold shutdowns or refueling; pressure, flowrate, and vibration will be recorded and evaluated in accordance with ¶5.2(b).

Licensee's Basis for Relief: "During quarterly testing of the HPSI Pumps, the pumps cannot develop sufficient discharge pressure to overcome RCS pressure and allow flow through the safety injection line. Thus, during quarterly testing of the HPSI pumps, flow is routed through a minimum flow recirculation line returning boric acid solution to the refueling water tanks. This recirculation flowpath is capable of passing a flowrate somewhat less than 10 percent of that at the pump design operating point. A flow instrument is installed on this recirculation piping; however, there is concern regarding the practice of throttling under minimum flow conditions with the potential for causing pump damage. In addition, hydraulic pump test data at or near a pump's shutoff head provides little information as to the mechanical condition of a pump.

During cold shutdown conditions, full flow operation of the HPSI pumps to the RCS is restricted to preclude RCS system pressure transients due to mass addition that could result in exceeding the pressure-temperature limits specified in the Technical Specifications (LTOP), unless the RCS is de-pressurized and the pressurizer manway is removed. However, under certain circumstances it is possible to line-up the HPSI pumps so that they take their suction from the RCS to preclude mass addition and a resulting pressure transient.

NRC Generic Letter 89-04, Position 9, (Reference 2.7), allows elimination of minimum flow test line flowrate measurements providing inservice tests are performed during cold shutdowns or refueling under full or substantial flow conditions where pump flowrate is recorded and evaluated. The proposed alternate testing is consistent with the philosophy and the intent of Position 9."

Evaluation: It is impractical to test the high pressure safety injection (HPSI) pumps at full-flow during operation because the head produced by these pumps cannot overcome the reactor coolant system pressure. These pumps can only be tested during operation utilizing a minimum flow recirculation line.

In Generic Letter 89-04, Position 9, the NRC determined that in cases where flow can only be established through a non-instrumented minimum flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the increased interval is an acceptable alternative to the Code requirements. During the deferred test, pump differential pressure, flow rate, and bearing vibration measurements must be taken and during the quarterly testing at least pump differential pressure and vibration must be measured.

Referring to the licensee's request, it appears that although there is an instrumented flow path during the quarterly testing, the licensee will only measure flowrate quarterly to verify that it is greater than the minimum required. Flowrate will not be evaluated against a reference value and the licensee will not take any corrective actions based on the flowrate. OMa-1988 Part 6, requires flowrate to be measured and corrective actions taken quarterly if the measured value is in the alert or required action range. In the requests' basis, the licensee states that there is a concern for potential pump damage if the pumps are throttled during minimum flow conditions. The subject pumps are tested using a fixed resistance test circuit. The Code, ¶5.2(c), addresses this situation, i.e., where the system resistance cannot be varied, and requires that flowrate and pressure be determined and compared to their respective reference values. Therefore, no throttling would be required.

Although, Generic Letter 89-04, Position 9 only addresses the situation where the minimum flow line is uninstrumented, as discussed in NUREG-1482, Appendix A, Question Group 48, the NRC would prefer a more comprehensive test performed at some reduced test frequency rather than relying only on the minimum flow test that is performed quarterly. Tests employing the minimum flow recirculation lines "produce data of marginal value and provide little confidence in the continued operability of the pump." The pumps are operated in that region of the pump curve near shutoff head conditions where large changes in flow are associated with small changes in differential pressure, and deviations in pump hydraulic parameters may go undetected. Flow measurements taken under these operating conditions are not necessarily a meaningful test for pump operational readiness because the test flow rate is a small fraction of rated pump flow. Measurement of pressure and vibration quarterly should provide adequate indication of these standby pumps' operational readiness quarterly, with a more comprehensive test at full flow conditions performed at cold shutdowns or refueling. The licensee proposed alternative to measure and take corrective action quarterly on differential pressure and vibration, and then at cold shutdowns or refueling, measure and take corrective action on flow rate, as well as differential pressure and vibration, would provide an acceptable level of quality and safety. Therefore, it is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

The 1994 Addenda of the ASME OM Code has not yet been endorsed by the NRC in the regulations, however, it should be noted that the comprehensive pump test revision included in the 1994 Addenda of the OM Code requires standby centrifugal pumps to have their speed and flowrate or differential pressure measured quarterly; and speed, flowrate, differential pressure, and vibration measured every two years. Related to this revision are more restrictive acceptance criteria and instrument accuracy requirements.

When test parameters are in the alert range, the Code requires the test frequency to be doubled. This includes pump testing performed during cold shutdowns or refueling outages. The licensee is referred to Reference 14, Item 3.3.5, regarding the NRC's recommendation on performance of corrective action when pumps are in the alert range during the test at refueling.

2.1.3 Relief Request PR-06, Containment Spray Pumps

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶ 5.1 and 5.2(c) which requires flowrate and pressure to be determined and compared to their respective reference values nominally every three months, where system resistance cannot be varied.

Proposed Alternate Testing: The licensee has proposed to compare measurements of pressure and vibration to their reference values quarterly. Flowrate will only be verified to be greater than the minimum flow requirement. During testing performed at cold shutdowns or refueling, pressure, flowrate, and vibration will be recorded and evaluated in accordance with ¶5.2(b).

Licensee's Basis for Relief: "During quarterly testing of the containment spray pumps, flow is routed through a minimum flow recirculation line returning borated water to the refueling water tank (RWT) to avoid pumping water through the spray headers and spraying down containment with borated water. This recirculation flowpath is capable of passing a flowrate approximately 3 percent of that at the pump design operating point. A flow instrument is installed on this recirculation piping; however, there is concern regarding the practice of throttling under minimum flow conditions with the potential for causing pump damage. In addition, hydraulic pump test data at or near a pump's shutoff head provides little information as to the mechanical condition of a pump.

NRC Generic Letter 89-04, Position 9, (Reference 2.7), allows elimination of minimum flow test line flowrate measurements providing inservice tests are performed during cold shutdowns or refueling under full or substantial flow conditions where pump flowrate is recorded and evaluated. The proposed alternate testing is consistent with the philosophy and the intent of Position 9.

Performing full-flow testing of a CS pump requires substituting it for the running LPSI pump in the shutdown cooling (SDC) line-up. However, normal SDC flow is approximately 3000 gpm and a CS pump provides only approximately 1500 gpm. Therefore, this test can only be safely performed after enough time has elapsed since shutdown to allow the decay heat rate to substantially diminish.

These pumps are standby pumps and little degradation is expected with respect to hydraulic performance during operational periods when the pumps are idle. Thus, the alternate testing will provide adequate monitoring of these pumps with respect to the applicable Code requirements to ensure continued operability and availability for accident mitigation."

Evaluation: It is impractical to test the containment spray (CS) pumps at full-flow during operation because this would require spraying down the containment with borated water. These pumps can only be tested during operation utilizing a minimum flow recirculation line.

In Generic Letter 89-04, Position 9, the NRC determined that in cases where flow can only be established through a non-instrumented minimum flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the increased interval is an acceptable alternative to the Code requirements. During the deferred test, pump differential pressure, flow rate, and bearing vibration measurements must be taken and during the quarterly testing at least pump differential pressure and vibration must be measured.

Referring to the licensee's request, it appears that although there is an instrumented flow path during the quarterly testing, the licensee will only measure flowrate quarterly to verify that it is greater than the minimum required. Flowrate will not be evaluated against a reference value and the licensee will not take any corrective actions based on the flowrate. OMa-1988 Part 6, requires flowrate to be measured and corrective actions taken quarterly if the measured value is in the alert or required action range. In the requests' basis, the licensee states that there is a concern for potential pump damage if the pumps are throttled during minimum flow conditions. The subject pumps are tested using a fixed resistance test circuit. The Code, ¶5.2(c), addresses this situation, i.e., where the system resistance cannot be varied, and requires that flowrate and pressure be determined and compared to their respective reference values. Therefore, no throttling would be required.

Although, Generic Letter 89-04, Position 9 only addresses the situation where the minimum flow line is uninstrumented, as discussed in NUREG-1482, Appendix A, Question Group 48, the NRC would prefer a more comprehensive test performed at some reduced test frequency rather than relying only on the minimum flow test that is performed quarterly. Tests employing the minimum flow recirculation lines "produce data of marginal value and provide little confidence in the continued operability of the pump." The pumps are operated in that region of the pump curve near shutoff head conditions where large changes in flow are associated with small changes in differential pressure, and deviations in pump hydraulic parameters may go undetected. Flow measurements taken under these operating conditions are not necessarily a meaningful test for pump operational readiness because the test flow rate is a small fraction of rated pump flow. Measurement of pressure and vibration quarterly should provide adequate indication of these standby pumps' operational readiness quarterly, with a more comprehensive test at full flow conditions performed at cold shutdowns or refueling. The licensee proposed alternative to measure and take corrective action quarterly on differential pressure and vibration, and then at cold shutdowns or refueling measure and take corrective action on flow rate, as well as differential pressure and vibration, would provide an acceptable level of quality and safety. Therefore, it is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

The 1994 Addenda of the ASME OM Code has not yet been endorsed by the NRC in the regulations, however, it should be noted that the comprehensive pump test re[illegible] included in the 1994 Addenda of the OM Code requires standby centrifugal pumps to have their speed and flowrate or differential pressure measured quarterly; and speed, flowrate, differential pressure, and vibration measured every two years. Related to this revision are more restrictive acceptance criteria and instrument accuracy requirements.

When test parameters are in the alert range, the Code requires the test frequency to be doubled. This includes pump testing performed during cold shutdowns or refueling outages. The licensee is referred to Reference 14, Item 3.3.5, regarding the NRC's recommendation on performance of corrective action when pumps are in the alert range during the test at refueling.

2.2 Auxiliary Feedwater Pumps

2.2.1 Relief Request PR-02, Steam-Driven AFW Pumps

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶ 5.1 and 5.2(c) which requires flowrate and pressure to be determined and compared to their respective reference values nominally every three months, where system resistance cannot be varied.

Proposed Alternate Testing: The licensee has proposed to compare measurements of pressure and vibration to their reference values quarterly. Flowrate will only be verified to be greater than the minimum flow requirement. During testing performed at cold shutdowns or refueling; pressure, flowrate, and vibration will be recorded and evaluated in accordance with ¶5.2(b).

Licensee's Basis for Relief: "Full or substantial flow testing of these pumps is not practical during plant operation at power due to the potential for thermal shock of the steam generator nozzles or internals. Thus, during quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line returning condensate to the condensate storage tank and the respective pump suction line. This recirculation flowpath is capable of passing a flowrate somewhat less than 10 percent of that at the pump design operating point. A flow instrument is installed on this recirculation piping; however, there is concern regarding the practice of throttling under minimum flow conditions with the potential for causing pump damage. In addition, hydraulic pump test data at or near a pump's shutoff head provides little information as to the mechanical condition of a pump.

During cold shutdown conditions steam may or may not be available for turbine operation depending on the circumstances of the cold shutdown. It is not desirable to use auxiliary steam for this purpose.

NRC Generic Letter 89-04, Position 9, (Reference 2.7), allows elimination of minimum flow test line flowrate measurements providing inservice tests are performed during cold shutdowns or refueling under full or substantial flow conditions where pump flowrate is recorded and evaluated. The proposed alternate testing is consistent with the philosophy and the intent of Position 9.

These pumps are standby pumps and little degradation is expected with respect to hydraulic performance during operational periods when the pumps are idle. Thus, the alternate testing will provide adequate monitoring of these pumps with respect to the applicable Code requirements to ensure continued operability and availability for accident mitigation."

Evaluation: It is impractical to test the auxiliary feedwater (AFW) pumps at full-flow during operation because of the potential for thermal shock and damage to the steam generator nozzles and reactor internals. These pumps can only be tested during operation utilizing a minimum flow recirculation line.

In Generic Letter 89-04, Position 9, the NRC determined that in cases where flow can only be established through a non-instrumented minimum flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the increased interval is an acceptable alternative to the Code requirements. During the deferred test, pump differential pressure, flow rate, and bearing vibration measurements must be taken and during the quarterly testing at least pump differential pressure and vibration must be measured.

Referring to the licensee's request, it appears that although there is an instrumented flow path during the quarterly testing, the licensee will only measure flowrate quarterly to verify that it is greater than the minimum required. Flowrate will not be evaluated against a reference value and the licensee will not take any corrective actions based on the flowrate. OMa-1988 Part 6, requires flowrate to be measured and corrective actions taken quarterly if the measured value is in the alert or required action range. In the requests' basis, the licensee states that there is a concern for potential pump damage if the pumps are throttled during minimum flow conditions. The subject pumps are tested using a fixed resistance test circuit. The Code, ¶5.2(c), addresses this situation, i.e., where the system resistance cannot be varied, and requires that flowrate and pressure be determined and compared to their respective reference values. Therefore, no throttling would be required.

Although, Generic Letter 89-04, Position 9 only addresses the situation where the minimum flow line is uninstrumented, as discussed in NUREG-1482, Appendix A, Question Group 48, the NRC would prefer a more comprehensive test performed at some reduced test frequency rather than relying only on the minimum flow test that is performed quarterly. Tests employing the minimum flow recirculation lines "produce data of marginal value and provide little confidence in the continued operability of the pump." The pumps are operated in that region of the pump curve near shutoff head conditions where large changes in flow are associated with small changes in differential pressure, and deviations in pump hydraulic parameters may go undetected. Flow measurements taken under these operating conditions are not necessarily a meaningful test for pump operational readiness because the test flow rate is a small fraction of rated pump flow. Measurement of pressure and vibration quarterly should provide adequate indication of these standby pumps' operational readiness quarterly, with a more comprehensive test at full flow conditions performed at cold shutdowns or refueling. The licensee proposed alternative to measure and take corrective action quarterly on differential pressure and vibration, and then at cold shutdowns or refueling, measure and take corrective action on flow rate, as well as differential pressure and vibration, would provide an acceptable level of quality and safety. Therefore, it is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

The 1994 Addenda of the ASME OM Code has not yet been endorsed by the NRC in the regulations, however, it should be noted that the comprehensive pump test revision included in the 1994 Addenda of the OM Code requires standby centrifugal pumps to have their speed and flowrate or differential pressure measured quarterly; and speed, flowrate, differential pressure, and vibration measured every two years. Related to this revision are more restrictive acceptance criteria and instrument accuracy requirements.

When test parameters are in the alert range, the Code requires the test frequency to be doubled. This includes pump testing performed during cold shutdowns or refueling outages. The licensee is referred to Reference 14, Item 3.3.5, regarding the NRC's recommendation on performance of corrective action when pumps are in the alert range during the test at refueling.

2.2.2 Relief Request PR-03, Motor-Driven AFW Pumps

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶ 5.1 and 5.2(c) which requires flowrate and pressure to be determined and compared to their respective reference values nominally every three months, where system resistance cannot be varied.

Proposed Alternate Testing: The licensee has proposed to compare measurements of pressure and vibration to their reference values quarterly. Flowrate will only be verified to be greater than the minimum flow requirement. During testing performed at cold shutdowns or refueling; pressure, flowrate, and vibration will be recorded and evaluated in accordance with ¶5.2(b).

Licensee's Basis for Relief: "Full or substantial flow testing of these pumps is not practical during plant operation at power due to the potential for thermal shock of the steam generator nozzles or internals. Thus, during quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line returning condensate to the condensate storage tank and the respective pump suction line. This recirculation flowpath is capable of passing a flowrate somewhat less than 10 percent of that at the pump design operating point. A flow instrument is installed on this recirculation piping; however, there is concern regarding the practice of throttling under minimum flow conditions with the potential for causing pump damage. In addition, hydraulic pump test data at or near a pump's shutoff head provides little information as to the mechanical condition of a pump.

NRC Generic Letter 89-04, Position 9, (Reference 2.7), allows elimination of minimum flow test line flowrate measurements providing inservice tests are performed during cold shutdowns or refueling under full or substantial flow conditions where pump flowrate is recorded and evaluated. The proposed alternate testing is consistent with the philosophy and the intent of Position 9.

These pumps are standby pumps and little degradation is expected with respect to hydraulic performance during operational periods when the pumps are idle. Thus, the alternate testing will provide adequate monitoring of these pumps with respect to the applicable Code requirements to ensure continued operability and availability for accident mitigation."

Evaluation: It is impractical to test these pumps at full-flow during operation because of the potential for thermal shock and damage to the steam generator nozzles and reactor internals. These pumps can only be tested during operation utilizing a minimum flow recirculation line.

In Generic Letter 89-04, Position 9, the NRC determined that in cases where flow can only be established through a non-instrumented minimum flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the increased interval is an acceptable alternative to the Code requirements. During the deferred test, pump differential pressure, flow rate, and bearing vibration measurements must be taken and during the quarterly testing at least pump differential pressure and vibration must be measured.

Referring to the licensee's request, it appears that although there is an instrumented flow path during the quarterly testing, the licensee will only measure flowrate quarterly to verify that it is greater than the minimum required. Flowrate will not be evaluated against a reference value and the licensee will not take any corrective actions based on the flowrate. OMa-1988 Part 6, requires flowrate to be measured and corrective actions taken quarterly if the measured value is in the alert or required action range. In the requests' basis, the licensee states that there is a concern for potential pump damage if the pumps are throttled during minimum flow conditions. The subject pumps are tested using a fixed resistance test circuit. The Code, ¶5.2(c), addresses this situation, i.e., where the system resistance cannot be varied, and requires that flowrate and pressure be determined and compared to their respective reference values. Therefore, no throttling would be required.

Although, Generic Letter 89-04, Position 9 only addresses the situation where the minimum flow line is uninstrumented, as discussed in NUREG-1482, Appendix A, Question Group 48, the NRC would prefer a more comprehensive test performed at some reduced test frequency rather than relying only on the minimum flow test that is performed quarterly. Tests employing the minimum flow recirculation lines "produce data of marginal value and provide little confidence in the continued operability of the pump." The pumps are operated in that region of the pump curve near shutoff head conditions where large changes in flow are associated with small changes in differential pressure, and deviations in pump hydraulic parameters may go undetected. Flow measurements taken under these operating conditions are not necessarily a meaningful test for pump operational readiness because the test flow rate is a small fraction of rated pump flow. Measurement of pressure and vibration quarterly should provide adequate indication of these standby pumps' operational readiness quarterly, with a more comprehensive test at full flow conditions performed at cold shutdowns or refueling. The licensee proposed alternative to measure and take corrective action quarterly on differential pressure and vibration, and then at cold shutdowns or refueling, measure and take corrective action on flow rate, as well as differential pressure and vibration, would provide an acceptable level of quality and safety. Therefore, it is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

The 1994 Addenda of the ASME OM Code has not yet been endorsed by the NRC in the regulations, however, it should be noted that the comprehensive pump test revision included in the 1994 Addenda of the OM Code requires standby centrifugal pumps to have their speed and flowrate or differential pressure measured quarterly; and speed, flowrate, differential pressure, and vibration measured every two years. Related to this revision are more restrictive acceptance criteria and instrument accuracy requirements.

When test parameters are in the alert range, the Code requires the test frequency to be doubled. This includes pump testing performed during cold shutdowns or refueling outages. The licensee is referred to Reference 14, Item 3.3.5, regarding the NRC's recommendation on performance of corrective action when pumps are in the alert range during the test at refueling.

2.3 Charging Pumps

2.3.1 Relief Request PR-05, Vibration Measurement Frequency Response Range

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶4.6.1.6, which requires the frequency response range of the vibration measuring transducers and their readout system be from one-third minimum pump shaft rotational speed.

Proposed Alternate Testing: The licensee has proposed to use current instrumentation with a frequency response range from 4 Hz.

Licensee's Basis for Relief: "The rotational shaft speed of the charging pumps is 209 rpm relating to a rotational frequency of approximately 3.48 Hz. In order to satisfy the requirements of Paragraph 4.6.1.6, a vibration measurement system capable of measuring vibration to a lower limiting frequency of 1.16 Hz. would be required.

The instruments currently being used at Calvert Cliffs have a lower frequency limit for reliable, accurate measurement of 4 Hz. This instrumentation is "state-of-the-art" industrial grade, high quality equipment. Satisfying the Code requirements with respect to frequency response would require the unnecessary procurement of new and more sophisticated equipment beyond that intended by the Code.

Monitoring lower frequencies (less than rotational speed) is performed primarily for the purpose of detecting oil whirl or whip in journal bearings. The Calvert Cliffs charging pumps main bearings use oil-mist lubricated roller bearings that are not susceptible to the oil whip or whirl phenomena.

Other conditions that could result in low frequency vibration (less than shaft speed) are included in the general category of mechanical "rub" which is not considered to be significant from the aspect of pump degradation. Thus, it can be deduced that the instrumentation currently in use is adequate for determining pump degradation that may manifest itself in increased vibration.

In addition to the ASME pump testing, Calvert Cliffs also has implemented a "Rotating Machinery Vibration Monitoring Program" that includes periodic vibration monitoring of the charging pumps. This program is inclusive and encompasses a wider range of vibration analyses at several critical pump and motor locations.

The data derived from this expanded program along with the IST vibration data will provide a high degree of assurance that significant pump degradation will not go undiscovered."

Evaluation: OMa-1988, Part 6 requires that the frequency response range of the vibration measuring transducers and their readout system be from one-third minimum pump speed to at least 1000 Hz. Section XI previously required that the frequency response range of the readout system be from one-half minimum speed to at least maximum pump shaft rotational speed (IWP-4520(b)). This change was made by the ASME OM Code Committees in order to more adequately envelop all potential noise contributors that could indicate degradation. The lower limit of the range is to allow for detection of problems such as bearing oil whirl and looseness of bearings.

The charging pumps operate at very low speeds (i.e., at 3.48 Hz). The licensee has proposed to continue using vibration instrumentation with a lower frequency limit of 4 Hz. This instrumentation cannot measure subharmonic vibration or vibration at the running speed for the charging pumps.

The reciprocating charging pumps have oil-mist lubricated roller main bearings. As discussed by the licensee, these bearings are not subject to oil whip or whirl phenomena. Rotor or seal rub is another type of problem found at subharmonic vibration levels. Additionally, loose seals and bearings, bearing and coupling damage, poor shrink fit, torsional critical, and bearing-support resonance are also indicated in subharmonic levels. Problems such as unbalance, loose impeller, bent shaft, bearings eccentric, and shaft out of round may be detected at pump running speed (Ref. 16). The licensee should ensure that the problems detected at running speed and at subharmonic levels are adequately assessed using the proposed instrumentation. Consultation with the pump manufacturer would provide additional basis for this request.

The licensee has stated that this instrumentation is "state of the art" and that compliance with the Code would require unnecessary procurement of equipment beyond that intended by the Code. The licensee has not provided sufficient information on the hardship or unusual difficulty associated with complying with the Code, and has not demonstrated that there is not a compensating increase in the level of safety. Numerous utilities have procured and utilize vibration measurement equipment that have frequency response ranges down to 1.5-2 hz. (e.g., Monticello). It appears, based on the licensee's previous IST Program submittal (Ref. 15), which states that the charging pump's instrumentation reads accurately from 3 hz., that the licensee has, since the last interval, replaced the vibration instrumentation. Therefore, it is recommended that relief be denied. The licensee should procure new equipment that meets the Code requirements, or revise and resubmit the relief request to address the specific hardship and how the proposed alternative provides an acceptable level of safety.

The licensee mentions in the basis that they have implemented a "Rotating Machinery Vibration Monitoring Program" that includes periodic vibration monitoring of the charging pumps. The licensee states that "this program is inclusive and encompasses a wider range of vibration analyses at several critical pump and motor locations." The licensee, however, does not discuss what range of frequency this program encompasses and whether spectral analysis is used.

Immediate compliance would result in a hardship because of the time required to procure new instrumentation. Therefore, it is recommended that the alternate proposed by the licensee be authorized, in accordance with 10CFR50.55a(a)(3)(ii), for an interim period of one year to allow the licensee either to procure new equipment that meets the Code requirements or revise and resubmit the relief request. The proposed testing provides reasonable assurance of operational readiness of the charging pumps in the interim period because these normally operating pumps are tested quarterly and the majority of the modes of pump degradation could be detected with existing vibration instrumentation, except for the subharmonic and first harmonic modes.

2.4 Saltwater Pumps

2.4.1 Relief Request PR-08, Measurement of Vibration and Hydraulic Performance Limits

Relief Request: The licensee requests relief from the requirements of OMa-1988, Part 6, ¶4.6.4 and 5.2(d), which require vibration measurements to be taken on the upper motor bearing housing for vertical line shaft pumps and which specify the hydraulic limits at which corrective action is required.

Proposed Alternate Testing: The licensee has proposed to use the requirements for centrifugal pumps to measure vibration, i.e., on each accessible pump bearing housing and pump thrust bearing housing, and to establish the hydraulic performance limits.

Licensee's Basis for Relief: "These pumps meet the strict definition of a vertical line shaft pump stated in NUREG-1482, Paragraph 5.9 where such a pump is described as "a vertically suspended pump, where the pump driver and pumping element are connected by a line-shaft within an enclosing column which contains the pump bearings, making pump bearing vibration measurements impracticable" with the exception of the impracticality of measuring pump vibration. These pumps are mounted in a dry pit located at the intake structure with pump orientation such that they take suction through the intake structure floor with the drive motor mounted on an elevated platform above the pump and connected to the pump via a vertical shaft. This design allows pump operation in the event of flooding.

NUREG-1482 states that the basis for the more restrictive hydraulic acceptance criteria for vertical line shaft pumps is due to "inherent deficiencies in vibration testing." In this case there are no restrictions to performing vibration measurements as assumed by the Code for normal pump configuration (nonvertical line shaft pumps). Thus, with the ability to adequately monitor pump vibration, it is not necessary to apply the more restrictive hydraulic acceptance criteria. Clearly, the more restrictive limits are not required in this case to meet the Code requirement of assessing pump operational readiness."

Evaluation: Section XI previously established the same hydraulic and mechanical performance limits for both centrifugal and positive displacement pumps. Additionally, Section XI did not specifically address the vibration measurement location for vertical line shaft (VLS) pumps. The ASME OM Code Committee revised the pump requirements in OMa-1988, Part 6. Part 6 specifically addresses the measurement of VLS pump vibration. As discussed by Mr. J. in NUREG/CP-0111 (Ref. 17), vibration for these pumps is required to be measured motor bearing housing, since "the only accessible bearing for this type of pump is on motor bearing, as the pump bearings are generally under water." Specific, more stringent, hydraulic limits were put into Part 6 for VLS pumps since "there are inherent deficiencies in vibration testing, and degradation will be identified sooner through changes in hydraulic parameters." It appears that the Code requirements for VLS pumps were established on the basis that the pump bearings were not accessible and that the motor bearings on which vibration measurements are taken were located at a significant distance from the impellers and the pump bearings. In Question 14 in the Panel Discussion found on page 134 of NUREG/CP-0111, one of the panelist states that the more stringent criteria for VLS pumps whose casings are not submerged and are accessible for vibration monitoring would not apply since the method of vibration measurement is essentially the same as centrifugal pumps. However, the panelist states that it would have to be evaluated on a case-by-case basis. The ASME OM Code Committees have recently undertaken review of this issue of accessibility/inaccessibility in VLS pumps.

Based on the fact that the pump bearings are accessible for vibration measurement in these vertical line shaft centrifugal pumps and that these readings would provide formation on the mechanical degradation of the pump equivalent to centrifugal pumps, and considering that imposing the stricter vertical line shaft pump hydraulic criteria may result in these pumps entering the alert and required action range more frequently, which would result in a hardship without a compensating increase in the level of quality or safety, it is recommended that the licensee's proposal to take measurements and corrective actions based on the requirements for centrifugal pumps be authorized in accordance with 10CFR50.55a(a)(3)(ii).

2.4.2 Relief Request PR-09, Vibration Measurement Frequency Response Range
Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 6, ¶4.6.1.6, which requires the frequency response range of the vibration measuring transducers and their readout system be from one-third minimum pump shaft rotational speed to at least 1000 hertz (Hz).

Proposed Alternate Testing: The licensee has proposed to use current instrumentation with a frequency response range from 4 Hz.

Licensee's Basis for Relief: "The speed of the saltwater cooling (SW) pumps is approximately 585 rpm relating to a rotational frequency of 9.75 Hz. In order to satisfy the requirements of Paragraph 4.6.1.6, a vibration measurement system capable of measuring vibration to a lower limiting frequency of 3.25 Hz. would be required.

The instruments currently being used at Calvert Cliffs have a lower frequency limit for reliable, accurate measurement of 4 Hz. This instrumentation is "state-of-the-art" industrial grade, high quality equipment. Satisfying the Code requirements with respect to frequency response would require the unnecessary procurement of new and more sophisticated equipment beyond that intended by the Code.

Monitoring lower frequencies (less than rotational speed) is performed primarily for the purpose of detecting oil whirl or whip in journal bearings. Other conditions that could result in low frequency vibration (less than shaft speed) are included in the general category of mechanical "rub" which is not considered to be significant from the aspect of pump degradation. These pumps are provided with grease lubricated roller bearings that are not susceptible to oil-related vibration problems.

Vibration measurements taken on these pumps with instruments capable of monitoring frequencies to 4 Hz. will satisfy the intent of the Code-that of reading vibration at frequencies "just" less than one-half the rotating frequency.

In addition to the ASME pump testing, Calvert Cliffs also has implemented a "Rotating Machinery Vibration Monitoring Program" that includes periodic vibration monitoring of the saltwater pumps. This program is inclusive and encompasses a wider range of vibration analyses at several critical pump and motor locations."

Evaluation: The saltwater pumps operate at low speeds (i.e., at 9.75 Hz). OMa-1988 Part 6 requires that the frequency response range of the vibration measuring transducers and their readout system to be from one-third minimum pump speed to at least 1000 Hz. Section XI previously required that the frequency response range of the readout system be from one-half minimum speed to at least maximum pump shaft rotational speed. This change was made by the ASME OM Code Committees in order to more adequately envelop all potential noise contributors that could indicate degradation. The lower limit of the range is to allow for detection of problems such as bearing oil whirl and looseness of bearings.

The salt water cooling pumps are vertically driven centrifugal pumps that have grease lubricated roller bearings. As discussed by the licensee, these bearings are not subject to oil whip or whirl phenomena. Rotor or seal rub is another type of problem found at subharmonic vibration levels. Additionally, loose seals and bearings, bearing and coupling damage, poor shrink fit, torsional critical, and bearing-support resonance are also indicated in subharmonic levels (Ref. 16). The licensee has proposed to continue using vibration instrumentation with a lower frequency limit of 4 Hz. This instrument would cover vibration frequencies down to 41% of running speed. The licensee's proposed alternative would provide adequate indication of subharmonic problems. Requiring compliance with the Code requirements (i.e., requiring the purchase and use of new equipment) would present a hardship without a compensating increase in the level of quality or safety. Therefore, it is recommended that the alternative be approved in accordance with 10CFR50.55a(a)(3)(ii).

3.0 VALVE IST PROGRAM RELIEF REQUESTS

In accordance with §50.55a, BGE has submitted twelve relief requests (Request VR-04 was withdrawn). Ten requests are for specific and generic valves at the Calvert Cliffs Plant that are subject to inservice testing under the requirements of ASME Section XI. Relief Request VR-06 addresses valves that are not required to achieve a safe shutdown. Relief Request VR-12 addresses non-ASME Code Class valves. As discussed in NUREG-1482, Section 2.2, relief is not required for plants licensed with hot standby as the safe shutdown condition, or for valves that are non-ASME Code Class. The remaining ten relief requests have been reviewed to verify their technical basis and determine their acceptability. Relief Requests VR-05, 10 and 11 are approved in accordance with Generic Letter 89-04, Position 2. The seven relief requests that are not authorized by Generic Letter 89-04 are summarized below, along with the technical evaluation by BNL.

3.1 Safety and Relief Valves

3.1.1 Relief Request VR-01, Test Accumulators

Relief Request: The licensee requests relief from the requirements of the OM-1987, Part 1, ¶8.1.2.2 which requires that a minimum accumulator volume be used for set pressure testing Class 2 and 3 safety and relief valves used for compressible fluid service, other than steam, and specifies the formula to calculate this minimum volume.

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

Licensee's Basis for Relief: "The accumulator volume requirement is not required for simple determination of the valve set pressure. This was recognized by the ASME Code Committee and corrected in more recent versions of the OM Code."

Evaluation: OM-1987, Part 1, ¶8.1.2.2 requires the set point test accumulator have a minimum volume equal to the valve capacity (Cubic feet/second) multiplied by the time open (seconds), divided by 10. Unlike ASME Section III, Part 1 and the OM Code do not require the verification of valve capacity, only the set pressure. Based on an interpretation submitted to the ASME OM Committee concerning the requirements of Part 1, the committee reviewed the requirements of ¶8.1.2.2 and its basis. The Code Committee considered the requirements to be overly conservative and unnecessarily prescriptive. The Code was revised in the 1994 Addenda (OMc) to delete the prescriptive requirements and to require that the volume and the pressure source flow rate be sufficient to determine the valve set-pressure. Compliance with the Part 1 requirements would require a calculation for each valve and possibly requiring resizing the accumulator drum. The use of the OM Code, OMc-1994, ¶I8.1.2(b) provides an acceptable means of performing set

Attachment 1-Summary of Pump and Valve Relief Requests
Calvert Cliffs Nuclear Power Plant

Relief Request No.	TER Section	Code Requirement	Equipment Identification	Proposed Alternate Method of Testing	NRC Action
VR-12	-	Part 10, ¶ 4.2.1, Test frequency	Saltwater air compressors to Instrument Air manual valves, 1-IA-728, 2-IA-314, 317, and 1110	Exercise valves during refueling.	Approval not required. Valves are not ASME Code Class.
VR-13	3.1.4	Part 1, ¶8.1.1.4, Test insulation requirements	Pressurizer Safety Valves, 1(2)-RC-200 and 201-RV	Test valves at normal operating conditions valve body temperature profile without valve insulation.	Alternate approved in accordance with 10CFR50.55a(a)(3)(i), with provisions.

pressure tests. Therefore, it is recommended that the licensee's alternative be authorized in accordance with 10CFR50.55a(a)(3)(i).

3.1.2 Relief Request VR-02, Thermal Equilibrium

Relief Request: The licensee requests generic relief from the requirements of the OM-1987, Part 1, ¶8.1.3.4 which requires that the test method be such that the temperature of the valve body be known and stabilized before commencing set pressure testing, with no change in measured temperature of more than 10 degree-F in 30 minutes for liquid service valves.

Proposed Alternate Testing: The licensee has proposed to use the requirements in the 1995 Edition of the OM Code which does not require verification of thermal equilibrium for valves that are tested at ambient temperature using a test medium at ambient temperature.

Licensee's Basis for Relief: "For testing under normal prevailing ambient conditions with the test medium at approximately the same temperature, the requirement for verifying temperature stability is inappropriate and an ineffective use of resources. There is little or no consequence of any minor changes in ambient temperature.

This has been identified by the OM-1 Code Working Group and the ASME Code Committees and is reflected in the latest version of the Code (OM Code-1995) Paragraphs I 8.1.2(d) and I 8.1.3(d)."

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

3.1.3 Relief Request VR-03, Alternate Test Media

Relief Request: The licensee requests generic relief from the requirements of the OM-1987, Part 1, ¶ 8.1.2.1 and 8.1.3.1, which require safety and relief valves to be tested with their normal system operating fluid and temperature for which they are designed, and ¶ 8.1.1.1, which requires valves designed to operate on steam be tested with saturated steam. Alternate media may be used provided the requirements of ¶8.3 are met.

Proposed Alternate Testing: The licensee has proposed to test these valves in accordance with Part 1, except that the valves will be tested at ambient shop temperatures without a temperature correlation as required by ¶8.3.

Licensee's Basis for Relief: "These valves are normally installed on various systems throughout the plant. Based on potential variations in ambient conditions as well as system operating conditions, a discrete design/operating temperature cannot practically be determined for each valve. Obviously, it is impractical to test the valve at multiple operating conditions.

Based on input from valve manufacturers, typically safety valve setpoints vary inversely with the temperature of the valve. Thus it can be deduced that measuring a valve's setpoint at the lowest temperature that a valve is expected to experience when its protection is required will ensure adequate protection at the elevated temperatures. Clearly this is a conservative application of the Code requirement.

The only adverse concern is that of the potential for premature lifting of a valve. Although this is of some limited operational concern, in no case does it pose a significant safety concern."

Evaluation: OM Part 1, ¶8.1.1.2 and 8.1.1.3 require valves to be tested with their normal system operating fluid and temperature for which they are designed, and ¶8.1.1.1 requires valves designed to operate on steam be tested with saturated steam. Alternate media may be used, provided the requirements of ¶8.3 are met. Additionally, Part 1 requires the ambient temperature of the operating environment of the valve be simulated during the set pressure test. Alternate ambient temperatures may be used, but the requirements of ¶8.3.2 and 8.3.3 must be met. Part 1, ¶8.3 requires the establishment of a correlation and certification of the correlation procedure.

The licensee has requested generic relief. Generic relief from these requirements would not be appropriate. Each valve's application must be evaluated. The request should identify the specific test and design process and ambient temperatures (or ranges of temperatures) of each valve. The licensee states that "Obviously, it is impractical to test the valve at multiple operating conditions." It is not obvious why it is impractical to test the valve at multiple operating conditions or to develop a correlation for a number or range of operating conditions.

The licensee states that "based on input from valve manufacturers, typically safety valve setpoints vary inversely with the temperature of the valve." This may be true for the majority of the valves, however, there are cases where this relationship is not valid. The ASME OM Part 1 Working Group has recently reviewed this issue and could not validate this assumption based on input from at least one valve manufacturer. The licensee should ensure that this assumption is true for all the valves (i.e., for each manufacturer, model, and whether the valve is insulated or not) that are the subject of this request.

Additionally, the licensee has stated that premature lifting of a valve does not pose a significant safety concern. The licensee should provide an evaluation of this concern for each valve. Each evaluation should specifically consider the integrity of the pressure retaining boundary that would be violated if the valve prematurely lifted, the system's makeup capability, and any other safety issues (e.g., the potential for overcooling the RCS if the main steam safety valves were to prematurely lift). The licensee should discuss the safety significance of each valve.

In conclusion, generic relief cannot be recommended. The licensee should comply with the Code requirements or resubmit the request providing specific information discussed above for each valve. The licensee is referred to Ref. 14, Question 2.4.7.

3.1.4 Relief Request VR-13, Pressurizer Safety Valves

Relief Request: The licensee requests relief from the requirements of the OM-1987, Part 1, ¶8.1.1.4 which requires valves that are insulated in service to be insulated during testing.

Proposed Alternate Testing: The licensee has proposed to test these valves in a vendor testing lab at the valve body temperature profile necessary to simulate normal operating conditions. No insulation will be installed.

Licensee's Basis for Relief: "Changes in safety/relief valve body temperature can change the lift setpoint measured during inservice testing. Changes in ambient temperature or modifications to insulation also may change the lift setpoint by virtue of the resulting effect on the valve body temperature. The purpose of Paragraph 8.1.1.4 is to ensure the effect of temperature variations are minimized. Requiring insulation to be installed during testing is clearly intended to also ensure the valve body's temperature, and therefore its performance, is similar to that under normal operating circumstances. Calvert Cliffs has determined the normal operating temperature profile for the pressurizer safety valves by instrumenting each valve body at several locations and recording empirical data during normal operation.

Recently, Calvert Cliffs commissioned testing using the valves' actual operating temperature profile at a national vendor's testing facility to determine the impact of having the insulation removed versus installed during testing of the pressurizer safety valves. This testing showed that pressurizer safety valves which have had their setpoints satisfactorily verified in-situ will perform satisfactorily two years later in a laboratory setting if the valve body's actual operating temperature profile is recreated. The test was conducted using two valves adjusted to their respective setpoints (which differ by only 65 psi).

The first series of tests was performed with each valve uninsulated. Prior to setpoint testing, each valve was thermally stabilized at the specified temperature profile to match normal operating conditions. The valves performed within their as-found setpoint tolerance.

The second series of tests was performed with each valve insulated (using the actual insulation from the plant normally installed on each valve). Prior to setpoint testing, each valve was thermally stabilized. However, due to the test configuration, the valve could not be thermally stabilized at the actual operating temperature profile. Instead, it could only be stabilized at a higher temperature. The overall impact of the higher temperature profile is that the lift pressure for the valves is lower than when at the correct temperature profile. This is a non-conservative error because, if the valves were adjusted to lift at their operating setpoint under these conditions, they would then be set to lift by as much as approximately 2% high when returned to their normal plant installation.

The third series of tests was performed with each valve insulated and with the ambient temperature being varied. The variations in ambient temperature had little effect on the valve's lift pressure.

Because of differences in the test configuration and the normal plant configuration, the vendor was unable to stabilize the valves' temperature profile when insulated consistent with the one specified for normal plant operating conditions. Rather, the temperatures measured at all the points being monitored, most notably the upper and lower bonnet, were higher.

The higher temperature profile for the insulated valves in the testing configuration occurred because, when installed in the plant, these valves are attached to long runs of piping with numerous associated piping supports which serve as heat sinks for the valves, but in the test facility these long runs of piping are no longer attached. In the plant, these heat sinks allow the valves to stabilize at a lower temperature profile even when insulated, as compared to the temperature profiles when insulated in the vendor test facility. Additionally, the presence of forced ventilation in the field increases the heat transfer out of each valve body through the insulation for the same ambient temperature when compared to the stagnant conditions present in the test configuration.

In other words, the heat input and heat output of the insulated valves in a stagnant environment cannot be balanced in the testing facility until the valves are hot enough to create the necessary heat transfer rate through the insulation needed to offset the heat input. Since the heat transfer out of the valve to the attached piping is lost, more heat output through the insulation is required. The effect is additionally aggravated by the lack of forced ventilation. As a result, the valves stabilize at a high temperature and the lift pressure measured was lower (by as much as approximately 2%) with the valves insulated and at these higher temperatures."

Evaluation: The Code, Part 1, ¶8.1.1.1 requires valves that are designed to operate on steam to be set pressure tested with saturated steam. Paragraph 8.1.1.4, requires that the test method shall be such that the temperature of the valve body be known and stabilized before commencing set pressure testing. Valves that are insulated in service shall be insulated in like manner during testing. Additionally, ¶8.1.1.5 requires the ambient temperature of the operating environment be simulated during the set pressure test. The Code does not require the determination or replication of the normally operating valve body temperature profile, however, it appears that the intent of the Code is to require replication of the operating conditions during the test to the extent reasonable.

As stated by the licensee based on test results, the normal operating valve body temperature cannot be established in the test facility when testing using saturated steam at the normal operating temperature with the insulation installed due to the lack of adjacent heat sinks and ventilation. Use of an lower temperature test media would require a correlation. The licensee's proposal will simulate the actual temperature profile experienced during normal plant operation, and provides an acceptable alternate to the Code requirements. Compliance with the Code would cause the setpoints to be adjusted non-conservatively. The proposed alternative provides an acceptable level of quality and safety and it is recommended that the alternative be authorized in accordance with 10CFR50.55a(a)(3)(i). The licensee should ensure that any modifications to the piping system or environmental systems (HVAC) are reviewed and evaluated to ensure that the temperature profile is not affected such that the testing performed would be invalid.

3.2 Containment Spray and Safety Injection System

3.2.1 Relief Request VR-07, SIT Discharge Check Valves

Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 10, ¶4.3.2, which requires check valves to be exercised nominally every three months, except as provided by ¶4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.4.

Proposed Alternate Testing: The licensee has proposed to exercise these valves each refueling outage, using non-intrusive test methods to verify full stroke. If test results are inconclusive or the valve does not full stroke, disassembly and inspection in accordance with Generic Letter 89-04, Position 2 will be performed. Additionally, sample disassembly and inspection may be used, in lieu of full-stroke exercising using non-intrusives, to minimize radiation exposure when refueling outage conditions warrant, or when check valve maintenance is already planned.

Licensee's Basis for Relief: "These are simple check valves that have no external means to exercise them. Opening them requires forcing water from the safety injection tanks to the reactor coolant system. During normal operation, RCS pressure is higher than safety injection tank pressure therefore, opening is not possible. During cold shutdown periods, "dumping" a safety injection tank is also not practical due to the plant conditions and the extensive system preparations required for the evolution. During refueling outages, it is possible to "dump" each safety injection tank to exercise each check valve. However, flow indication is not available and full design flow cannot be achieved due to the slow opening time of the SIT discharge MOV's. Therefore, the ability of each check valve to full-stroke can only be confirmed using non-intrusive monitoring techniques. (Due to their service conditions, these check valves cannot remain instrumented.)"

Evaluation: OM Part 10, ¶4.3.2 requires check valves to be exercised quarterly. If full-stroke exercising during plant operation or cold shutdowns is impractical, it may be limited to full-stroke during refueling outages. The licensee has discussed how exercising during power operation is impractical due to the safety injection (SI) system pressure being lower than the RCS pressure.

Additionally, full-stroke exercising these valves during cold shutdowns is also impractical due to the need to set up test equipment and the fact that the test could delay plant startup. Relief is not required in order to defer testing to refueling outages based on the impracticality of performing the test at power operation and cold shutdowns.

The licensee has proposed using non-intrusive testing (NIT). Relief is not required because this test method is considered an acceptable "other positive means," in accordance with Part 10, ¶4.3.2.4(a). The NIT must be repeatable and qualified, as discussed in Generic Letter 89-04, Position 1. The use of non-intrusive test methods on each valve every refueling outage, as proposed by the licensee, is acceptable in accordance with the Code. As discussed in NUREG-1482, Section 4.1.2, check valves may also be tested using NIT on a sampling basis.

The NRC's position is that check valves should be tested with flow, if practical (See discussion in Reference 14, Question 2.3.23). If testing with flow is impractical, disassembly and inspection is an acceptable alternative. If following the dump of the safety injection tank (SIT), non-intrusive test data is inconclusive or the valve did not fully-stroke open, disassembly and inspection would be an appropriate corrective action, since refilling the SIT and performing a retest would be impractical based on the extensive test set up and the potential for delaying plant startup. The valve would be required to be declared inoperable first if the valve failed to exhibit the required change of obturator position.

The licensee has also proposed the use of sample disassembly and inspection in lieu of exercising with flow to minimize personnel exposure. The use of disassembly and inspection interchangeably with NIT is not acceptable because the licensee may not be able to determine degradation given the extended test/inspection intervals. Additionally, it would appear that personnel radiation exposure during valve disassembly and inspection would exceed any exposure related to the use of non-intrusive techniques. The licensee would need to demonstrate on a valve specific basis the impractical condition due to radiation exposure. NUREG-1482, Section 2.5.1 provides guidance on what information should be provided. Additionally, the licensee has proposed sample disassembly and inspection when check valve maintenance is already planned. In this case, testing with flow would not be impractical, and should be performed first. Maintenance should not be considered a substitute for a Code required test. As discussed in NUREG-1482, Appendix A, Question Groups 11 and 15, disassembly and inspection is an option only where full stroke exercising cannot practically be performed by flow or by other positive means. The licensee should perform exercising of these valves in accordance with the Code. The licensee's request to utilize sample disassembly and inspection is not authorized in accordance with Generic Letter 89-04, Position 2, unless testing with flow is impractical. The licensee would need to document the basis for the determination that using flow or other practical means is impractical. As discussed in NUREG-1482, Section 4.1.2, the use of non-intrusives is not mandated. However, the NRC encourages the use of these techniques, where practical.

3.2.2 Relief Request VR-08, SIT and SI Pump Discharge Check Valves
Relief Request: The licensee requests relief from the requirements of the OMa-1988, Part 10, ¶4.3.2, which requires check valves to be exercised nominally every three months, except as provided by ¶4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

Proposed Alternate Testing: The licensee has proposed to exercise these valves each refueling outage, using non-intrusive test methods to verify full stroke. If test results are inconclusive or the valve does not full stroke, disassembly and inspection in accordance with Generic Letter 89-04, Position 2 will be performed. Additionally, sample disassembly and inspection may be used, in lieu of full-stroke exercising using non-intrusives, to minimize radiation exposure when refueling outage conditions warrant, or when check valve maintenance is already planned.

Licensee's Basis for Relief: "These are simple check valves that have no external means to exercise them. Opening them requires forcing water from the safety injection tanks to the reactor coolant system. During normal operation, RCS pressure is higher than safety injection tank pressure therefore, opening is not possible. During cold shutdown periods, "dumping" a safety injection tank is also not practical due to the plant conditions and the extensive system preparations required for the evolution. During refueling outages, it is possible to "dump" each safety injection tank to exercise each check valve. However, flow indication is not available and full design flow cannot be achieved due to the slow opening time of the SIT discharge MOV's. Therefore, the ability of each check valve to full-stroke can only be confirmed using non-intrusive monitoring techniques.

Alternatively, these check valves may be full-stroked using the discharge of a low pressure safety injection pump. However, since the check valves have no external position indication, verifying their full-stroke open and closed, still requires non-intrusive monitoring techniques. Due to their service conditions, these valves cannot remain instrumented and it is not considered practical to instrument them during a cold shutdown period."

Evaluation: OM Part 10, ¶4.3.2 requires check valves to be exercised quarterly. If full-stroke exercising during plant operation or cold shutdowns is impractical, it may be limited to full-stroke during refueling outages. The licensee has discussed how exercising during power operation is impractical due to the safety injection system pressure being lower than the RCS pressure. Additionally, full-stroke exercising these valves during cold shutdowns is also impractical due to the need to set up test equipment and the fact that the test could delay plant startup. Relief is not required in order to defer testing to refueling outages based on the impracticality of performing the test at power operation and cold shutdowns.

The licensee has proposed using non-intrusive testing (NIT). Relief is not required because this test method is considered an acceptable "other positive means," in accordance with Part 10, ¶4.3.2.4(a). The NIT must be repeatable and qualified, as discussed in Generic Letter 89-04, Position 1. The use of non-intrusive test methods on each valve every refueling outage, as proposed by the licensee, is acceptable in accordance with the Code. As discussed in NUREG-1482, Section 4.1.2, check valves may also be tested using NIT on a sampling basis.

The NRC's position is that check valves should be tested with flow, if practical (See discussion in Reference 14, Question 2.3.23). If testing with flow is impractical, disassembly and inspection is an acceptable alternative. If following the dump of the safety injection tank (SIT), non-intrusive test data is inconclusive or the valve did not fully-stroke open, disassembly and inspection would be an appropriate corrective action, since refilling the SIT and performing a retest would be impractical based on the extensive test set up and the potential for delaying plant startup. The valve would be required to be declared inoperable first if the valve failed to exhibit the required change of obturator position.

The licensee has also proposed the use of sample disassembly and inspection in lieu of exercising with flow to minimize personnel exposure. The use of disassembly and inspection interchangeably with NIT is not acceptable because the licensee may not be able to determine degradation given the extended test/inspection intervals. Additionally, it would appear that personnel radiation exposure during valve disassembly and inspection would exceed any exposure related to the use of non-intrusive techniques. The licensee would need to demonstrate on a valve specific basis the impractical condition due to radiation exposure. NUREG-1482, Section 2.5.1 provides guidance on what information should be provided. Additionally, the licensee has proposed sample disassembly and inspection when check valve maintenance is already planned. In this case, testing with flow would not be impractical, and should be performed first. Maintenance should not be considered a substitute for a Code required test. As discussed in NUREG-1482, Appendix A, Question Groups 11 and 15, disassembly and inspection is an option only where full stroke exercising cannot practically be performed by flow or by other positive means. The licensee should perform exercising of these valves in accordance with the Code. The licensee's request to utilize sample disassembly and inspection is not authorized in accordance with Generic Letter 89-04, Position 2, unless testing with flow is impractical. The licensee would need to document the basis for the determination that using flow or other practical means is impractical. As discussed in NUREG-1482, Section 4.1.2, the use of non-intrusives is not mandated. However, the NRC encourages the use of these techniques, where practical.

3.2.3 Relief Request VR-09, SI PIVs

Relief Request: The licensee requests relief from the requirements of OMa-1988, Part 10, ¶4.2.2.3(a), which requires Category A valves to be leak tested at least once every 2 years.

Proposed Alternate Testing: The licensee has proposed to test these valves on a schedule in accordance with the performance-based requirements of 10CFR50, Appendix J, Option B. No additional testing will be performed.

Licensee's Basis for Relief: "Leakage testing of these valves for both purposes is done concurrently using the same procedures and the same acceptance criteria. Recently, BG&E has opted to convert to "Option B" of the Appendix J Testing Program whereby valves that have a history of good performance with respect to their leak tight integrity, may be tested at a frequency less than the two years required by Appendix J and Part 10. The Part 10 requirements to continue to perform seat leakage testing at 2-year intervals for containment isolation valves which also provide a reactor coolant system pressure isolation function would essentially eliminate the benefit of applying Option B to these valves and would subject these valves to unnecessary leak testing even when they meet Option B criteria for extending the Appendix J testing frequency. (It should be noted that local leak rate testing these valves requires a reduced RCS inventory condition.)

The consequences of failure (gross leakage) of one of these valves is not significant from the aspect of accident severity. There is two valve isolation between the LPCI piping and the reactor coolant systems. Note that these are gate valves that are typically not subject to catastrophic failure when statically closed.

Based on past performance of these valves and other issues discussed above, leakage testing of these valves at an extended frequency as permitted by Option B is adequate to ensure the continued operability and reliability of these valves."

Evaluation: The Code requires leak testing of Category A valves, with leak tight functions besides containment isolation, at least once every two years. The licensee has proposed testing these reactor coolant pressure isolation valves (PIVs) on a schedule in accordance with Appendix J, Option B. Appendix J, Option B allows Type C testing of containment isolation valves (CIVs) to be performance based. Regulatory Guide 1.163 restricts Type C testing to a maximum interval of five years.

The Code requires that the test medium be specified by the owner and provides requirements in Part 10, ¶4.2.2.3(b)(4) for leakage tests involving pressure differentials lower than function pressure differentials. Section XI, IWV-3423(f) previously allowed a correlation to use an alternate medium. However, the ASME OM Code Committees deleted this option in Part 10, citing in their white paper that correlations were not supported by in-field test data. As discussed in Reference 14, Question 2.8.8, it is not acceptable to perform one test for a CIV, that is also a PIV, using a correlation for low pressure air to high pressure water.

The licensee states that leakage testing of these valves, which provide isolation between the reactor coolant and the shutdown cooling system, for both CIV and PIV purposes is done concurrently using the same procedures and the same acceptance criteria. In their response to Generic Letter 87-06 (Ref. 18), the licensee committed to test these pressure isolation valves using the local leak rate test in accordance with 10CFR50 Appendix J each refueling outage and has provided the acceptance criteria for each valve in sccm, therefore no correlation is required. The licensee has proposed testing the PIVs in accordance with Appendix J, i.e., with air or nitrogen at the calculated peak containment internal pressure related to a design basis accident.

The Standard Technical Specifications (Ref. 19) require testing of PIVs at least every 18 months, a typical refueling cycle. In addition, testing must be performed once after the valve has been opened by flow or exercised to ensure tight reseating. The leakage limit of 0.5 gpm per inch of nominal valve diameter up to 5 gpm maximum applies to each valve. The basis for the LCO is the 1975 Reactor Safety Study that identified potential intersystem LOCAs as a significant contributor to the risk of core melt. The dominant accident sequence in the intersystem LOCA category is the failure of the low pressure portion of the shutdown cooling (SDC) system outside containment. The licensee's Technical Specifications, however, do not include requirements for PIVs.

The licensee has not discussed the hardship or unusual difficulty with performing the PIV test every refueling. Testing the valves as PIVs could be performed with water, thereby negating the need for draining the water from the system. It is recommended that the request for relief be denied because the extended test interval is not justified given the safety significance of the potential for a intersystem LOCA in the safety injection system, an accident mitigation system, and the size of the valves (i.e., 12 inch). While extending the CIV leakage testing is already acceptable under the provisions of OM Part 10, the Code includes no provisions for leak testing PIVs at intervals beyond once every 2 years. The licensee should continue to perform leakage testing every 2 years.

The licensee has only requested relief from the Code test frequency requirements. Therefore, it is assumed that the licensee is complying with the requirements of Part 10, ¶4.2.2, except for paragraph 4.2.2.3(a). This would include the analysis of leakage rates and corrective action requirements of ¶4.2.2.3 (e) and (f). The licensee should submit a request for relief if these requirements are impractical.

Additionally, the licensee has indicated in the Valve Tables that these valves are passive closed valves and has not specified an exercise in the closed direction. These valves are containment isolation valves and would appear to have an active closed function during shutdowns when shutdown cooling was in operation. The licensee should review the function and testing requirements for these valves.

4.0 VALVE TESTING DEFERRAL JUSTIFICATIONS

Baltimore Gas and Electric Company has submitted 59 justifications for deferring valve testing. These justifications document the impracticality of testing 196 valves quarterly, during power operation, and 36 valves during operation or cold shutdowns (counting valves in both units). These justifications were reviewed to verify their technical basis.

As discussed in Generic Letter 91-18 (Ref. 20), it is not the intent of IST to cause unwarranted plant shutdowns or to unnecessarily challenge other safety systems. Generally, those tests involving the potential for a plant trip, or damage to a system or component, or excessive personnel hazards are not considered practical. Removing one train for testing or entering a Technical Specification limiting condition of operation is not sufficient basis for not performing the required tests, unless the testing renders systems inoperable for extended periods of time (Reference NUREG-1482, Section 3.1.1). Other factors, such as the effect on plant safety and the difficulty of the test, may be considered.

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

BNL's evaluation of each deferral justification is provided in Appendix A. The anomalies associated with the specific justifications are provided in Section 5.12 of this TER.

5.0 IST SYSTEM SCOPE REVIEW

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

(a) Valve AFW-4550-CV is an air-operated valve with a fail close function denoted on the P&ID, however, the IST Program does not require a fail safe test. Additionally, this valve, which is the cross-connect valve between Units 1 and 2, is identified as a passive close valve. The check valve in series, AFW-190, has no safety function to close. The licensee should ensure that there is no requirement for unit isolation once the air-operated valve is opened.

(b) Normally closed manual valve MS-107 is not included in the IST Program. This valve is opened to provide main steam to No. 12 steam driven AFW pump turbine. The check valve downstream of the manual valve, MS-108, is included in the IST Program and has a safety function to open. The licensee should review the function of the manual valve. As discussed in NUREG-1482, Section 4.4.6, manual valves are required to be tested in accordance with Part 10 if the valve is credited in the safety analysis for being capable of being repositioned to shutdown the plant, or to mitigate the consequences of an accident.

(c) Check valves AFW-129, 130, 193, 194, 199, and 200 are the AFW injection check valves into the steam generators. The IST Program only identifies a safety function to open. The licensee should review the function of these valves to ensure that the valves are not required to isolate the steam generators, for example in the case of a pipe rupture. Additionally, there are no containment isolation valves identified for penetrations 21 or 22 in the IST Program. Although no Type C test would be required, pursuant to Appendix A, Criterion 57, at least one containment isolation valve is required. Figure 5-10 of the SAR identifies control valves CV-4511 and 4512, check valves AFW-199 and 200, and locked closed manual valves AFW-163 and 165 as the containment isolation valves. The control and check valves are only identified with an active open function. It would appear that these valves also have an active safety function to close to provide containment isolation capabilities. The licensee should review the function and classification of these valves.

6.0 IST PROGRAM RECOMMENDED ACTION ITEMS

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

6.1 In BGE's IST Program submittal letter, Reference 1, the licensee states that "after the Improved Technical Specifications are approved, we will implement relief requests as allowed by 10CFR50.55a. Specifically, 10CFR50.55a(f)(5)(iv) allows up to one full year following implementation of each relief request to demonstrate that a Code requirement is impractical." The licensee further states that where relief is required, the updated IST Program requirements will not be fully implemented until the NRC approves each specific relief request or the Improved Technical Specification. On page three of the submittal letter the licensee states "We have concluded that a pump or valve test requirement by the Code or addenda is impractical when:

> The requirement cannot be met due to plant or system design or configuration;
>
> The requirement would result in an additional use of resources without a compensating increase in the level of quality or safety; or,
>
> Compliance with the requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

NUREG-1482, Section 6 discusses the use of the revised standard technical specifications. There is a distinction between requests for relief where the Code requirements are impractical (i.e., 10CFR50.55a(f)(6)(i)) and requests for approval of alternates (i.e., 10CFR50.55a(a)(3)). As discussed in the NUREG, licensees implementing the revised standard technical specifications will not need prior approval to implement requests for relief where the Code requirements are impractical. However, where the Code requirements are practical and the licensee is proposing an alternate (10CFR50.55a(a)(3)(i) or (ii)), implementation may not begin until authorized by the Director of the Office of Nuclear Regulation. Only the first item identified by the licensee in the submittal letter would be considered by the NRC as impractical, i.e., design limitations or physical constraints. Requirements that result in a hardship or unusual difficulty are not considered impractical. The NRC would review these requests pursuant to (a)(3)(i) or (ii). As stated in NUREG-1482, Section 3.3.3, the regulations do not allow a licensee to continue with a previous program until the NRC has reviewed the requests for the next interval. After the start of the new interval, the Code requirements must be met (including for those components where an alternate is proposed, but is not yet authorized), unless the requirements are impractical or an alternate is authorized by the commission.

6.2 Section 5.4 of the IST Program discusses testing intervals and states that a 25 percent extension may be applied to the test schedule as allowed by plant technical specifications. As discussed in NUREG-1482, Section 3.1.3, the 25 percent extension would not, however, be applied to safety and relief valve testing in accordance with Part 1.

6.3 The note in the legend for the Pump Tables indicates that if the table contains a "YES," the parameter is measured, evaluated and recorded per the Code, and if "NO" is indicated, the parameter is measured in a manner not strictly specified by the Code, and the associated relief request is noted. The actual table indicates "YES" for a number of pump parameters that are not measured or evaluated in accordance with the Code, e.g., the charging pumps' discharge pressure (PR-07). Additionally, a "NO" is indicated in the speed column for the Service Water and Salt Water Cooling pumps. A "N/A" would appear more appropriate.

6.4 When pump test parameters are in the alert range, the Code requires the test frequency to be doubled. This includes testing performed during cold shutdowns or refueling outages, such as proposed in PR-01, 2, 3, 4 and 6. The licensee is referred to Reference 14, Item 3.3.5, regarding the NRC's recommendation on performance of corrective action when pumps are in the alert range during the test at refueling. (TER Sections 2.1.1, 2.1.2, 2.1.3, 2.2.1, and 2.2.2)

6.5 The licensee should ensure that the problems detected at running speed and at subharmonic levels are adequately assessed using the proposed vibration instrumentation for the charging pumps (PR-05). Consultation with the pump manufacturer would provide additional basis for this request.

The licensee has stated that the charging pump vibration instrumentation is "state of the art" and that compliance with the Code would require unnecessary procurement of equipment beyond that intended by the Code. The licensee has not provided sufficient information on the hardship or unusual difficulty associated with complying with the Code and has not demonstrated that there is not a compensating increase in the level of safety. Numerous utilities have procured and utilize vibration measurement equipment that have frequency response ranges down to 1.5-2 hz. (e.g., Monticello). It appears, based on the licensee's previous IST Program submittal (Ref. 15), which states that the charging pump's instrumentation reads accurately from 3 hz., that the licensee has, since the last interval, replaced the vibration instrumentation. Therefore, it is recommended that relief be denied. The licensee should procure new equipment that meets the Code requirements or revise and resubmit the relief request to address the specific hardship and how the proposed alternative provides an acceptable level of safety.

The licensee mentions in the basis that they implement a "Rotating Machinery Vibration Monitoring Program" that includes periodic vibration monitoring of the charging pumps. The licensee states that "this program is inclusive and encompasses a wider range of vibration analyses at several critical pump and motor locations." The licensee, however, does not discuss what range of frequency this program encompasses and whether spectral analysis is used.

It is recommended that an interim period of one year be allowed for the licensee either to procure new equipment that meets the Code requirements or revise and resubmit the relief request. (TER Section 2.3.1)

6.6 Relief is not required to use the positions included in NUREG-1482, Section 4.3.9, as requested in VR-01. The licensee should, however, reference the use of this position in the IST Program. (TER Section 3.1.2)

6.7 The licensee has requested generic relief in VR-03 concerning relief valve test condition correlation requirements. Generic relief would not be appropriate. Each valve's application must be evaluated. The request should identify the specific test and design process and ambient temperatures (or ranges of temperatures) of each valve. The licensee states that "Obviously, it is impractical to test the valve at multiple operating conditions."

It is not obvious why it is impractical to test the valve at multiple operating conditions or to develop a correlation for a number or range of operating conditions.

The licensee states that "based on input from valve manufacturers, typically safety valve setpoints vary inversely with the temperature of the valve." This may be true for the majority of the valves, however, there are cases where this relationship is not valid. The ASME OM Part 1 Working Group has recently reviewed this issue and could not validate this assumption based on input from at least one valve manufacturer. The licensee should ensure that this assumption is true for all the valves (i.e., for each manufacturer, model, and whether the valve is insulated or not) that are subject of this request.

Additionally, the licensee has stated that premature lifting of a valve does not pose a significant safety concern. The licensee should provide an evaluation of this concern for each valve. Each evaluation should specifically consider the integrity of the pressure retaining boundary that would be violated if the valve prematurely lifted, the system's makeup capability, and any other safety issues (e.g., the potential for overcooling the RCS if the main steam safety valves were to prematurely lift). The licensee should discuss the safety significance of each valve.

In conclusion, generic relief cannot be recommended. The licensee should comply with the Code requirements or resubmit the request providing specific information discussed above for each valve. The licensee is referred to Ref. 14, Question 2.4.7. (TER Section 3.1.3)

6.8 The licensee has proposed in VR-13 to test the pressurizer safety valves in a vendor testing lab at the valve body temperature profile necessary to simulate normal operating conditions. No insulation will be installed. The licensee should ensure that any modifications to the piping system or environmental systems (HVAC) are reviewed and evaluated to ensure that the temperature profile is not affected such that the testing performed would be invalid. (TER Section 3.1.4)

6.9 The licensee has proposed using non-intrusive testing (NIT). Relief is not required because this test method is considered an acceptable "other positive means," in accordance with Part 10, ¶4.3.2.4(a). The NIT must be repeatable and qualified, as discussed in Generic Letter 89-04, Position 1. The use of non-intrusive test methods on each valve every refueling outage, as proposed by the licensee, is acceptable in accordance with the Code. As discussed in NUREG-1482, Section 4.1.2, check valves may also be tested using NIT on a sampling basis.

The licensee has also proposed the use of sample disassembly and inspection in lieu of exercising with flow to minimize personnel exposure in VR-07 and 08. The use of disassembly and inspection interchangeably with NIT is not acceptable because the licensee may not be able to determine degradation given the extended test/inspection intervals. Additionally, it would appear that personnel radiation exposure during valve disassembly and inspection would exceed any exposure related to the use of non-intrusive techniques. The licensee would need to demonstrate on a valve specific basis the impractical condition due to radiation exposure. NUREG-1482, Section 2.5.1 provides guidance on what information should be provided. Additionally, the licensee has proposed sample disassembly and inspection when check valve maintenance is already planned. In this case, testing with flow would not be impractical, and should be performed first. Maintenance should not be considered a substitute for a Code required test. As discussed in NUREG-1482, Appendix A, Question Groups 11 and 15, disassembly and inspection is an option only where full stroke exercising cannot practically be performed by flow or by other positive means. The licensee should perform exercising of these valves in accordance with the Code. The licensee's request to utilize sample disassembly and inspection is not authorized in accordance with Generic Letter 89-04, Position 2, unless testing with flow is impractical. The licensee would need to document the basis for the determination that using flow or other practical means is impractical. (TER Sections 3.2.1 and 3.2.2)

6.10 In VR-09 the licensee has not discussed the hardship or unusual difficulty with performing the PIV test every refueling. Testing the valves as PIVs could, as is typically done, be performed with water, thereby negating the need for draining the water from the system.

It is recommended that VR-09 be denied because the extended test interval is not justified given the safety significance of the potential for a intersystem LOCA in the safety injection system, an accident mitigation system, and the size of the valves (i.e., 12 inch). The licensee should continue to perform leakage testing of the shutdown cooling PIVs every 2 years.

The licensee has only requested relief from the Code test frequency requirements. Therefore, it is assumed that the licensee is complying with the requirements of Part 10, ¶4.2.2, except for paragraph 4.2.2.3(a). This would include the analysis of leakage rates and corrective action requirements of ¶4.2.2.3 (e) and (f). The licensee should submit a request for relief if these requirements are impractical.

Additionally, the licensee has indicated in the Valve Tables that the shutdown cooling PIVs/CIVs are passive closed valves and has not specified an exercise in the closed direction. These valves are containment isolation valves and would appear to have a active closed function during shutdowns when shutdown cooling was in operation. The licensee should review the function and testing requirements for these valves. (TER Section 3.2.3)

6.11 In Relief Requests VR-05, 07, 08, 10 and 11, the licensee has proposed to utilize Generic Letter 89-04, Position 2 and has identified in the requests valves from both units. It is assumed that there are two valve groups per request (i.e., one for each unit). If the groups contain valves from both units, the licensee is referenced to Section 4.1 of NUREG-1482. The guidance for grouping similar check valves contained in Position 2 of Generic Letter 89-04, including group size, must be met.

6.12 Valve Testing Deferral Justification anomalies:
(a) The licensee has not provided a basis in justification CSJ-3 for deferring closure verification to cold shutdowns. The justification should be revised to address the basis for deferring this exercise. As discussed in NUREG-1482, Appendix A, Question Group 24, exercising the valve open is not a prerequisite in order to verify the valve's closure capability.

(b) The Valve Tables indicate that valves 1(2)-CVC-228 will be partially-stroked quarterly. Justification CSJ-7, however, states that it is impractical to partial stroke these valves during operation. Additionally, the Valve Tables indicate that the valves will be exercised closed at cold shutdowns, while the basis of justification CSJ-7 states that the valves will be confirmed closed quarterly. The licensee should correct the Valve Tables or justification accordingly.

(c) Check valves 1(2)-CVC-251 are normally closed and only have a safety function to close. The licensee states in justification CSJ-8A that "any leakage of concentrated boric acid past CV512 into the VCT will affect reactivity and cause a reactor power transient." Valve CV512 is a 3 inch globe valve. This type of valve normally provides excellent seat leak tightness. It is not apparent that verifying closure of CVC-251 will cause a significant power transient due to leakage past a globe valve. This leakage could be tempered by injecting reactor makeup water directly into the charging pump suction or into the VCT. Additionally, boric acid is batch added during power operation.

The licensee states that when boric acid is added to the VCT during power operation "the operators are required to verify the plant response by checking the appropriate parameters, including VCT level, VCT pressure, and boric acid flow rate. This effectively verifies CVC251 is adequately closed." This test does not appear to adequately verify CVC-251 is closed. Normally closed valve CV-210X, and check valves, CVC-244 and 247, are in series.

The licensee should review the test method and revise the justification accordingly.

(d) The licensee has not provided a basis in justification CSJ-9 for deferring valves 1(2)-CVC-257 closure verification to cold shutdowns. The justification should be revised to address the basis for deferring this exercise. As discussed in NUREG-1482, Appendix A, Question Group 24, exercising the valve open is not a prerequisite in order to verify the valve's closure capability.

(e) The licensee states that is impractical to exercise 1(2)-CVC-186 quarterly in justification CSJ-14, because some flow is diverted through valve 1(2)-CVC-435. There is a manual valve, 1(2)-CVC-188 in series with valve 1(2)-CVC-435, that could be isolated in order to full-stroke exercise 1(2)-CVC-186. The licensee should provide a discussion of the impracticality of exercising this valve by manually closing 1(2)-CVC-188.

(f) The licensee states in CSJ-15 that valves 1(2)-CVC-435 cannot be exercised open because the normal charging lineup would be isolated resulting in level transients, and would not be considered prudent during normal plant operation. Flow through the 2 inch bypass would not appear to cause severe pressurizer level transients and plant shutdown. At least one other CE PWR (Palisades) full-stroke exercises this valve quarterly. The licensee should reevaluate the practicality of full-stroke exercising these valves quarterly.

(g) The licensee states in CSJ-27 that the test for verifying closure of valves 1(2)-MS-103 and 106 is "extremely cumbersome and requires extensive system realignment and resources and an extended period during which the associated AFW pump is out of service." It appears that when each AFW pump is tested, the other pump's associated main steam check valve is closed. Without additional information on the test method used, the basis for deferring testing is inadequate.

(h) Justifications CSJ-29 and RFJ-01 are based on the need to open the valves before performing the back-leakage tests. Per NUREG-1482, Appendix A, Question Group 24, Current Considerations, if a valve performs a safety function only in the closed position, demonstration of a stroke open before verification of closure is not required by the Code. This guidance is also included in Section 5.3 of the licensee's IST Program. These justifications are for valves that are not ASME Code Class 1, 2, or 3.

(i) Justifications CSJ-34, 35 and 36 discuss the impracticality of testing during power operation, however, the Valve Tables indicate that the valves will be full-stroke exercised during refueling. The "cold shutdown" justification does not discuss the impracticality of testing the valves during cold shutdowns. Additionally, the licensee has not provided justification for deferring closure verification in CSJ-34. The licensee should revise the Table or justifications accordingly.

(j) Justifications RFJ-6, 7, 8, 9, and 10, state that the test is impractical to perform "every outage during normal operation or during cold shutdown periods." These sentences appear to be incorrect. These justifications are for non-ASME Code Class valves.

(k) The licensee has not discussed in CSJ-37 the impracticality of performing a closure test quarterly. The Valve Tables identify that the valves will be exercised closed during cold shutdowns. The Valve Tables or Justification should be revised accordingly.

(l) The basis for justification CSJ-39 states that the valves will be verified closed quarterly. The Valve Table, however, indicates that the valves will be full-stroke exercised closed at cold shutdowns. The licensee should exercise/verify closure quarterly, or provide additional information to justify deferring this test to cold shutdowns.

(m) In the basis for CSJ-40, the licensee states that the valves will be partial-stroke exercised whenever the associated HPSI pump is run to fill a safety injection tank. In the Valve Table, the licensee indicates that the valves will be partial-stroke exercised quarterly. If the HPSI pump is not run quarterly to fill the SITs, then the justification should provide additional information to support the bases that partial-stroke exercising is impractical to perform quarterly. The basis of CSJ-34 states that these valves will be partial-stroke exercised open quarterly and whenever the HPSI pump is operated to fill the SITs.

(n) It does not appear to be impractical to verify closure of the valves identified in CSJ-42 during power operation. The test connections are located outside containment and there is no restriction to opening one CIV, unless the other CIV is inoperable (See discussion in NUREG-1482, Section 3.1.1(2)). The licensee has stated that there is a concern with radiation exposure, however, the licensee has not provided specific information as discussed in NUREG-1482, Section 2.5.1. The licensee has stated that these valves are opened relatively infrequently and for a short duration. The licensee should note that valves need not be considered active if they are only temporarily removed from their safety position for a short period of time, as discussed in NUREG-1482, Section 2.4.2. If the valve is routinely repositioned during power operation it would be considered active. The licensee should review the classification of these valves and, if necessary, revise the IST Program to include quarterly testing, or provide additional justification.

(o) The licensee states in CSJ-43 that "In order to open these valves, the containment spray pumps must be operated with injection into the containment spray headers." However, it is impractical to full-stroke exercise the CS pump discharge valves in any operational mode using the containment spray header. These valves are discussed in Cold Shutdown Justification Number 43, however, in the Valve Tables, these valves are identified as being full-stroke exercised during refueling. The licensee does not discuss how or when the valves will be tested in the justification. However, as discussed in Relief Request PR-06 addressing the containment spray pumps, the CS pumps (and the associated discharge check valves) can be full-flow tested substituting the CS pumps for the LPSI pumps in shutdown cooling lineup after sufficient decay heat has been removed. It appears that these valves will be full-stroke exercised during cold shutdowns of sufficient length. The licensee should provide additional information in this CSJ to support deferring quarterly testing.

(p) The licensee states in CSJ-44 that the normal way to open valves 1(2)-SW-5149-CV is to open one of the associated overboard valve pairs. It is not apparent from the P&ID whether the valves can be opened using the override handswitch HS-5149, without opening a valve pair. Provided that the valves cannot be operated using HS-5149, the alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c). The licensee should ensure that the valves cannot be operated using HS-5149 such that the valve pairs would not be opened.

(q) The licensee's basis for deferring testing in RFJ-11 is that a LCO would need to be entered for an extended period of time (probably in excess of 3-4 hours). As discussed in NUREG-1482, Section 3.1.2, a required entry into a LCO to perform IST would not justify deferring testing until a cold shutdown or refueling. With one diesel generator inoperable during operation, Calvert Cliffs Tech Spec 3.8.1.1 requires both EDGs be restored within 72 hours. Tech Spec 3.8.1.2 only requires one EDG to be operable during cold shutdowns and refueling. Additionally, the licensee states that testing quarterly would result in increased run time on the compressors and the potential for air system contamination. This does not appear to be sufficient basis for deferring testing to refueling. On review of the EDG Starting Air P&ID, it appears that the supply header could be depressurized through SV-10247 and 10275 and the silencers used for air dryer regeneration. Testing in this manner would probably not require the air receivers or EDGs to be declared inoperable. The licensee should review the test method and revise the request accordingly. Additionally, for the subject valves, the Valve Table incorrectly identifies the Refueling Justification Number as RFJ-08.

6.13 The system scope review results showed compliance with the Code, except for the following items regarding the auxiliary feedwater system. The licensee should review these items and make changes to the IST Program, where appropriate. Additionally, the licensee should verify that there are not similar problems with the IST Program for other systems (TER Section 5.0).

(a) Valve AFW-4550-CV is an air-operated valve with a fail close function denoted on the P&ID, however, the IST Program does not require a fail safe test. Additionally, this valve, which is the cross-connect valve between Units 1 and 2, is identified as a passive close valve. The check valve in series, AFW-190, has no safety function to close. The licensee should ensure that there is no requirement for unit isolation once the air-operated valve is opened.

(b) Normally closed manual valve MS-107 is not included in the IST Program. This valve is opened to provide main steam to No. 12 steam driven AFW pump turbine. The check valve downstream of the manual valve, MS-108, is included in the IST Program and has a safety function to open. The licensee should review the function of the manual valve. As discussed in NUREG-1482, Section 4.4.6, manual valves are required to be tested in accordance with Part 10 if the valve is credited in the safety analysis for being capable of being repositioned to shutdown the plant, or to mitigate the consequences of an accident.

(c) Check valves AFW-129, 130, 193, 194, 199, and 200 are the AFW injection check valves into the steam generators. The IST Program only identifies a safety function to open. The licensee should review the function of these valves to ensure that the valves are not required to isolate the steam generators, for example in the case of a pipe rupture. Additionally, there are no containment isolation valves identified for penetrations 21 or 22 in the IST Program. Although no Type C test would be required, pursuant to Appendix A, Criterion 57, at least one containment isolation valve is required. Figure 5-10 of the SAR identifies control valves CV-4511 and 4512, check valves AFW-199 and 200, and locked closed manual valves AFW-163 and 165 as the containment isolation valves. The control and check valves are only identified with an active open function. It would appear that these valves also have an active safety function to close to provide containment isolation capabilities. The licensee should review the function and classification of these valves.

7.0 REFERENCES

1. "Third Ten-Year Inservice Test Program for Safety Related Pumps and Valves," C. Cruse, BGE, to NRC Document Control Desk, June 30, 1997

2. "Response to Questions on the Third Ten-Year Inservice Test Program for Safety-Related Pumps and Valves," C. Cruse, BGE, to NRC Document Control Desk, October 1, 1997.

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

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

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

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

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

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

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

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

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

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

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

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

15. Letter from R. Capra, NRC, to G. Creel, BGE, "Second Ten-Year Inservice Inspection Testing Program-Calvert Cliffs Nuclear Power Plant, Units 1 and 2, TAC Nos. 64976 and 64977," dated September 20, 1990.

16. *Pump Handbook*, I.J. Karassik, McGraw Hill Book Company, 1976

17. NUREG/CP-0111, Proceedings of the NRC/ASME Symposium on Valve and Pump Testing, October 1990.

18. Letter from J. Tierman, BGE, to R. Capra, NRC, "Response to Generic Letter 87-06, "Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves," July 7, 1987.

19. Standard Technical Specifications, Combustion Engineering Plants, September 1992.

20. 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.

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

Deferral No.	Valve Identification	Licensee's Justification for Deferring Valve Exercising	Proposed Alternate Testing	Evaluation of Licensee's Justification
CSJ-1	1(2)-AFW-102 and 1(2)-AFW-116 AFW Pump 11 (21) and 12 (22) Discharge Check Valves	"These are simple check valves with no external means of exercising; thus the only practical means of opening these valves is to operate each pump discharging to the steam generators. During plant operation at power this is not practical due to the potential for thermal shock of the steam generator nozzles or internals. During quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line branching off upstream of these check valves that returns condensate to the condensate storage tank and the respective pump's suction line, thus partial flow exercising is also impractical. In addition, the quarterly testing does not pressurize the common discharge header, thus verifying the closure of the check valve at the discharge of the idle pump is not possible without an extensive change in the system valve lineup. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because relatively cold auxiliary feedwater flow would be introduced into the steam generators which could potentially result in damage to the steam generator and nozzle connections due to thermal shock. Additionally, during operation the discharge piping may not be pressurized and the need to set up equipment makes it impractical to verify closure quarterly. The alternative provides full-stroke exercising to the open and closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-2	1(2)-AFW-[illegible]9 and 1(2)-AFW-130 AFW Discharge to Steam Generators Check Valves	"These are simple check valves with no external means of exercising; thus the only practical means of opening these valves is to operate each pump discharging to the steam generators. During plant operation at power this is not practical due to the potential for thermal shock of the steam generator nozzles and internals. During quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line branching off upstream of these check valves that returns condensate to the condensate storage tank and the respective pump's suction line, thus partial flow exercising is also impractical. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because relatively cold auxiliary feedwater flow would be introduced into the steam generators which could potentially result in damage to the steam generator and nozzle connections due to thermal shock. The alternative provides full-stroke exercising to the open position d[illegible] cold shutdowns in accordance with [illegible]rt 10, ¶4.3.2.2 (c).

CSJ-3	1(2)-AFW-183 AFW Pump 13 (23) Discharge Check Valves	"These are check valves with no external means of exercising; thus the only practical means of opening these valves is to operate each pump discharging to the steam generators. During plant operation at power this is not practical due to the potential for thermal shock of the steam generator nozzles or internals. During quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line branching off at these check valves that returns condensate to the condensate storage tank and the respective pump's suction line, thus partial flow exercising is also impractical. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because relatively cold auxiliary feedwater flow would be introduced into the steam generators which could potentially result in damage to the steam generator and nozzle connections due to thermal shock. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c). The licensee has not provided a basis for deferring the exercise closed to cold shutdowns. The justification should be revised to address the basis for deferring this exercise. As discussed in NUREG-1482, Appendix A, Question Group 24, exercising the valve open is not a prerequisite in order to verify the valve's closure capability.
CSJ-4	1(2)-AFW-190 Unit 1(2) AFW Cross-Connect Check Valves	"These are simple check valves with no external means of exercising; thus the only practical means of opening these valves is to operate each pump discharging to the steam generators. During plant operation at power this is not practical due to the potential for thermal shock of the steam generator nozzles or internals. During quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line branching off upstream of these check valves that returns condensate to the condensate storage tank and the respective pump's suction line, thus partial flow exercising is also impractical. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because relatively cold auxiliary feedwater flow would be introduced into the steam generators which could potentially result in damage to the steam generator and nozzle connections due to thermal shock. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-5	1(2)-AFW-193, 1(2)-AFW-194, 1(2)-AFW-199 and 1(2)-AFW-200 AFW S/G Supply Check Valves	"These are simple check valves with no external means of exercising; thus the only practical means of exercising is to operate each pump discharging to the steam generators. During plant operation at power this is not practical due to the potential for thermal shock of the steam generator nozzles or internals. During quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line branching off upstream of these check valves that returns condensate to the condensate storage tank and the respective pump's suction line, thus partial flow exercising is also impractical. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because relatively cold auxiliary feedwater flow would be introduced into the steam generators which could potentially result in damage to the steam generator and nozzle connections due to thermal shock. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).

CSJ-6	1(2)-CVC-162 VCT Outlet Check Valves	"These are simple check valves with no means of noting obturator position nor for manual exercising. Exercising these valves in the closed direction requires realignment of the CVCS system and shifting the suction of the charging pumps to an alternate source of water or securing the pumps. During plant operation this would disrupt the CVCS system balance with the potential for causing severe pressurizer level transients or reactor coolant make-up boron concentration variations. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising; thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because isolation of these valves would require the charging pumps to take suction from the RWT or boric acid storage tanks which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-7	1(2)-CVC-228 Emergency Boration Gravity Feed Check Valves	"These are simple check valves with no means of noting obturator position nor for manual exercising. Exercising these valves in the open direction requires realignment of the CVCS system and injection of concentrated boric acid into the reactor coolant system via the charging pumps. During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients or reactor coolant make-up boron concentration variations. Partial stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. These valves can be confirmed closed (statically tested) quarterly. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full- or partial-stroke exercise these valves open quarterly because the charging pumps would be required to take suction from the boric acid storage tanks which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c). The Valve Tables, however, indicate that these valves will be partially-stroked quarterly. Additionally, the Valve Tables indicate that the valves will be exercised closed at cold shutdowns, while the basis of the justification states that the valves will be confirmed closed quarterly. The licensee should correct the Valve Tables or justification accordingly.

CSJ-8	1(2)-CVC-235 Emergency Boration Check Valves	"These are simple check valves with no means of noting obturator position nor for manual exercising. Exercising these valves in the open direction requires injection of concentrated boric acid into the reactor coolant system via the charging pumps. During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients or reactor coolant make-up boron concentration variations. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because the charging pumps would be required to take suction from the boric acid storage tanks which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-8A	1(2)-CVC-251 Demineralized Water Supply to VCT Check Valves	"Verifying the ability of this check valve to close requires applying a back-pressure. The only source of a back-pressure during normal operation is a boric acid pump (temporarily installing a test pump each quarter is not considered practical). However, the boric acid pump discharge pressure is high enough to create a concern regarding possible leakage past CV512 into the VCT (since there are no isolation valves between CV512 and the VCT). Under accident conditions with CV210Y open, seat leakage past CV512 into the VCT does not present a concern because enough boric acid will still reach the charging pump suction. However, during power operation, any leakage of concentrated boric acid past CV512 into the VCT will affect reactivity and cause a reactor power transient. Furthermore, as the fuel cycle progresses and less boric acid is required in the RCS, the impact of such a reactivity changes will become more pronounced. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. When concentrated boric acid is batch added to the VCT during power operation, the operators are required to verify the plant response by checking the appropriate parameters, including VCT level, VCT pressure, and boric acid flow rate. This effectively verifies CVC251 is adequately closed. After each addition of concentrated boric acid to the VCT, demineralized water is used to flush the piping. This strokes open CVC251. Therefore, over the course of each quarter, this check valve is at least part-stroked open and closed several times. However, since the degree of RCS boration declines as the fuel cycle progresses, the frequency of adding concentrated boric acid to the VCT also decreases. It is not practical to add concentrated boric acid to the VCT solely for the purpose of part-stroking CVC251."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	These check valves are normally closed and only have a safety function to close. The licensee states that "any leakage of concentrated boric acid past CV512 into the VCT will affect reactivity and cause a reactor power transient." Valve CV512 is a 3-inch globe valve. This type of valve normally provides excellent seat leak tightness. It is not apparent that verifying closure of CVC-251 will cause a significant power transient due to leakage past a globe valve. This leakage could be tempered by injecting reactor makeup water directly into the charging pump suction or into the VCT. Additionally, boric acid is batch added during power operation. The licensee states that when boric acid is added to the VCT during power operation "the operators are required to verify the plant response by checking the appropriate parameters, including VCT level, VCT pressure, and boric acid flow rate. This effectively verifies CVC251 is adequately closed." This test does not appear to adequately verify CVC-251 is closed. Normally closed valve CV-210X, and check valves, CVC-244 and 247, are in series. The licensee should review the test method and revise the justification accordingly.

CSJ-9	1(2)-CVC-257 RWT to Charging Pump Suction Check Valves	"Exercising these valves requires realignment of the CVCS system and shifting the suction of the charging pumps to the refueling water storage tank (RWT). During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients or reactor coolant make-up boron concentration variations. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because the charging pumps would be required to take suction from the RWT which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c). The licensee has not provided a basis for deferring the exercise closed to cold shutdowns. The justification should be revised to address the basis for deferring this exercise. As discussed in NUREG-1482, Appendix A, Question Group 24, exercising the valve open is not a prerequisite in order to verify the valve's closure capability.
CSJ-10	1(2)-CVC-501-MOV VCT Outlet Isolation Valves	"Exercising these valves requires a major realignment of the CVCS system. During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients and a plant shutdown. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG- 1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because normal makeup flow would be interrupted resulting in pressurizer level transients. If alternate makeup sources were introduced, i.e., the RWT or boric acid storage tanks, reactor power transients due to the introduction of concentrated boric acid could result in possible plant shutdown or trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

CSJ-9	1(2)-CVC-257 RWT to Charging Pump Suction Check Valves	"Exercising these valves requires realignment of the CVCS system and shifting the suction of the charging pumps to the refueling water storage tank (RWT). During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients or reactor coolant make-up boron concentration variations. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because the charging pumps would be required to take suction from the RWT which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c). The licensee has not provided a basis for deferring the exercise closed to cold shutdowns. The justification should be revised to address the basis for deferring this exercise. As discussed in NUREG-1482, Appendix A, Question Group 24, exercising the valve open is not a prerequisite in order to verify the valve's closure capability.
CSJ-10	1(2)-CVC-501-MOV VCT Outlet Isolation Valves	"Exercising these valves requires a major realignment of the CVCS system. During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients and a plant shutdown. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG- 1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because normal makeup flow would be interrupted resulting in pressurizer level transients. If alternate makeup sources were introduced, i.e., the RWT or boric acid storage tanks, reactor power transients due to the introduction of concentrated boric acid could result in possible plant shutdown or trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

CSJ-9	1(2)-CVC-257 RWT to Charging Pump Suction Check Valves	"Exercising these valves requires realignment of the CVCS system and shifting the suction of the charging pumps to the refueling water storage tank (RWT). During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients or reactor coolant make-up boron concentration variations. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because the charging pumps would be required to take suction from the RWT which could cause pressurizer level and reactor power transients due to the introduction of concentrated boric acid, resulting in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c). The licensee has not provided a basis for deferring the exercise closed to cold shutdowns. The justification should be revised to address the basis for deferring this exercise. As discussed in NUREG-1482, Appendix A, Question Group 24, exercising the valve open is not a prerequisite in order to verify the valve's closure capability.
CSJ-10	1(2)-CVC-501-MOV VCT Outlet Isolation Valves	"Exercising these valves requires a major realignment of the CVCS system. During plant operation this could disrupt the CVCS system balance with the potential for causing severe pressurizer level transients and a plant shutdown. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG- 1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because normal makeup flow would be interrupted resulting in pressurizer level transients. If alternate makeup sources were introduced, i.e., the RWT or boric acid storage tanks, reactor power transients due to the introduction of concentrated boric acid could result in possible plant shutdown or trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

CSJ-11	1(2)-CVC-504-MOV RWT to Charging Pump Suction Isolation Valves	"During normal plant operation, charging pump suction is from the VCT with makeup water supplied from demineralized water. Should the VCT level decrease to 5%, these valves automatically open and the VCT discharge valves, MOV-501, close to ensure a continuous supply of borated water to the charging pumps. If this were to occur in the early stages of an accident, valve closure would be required later in the accident scenario when transferring the charging pump suction to the boric acid makeup tanks for emergency boration. Note that these valves do not automatically close on a SIAS. These valves are manually opened within one hour following a SIAS to allow the charging pumps to take suction from the RWT to de-pressurize the RCS to the shutdown cooling window upon the loss of the letdown system with or without auxiliary spray. Exercising these valves could result in an imbalance in the boron concentration of the reactor coolant makeup and a possible undesirable reactor power transient. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly. Reactor power transients due to the introduction of concentrated boric acid from the RWT, could result in possible plant shutdown or trip. The alternative provides full-stroke exercising to the open and closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-12	1(2)-CVC-184 Regenerative Heat Exchanger Charging Inlet Check Valves	"These are simple check valves with no external means of exercising or position indication. They are stroked open during normal charging pump operation and during quarterly testing of the charging pumps. The pump testing opens 1/2-CVC-184 adequately to pass the flow required by the applicable accident analyses for reactor coolant makeup; however, this is considered to be a part-stroke test since the flowrate is less than that required for core flush. The flowrate required for core flush cannot be charged to the RCS during normal operation as it would require abnormal system line-ups and likely result in undesirable pressurizer level transients. Verifying closure of these valves requires a shutdown of the charging pumps which would lead to an unacceptable pressurizer level transient and plant shutdown. This also would place excessive thermal cycles on system equipment due to starting and stopping charging and letdown flow. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. Additionally, entry into this area during plant operation would result in significant personnel radiation exposure."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-exercise these valves open or closed quarterly because of the potential for a pressurizer level transient that could cause the plant to trip. The alternative provides full-stroke exercising to the open and closed position during cold shutdowns, and partial-stroke exercising quarterly in accordance with OM Part 10, ¶4.3.2.2 (b).

CSJ-13	1(2)-CVC-185 Auxiliary Pressurizer Spray Check Valves	"These normally-closed valves open when initiating auxiliary pressurizer spray. In the event of a cold leg break, the safety injection pumps can inject into the pressurizer via this line for core flush. These are simple check valves with no external means of exercising or position indication. Exercising these valves to the open position would require initiation of auxiliary pressurizer spray flow and injection of cold water into the pressurizer spray nozzle placing significant thermal stress on the spray line and spray nozzle as well as unnecessarily consuming the limited number of thermal cycles allowed for the pressurizer nozzles. Such an evolution could also result in an undesirable reactor pressure transient and the potential plant shutdown or trip. Since they cannot be stroked open during operation, it is also not possible to stroke or otherwise verify closure of these valves. Partial stroking of these valves presents the same risks and problems that are associated with full stroking, thus it is also not feasible during operation. Due to the system configuration, insufficient instrumentation exists to verify either check valve's closure upon cessation of flow. During cold shutdown periods, the valves can be instrumented to permit nonintrusive verification of their closure; however, due to their location in the containment and equipment limitations, these valves cannot remain instrumented during normal operations. Additionally, instrumenting them each quarter during normal operation is impractical due to the excessive personnel radiation exposure which would be experienced. This is consistent with the position stated in NUREG-1482, Paragraphs 2.4.5 and 3.1.1."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves open quarterly because cooler water would be introduced into the pressurizers which could cause a RCS pressure transient and potentially result in damage to the nozzle connections due to thermal shock. It is impractical to verify the valves' ability to close quarterly because of the lack of installed instrumentation, and the need to set up non-intrusive test equipment. The alternative provides full-stroke exercising to the open and closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).

SALP INPUT

FACILITY NAME: Calvert Cliffs Nuclear Power Plant Units 1 and 2

SUMMARY OF REVIEW/INSPECTION ACTIVITIES

This SALP input is for the Calvert Cliffs Nuclear Power Plant Units 1 and 2, Inservice Testing Program third ten-year interval for pumps and valves. The review was performed by the Mechanical Engineering Branch with assistance from its contractor, Brookhaven National Laboratory.

NARRATIVE DISCUSSION OF LICENSEES PERFORMANCE

Two relief requests were denied and several require further action by the licensee. There are several recommendations identified in the TER. In addition, the contractor conducted an IST scope review on several systems against the requirements of the ASME Code and the regulations. The review revealed three items that potentially were not in compliance with the Code requirements.

With the exception of the above items, the licensee has maintained a focus on safety in the development of their IST program.

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DATE: December 1997

ENCLOSURE 2

CSJ-14	1(2)-CVC-186 and 1(2)-CVC-187 Charging Check Valves	"These are simple check valves with no external means of exercising or position indication. They are stroked open during quarterly testing of 1/2-CVC-518-CV and 1/2-CVC-519-CV, as well as the charging pumps. When 1/2-CVC-519-CV is closed, flow can pass through either 1/2-CVC-186 (which is in series with 1/2-CVC-518-CV) or bypass around the closed 1/2-CVC-519-CV through 1/2-CVC-435 and then pass through 1/2-CVC-187 (which is in series with 1/2-CVC-519-CV and 1/2-CVC-435). Therefore, it is assumed that 1/2-CVC-186 (and 1/2-CVC-435) are only part-stroked during quarterly testing. When 1/2-CVC-518-CV is closed, flow must pass through 1/2-CVC- 187 (which is in series with 1/2-CVC-519-CV and 1/2-CVC-435) although it is assumed to split equally between parallel valves 1/2-CVC-519-CV and 1/2-CV[illegible]-435 . Therefore, 1/2-CVC-187 is full-stroked during quarterly testi[illegible]ince there is no comparable bypass flowpath around 1/2-CVC-51[illegible]). [illegible]e to the system configuration, insufficient instrumentation exists to verify either check valve's closure upon cessation of flow. During cold shutdown periods, the valves can be instrumented to permit nonintrusive verification of their closure; however, due to their location in the containment and equipment limitations, these valves cannot remain instrumented during normal operations. Additionally, instrumenting them each quarter during normal operation is impractical due to the excessive personnel radiation exposure which would be experienced. This is consistent with the position stated in NUREG-1482, Paragraphs 2.4.5 and 3.1.1."	Per the Valve Tables, 1 and 2-CVC-186 are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly. Valves 1 and 2-CVC-187 are full-stroke exercised open quarterly and full-stroke exercised closed at cold shutdowns.	It is impractical to verify the valves' ability to close quarterly because of the lack of installed instrumentation, and the need to set up non-intrusive test equipment. The alternative provides verification of closure during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c). The licensee states that is impractical to full-stroke exercise 1(2)-CVC-186 open quarterly, because some flow is diverted through valve 1/2-CVC-435. There is a manual valve, (1)2-CVC-188 in series with valve 1(2)-CVC-435, that could be isolated in order to full-stroke exercise (1)2-CVC-186. The licensee should provide a discussion of the impracticality of exercising this 2" valve by manually closing (1)2-CVC-188.

CSJ-15	1(2)-CVC-435 Charging Control Valve Bypass Check Valves	"These are simple spring-loaded check valves with no external means of exercising or position indication. Exercising them would require shutdown of the normal charging lineup which would result in severe pressurizer level transients and plant shutdown. Due to system configuration, insufficient instrumentation exists to verify if a valve opens during quarterly stroke testing of 1/2-CVC-519-CV or quarterly charging pump testing. During cold shutdown periods, the valves may be instrumented to permit non-intrusive verification of their closure (sic); however, due to their location in the containment and equipment limitations, these valves cannot remain instrumented during normal operations, and instrumenting them each quarter during normal operation is impractical due to the excessive personnel radiation exposure which would be required. Additionally, lining up the CVCS system to ensure this valve is opened during normal operation would require securing all other charging flowpaths - not considered prudent action during normal plant operation. Due to the system configuration, insufficient instrumentation exists to verify either check valve's closure upon cessation of flow. During cold shutdown periods, the valves can be instrumented to permit non-intrusive verification of their closure; however, due to their location in the containment and equipment limitations, these valves cannot remain instrumented during normal operations. Additionally, instrumenting them each quarter during normal operation is impractical due to the excessive personnel radiation exposure which would be experienced. This is consistent with the position stated in NUREG-1482, Paragraphs 2.4.5 and 3.1.1."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly.	The licensee states that the valves cannot be exercised open because the normal charging lineup would be isolated resulting in level transients and would not be considered prudent during normal plant operation. Testing with flow through the 2 inch bypass would not appear to cause severe pressurizer level transients and plant shutdown. At least one other CE PWR (Palisades) full-stroke exercises this valve open quarterly. The licensee should reevaluate the practicality of full-stroke exercising these valves quarterly. It is impractical to verify the valves' ability to close quarterly because of the lack of installed instrumentation, and the need to set up non-intrusive test equipment. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-16	1(2)-CVC-505-CV and 1(2)-CVC-506-CV RCP Seal Bleed-off Containment Isolation Valves	"Exercising these valves to the closed position when the reactor coolant pumps (RCP's) are in operation would interrupt flow from the RCP seals and can result in damage to the pumps' seals. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. Note that these valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

CSJ-17	1(2)-CVC-515-CV and 1(2)-CVC-516-CV Letdown Stop Valves	"Closing either of these valves during operation would result in severe pressurizer level or CVCS system transients with the potential for a plant trip. In addition, such an operation would cause unnecessary thermal cycles on the Regenerative Heat Exchanger and, in general, is not a prudent action in the context of plant operation. If either valve failed to re-open, an expedited plant shutdown would be required. Partial closure of these valves presents the same risks and problems that are associated with full closure, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because of pressurizer level transients with the potential for a plant trip. The alternative provides full-stroke exercising to the closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-18	1(2)-CVC-517-CV Auxiliary Pressurizer Spray Line Stop Valves	"Opening these valves would result in initiation of auxiliary pressurizer spray flow and injection of cold water into the pressurizer spray nozzle placing significant thermal stress on the spray line and spray nozzle, as well as unnecessarily consuming the limited number of thermal cycles allowed for the pressurizer nozzles. Such an evolution could result in an unacceptable reactor pressurizer transient and a potential plant shutdown or trip. Partial stroking of these valves presents the same risks and problems that are associated with full stroking; thus, it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed, and fail-safe tested at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because cooler water would be introduced into the pressurizers which could cause a RCS pressure transient resulting in a plant trip and potentially could result in damage to the nozzle connections due to thermal shock. The alternative provides full-stroke exercising to the open and closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-19	1(2)-CC-3832-CV and 1(2)-CC-3833-CV Component Cooling Containment Supply/Return Valves	"These normally-open valves provide flowpaths for cooling water (normal cooling) to and from to the control rod drive mechanisms, reactor coolant pumps, and the reactor and steam generator supports. Closing any of these valves during plant operation at power will interrupt cooling flow and cause overheating and damage to the associated components. Should any one of these valves fail to re-open after closure, an immediate plant shutdown or trip and cooldown would follow. Partial closure of these valves presents the same risk as full closure; thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. Additionally, consistent with NUREG-1482, Paragraph 3.1.1.4, component cooling containment heat loads (such as the RCPS) will not necessarily be secured solely to test these control valves."	Per the Valve Tables, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly due to the potential for equipment damage resulting from isolating the cooling water supply. The alternative provides full-stroke exercising to the closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

CSJ-20	1(2)-CPA-1410-CV, 1(2)-CPA-1411-CV, 1(2)-CPA-1412-CV and 1(2)-CPA-1413-CV Containment Building Purge Supply/Exhaust Isolation Valves	"These valves are normally locked shut with power removed in Modes 1-4 per Technical Specification 3.6.1.7. They are only required to stroke in Modes 5 and 6 in the event of a refueling accident. During all other modes of operation, they remain closed and are essentially passive. If containment purge is established during a cold shutdown period, then these valves will be stroke tested; however, they are not necessarily opened during each cold shutdown period. Note that, if they are not opened they remain in their safety position and are not required to be operable with respect to their automatic closure capability. It is undesirable to stroke these valves during each cold shutdown since excessive operation can damage the sealing surfaces of these valves and cause degradation of the valve's leak-tight capability which would result in additional testing, maintenance, and cold shutdown extension. Therefore, these valves will be stroke tested during each refueling outage and during cold shutdown periods whenever containment purge is established. Partial closure of these valves presents the same risks and problems that are associated with full closure; thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. (NOTE: Following completion of ESP 94-205 the outboard purge valves will be eliminated and the lines will be blanked in Modes 1-4 to provide containment integrity.) Note that these valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns when containment purge is established and at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.
CSJ-21	1(2)-HP-6903-MOV Hydrogen Purge Supply Isolation Valves	"These normally-closed valves are required to remain closed during power operation per Calvert Cliffs Technical Specifications. If a valve were to fail in the open position during testing, then primary containment integrity would depend on a single check valve (1/2-HP-104) inside containment whose position cannot be verified. In this case, a plant shutdown would likely be required. This is consistent with the position stated in NUREG-1482, Paragraph 3.1.1(2). Note that these valves are <u>not</u> within the ASME/ISI class bounderies."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

CSJ-22	1(2)-FW-130 and 1(2)-FW-133 Steam Generator Feedwater Supply Check Valves	"These normally-open check valves provide flowpaths for normal feedwater flow to the steam generators. They close to isolate the steam generators and the non-Code portions of the main feedwater system to prevent back-leakage of steam generator inventory into the main feedwater system when the main feedwater pumps trip on a ESFAS signal and the feedwater headers depressurize. Exercising these valves to the closed position requires securing feedwater flow to the associated steam generator. During normal plant operation at power, this would result in a severe plant transient and trip. Partial closure of these valves presents the same risks and problems that are associated with full closure; thus, it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to verify closure of these valves quarterly because testing would result in a plant trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (c).
CSJ-23	1(2)-FW-4516-MOV and 1(2)-FW-4517-MOV Steam Generator Feedwater Supply Isolation Valves	"These normally-open valves provide flowpaths for normal feedwater flow to the steam generators. They close on SGIS to isolate the steam generators to mitigate the effects of a steamline break, to isolate the non-Code portions of the main feedwater system, and to prevent backleakage of steam generator inventory into the main feedwater system. In the event of a steam generator tube leak, they would be closed by the operator to prevent over-feeding the affected steam generator. Exercising (closing) these valves will result in securing feedwater flow to the associated steam generator. During normal plant operation at power, this would result in a severe plant transient and trip. Partial closure of these valves will cause severe transients in steam generator water level with the potential for a plant trip. Partial closure of these valves presents the same risks and problems that are associated with full closure; thus, it is also not feasible during plant operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because testing would (for full-stroke) or could (for partial-stroke) result in a plant trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-24	1(2)-IA-2085-CV Containment Air Control Valves	"Closing these valves will isolate instrument air to the containment and secure operating air to several components critical for plant operation including the pressurizer spray control valves. If the valve were to fail in the closed position, a plant shutdown would be required. Partial closure of these valves presents the same risk as full closure; thus, it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. Note that these valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

CSJ-25	1(2)-IA-2060-MOV Containment Air Supply Valves	"These are containment isolation valves that auto-close on CIS. In the course of an accident it may be required to operate CVCS valves CVC-517-CV, CVC-518-CV, and CVC-519-CV for core flush or makeup and valves in the PASS system, thus re-opening these valves would also be required. Note that these valves are not within the ASME/ISI class boundaries. Closing these valves isolates operating air to several components critical for plant operation including the pressurizer spray control valves. Closing these valves will isolate instrument air to the containment. If the valve were to fail in the closed position, a plant shutdown would be required. Partial closure of these valves presents the same risk as full closure; thus, it is also not feasible during operation. This is consistent with the position stated in NUREG 1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.
CSJ-26	1(2)-MS-4043-CV and 1(2)-MS-4048-CV Main Steam Isolation Valves (MSIVs)	"These valves close on CSAS and SGIS to prevent the unrestricted release of steam from multiple steam generators in the event of an upstream steamline rupture and to isolate the steam generators in the event of a LOCA, steam generator tube rupture, or downstream steamline rupture. When closed, they provide isolation of the unaffected steam generator thus ensuring an adequate supply of steam for AFW pump turbine operation. These valves are also required to be tested per Technical Specifications Para. 4.7.1.5 (ITS 3.7.2.1) During plant operation at power, full closure of any of these valves would result in a major plant transient and a turbine and reactor plant trip. These valves are provided with the capability of partial stroke (closure) exercising which can be performed at power without jeopardizing plant operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves quarterly because testing would result in a plant trip. The alternative provides full-stroke exercising to the closed position during cold shutdowns and partial-stroke exercising quarterly in accordance with OM Part 10, ¶4.2.1.2 (b).

CSJ-27	1(2)-MS-105 and 1(2)-MS-106 Main Steam Header to AFW Pump Turbines Check Valves	"These are simple check valves with no external means of exercising; thus, the only practical means of opening these valves is to operate each steam-driven AFW pump discharging to the steam generators. Full stroke exercising of these valves requires operating each steam-driven AFW pump at full accident flow thus requiring maximum steam flow to the turbine. During plant operation at power, this is not practical due to the potential for thermal shock of the steam generator nozzles and internals. During quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line; thus, partial flow exercising only is practical. The test for verifying closure is extremely cumbersome and requires extensive system realignment and resources and an extended period during which the associated AFW pump is out of service. Thus, it also is not practical during plant operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. Alternatively, these check valves may be non-intrusively monitored during full-flow testing of the AFW pumps when such testing is performed during a cold shutdown period. However, due to their service conditions, these check valves can not remain instrumented during normal operation. Instrumenting them each quarter would present personnel hazards due to their location and service conditions (additionally, it is unlikely they could be instrumented during every cold shutdown), and it is not likely the steam flow through these check valves resulting from AFW pump minimum flow testing is sufficient to full stroke these check valves."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves open quarterly because the introduction of relatively cooler water from the CST could potentially result in damage to the steam generator nozzles due to thermal shock. The quarterly testing of the AFW pumps in the minimum flow mode would not fully-open the steam valves. The alternative provides full-stroke exercising to the open position during cold shutdowns, and partial-stroke exercising quarterly in accordance with OM Part 10, ¶4.3.2.2 (b). The licensee states that the test for verifying closure is "extremely cumbersome and requires extensive system realignment and resources and an extended period during which the associated AFW pump is out of service." It appears that when each AFW pump is tested, the other pump's associated check valve is closed. Without additional information on the test method used, the basis for deferring testing is inadequate.
CSJ-28	1(2)-MS-108 and 1(2)-MS-110 Main Steam Header to AFW Pump Turbines Check Valves	"These are simple check valves with no external means of exercising; thus, the only practical means of opening these valves is to operate each steam-driven AFW pump discharging to the steam generators. Full stroke exercising of these valves requires operating each steam-driven AFW pump at full accident flow thus requiring maximum steam flow to the turbine. During plant operation at power, this is not practical due to the potential for thermal shock of the steam generator nozzles and internals. During quarterly testing of the AFW pumps, flow is routed through a minimum flow recirculation line; thus, partial flow exercising only is practical. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves open quarterly because the introduction of relatively cooler water from the CST could potentially result in damage to the steam generator nozzles due to thermal shock. The quarterly testing of the AFW pumps in the minimum flow mode would not fully-open the steam valves. The alternative provides full-stroke exercising to the open position during cold shutdowns, and partial-stroke exercising quarterly in accordance with OM Part 10, ¶4.3.2.2 (b).

CSJ-29	O-N2-344 and O-N2-347 Nitrogen Supply to Safety Injection Tanks Outboard Check Valves	"These are simple check valves with no external means of exercising or position indication; thus, verifying the ability of these check valves to close requires containment access to exercise them open, followed by a back-leakage test. Such access is not practical on a routine basis during plant operation at power. These check valves are normally closed and only need to perform their active closure function in the event an accident occurred during nitrogen addition to the SITS. This is a relatively infrequent operation and one of short duration. Additionally, these check valves are in series with 1/2-SI-491, 1/2-SI-492, 1/2-SI-493, & 1/2-SI-494. This position is consistent with that set forth in NUREG-1482, Paragraph 2.4.5. Note that these valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.
CSJ-30	1(2)-RC-105-SV and 1(2)-RC-106-SV Pressurizer Vent Valves	"These valves are administratively controlled in the closed position to prevent inadvertent operation. Since these are Class 1 reactor coolant system isolation valves, failure of a valve to close or leakage following closure could result in a loss of coolant in excess of the limits imposed by the Plant Technical Specifications necessitating a plant shutdown. Furthermore, failure of the valve to indicate a return to the fully closed position following exercising could likely result in a containment entry at power or a plant shutdown. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising; thus, it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed, and fail-safe tested at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because testing during power operation could jeopardize the integrity of the RCS pressure boundary. The alternative provides full-stroke exercising to the open and closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-31	1(2)-RC-100E-CV and 1(2)-RC-100F-CV Pressurizer Spray Valves	"Due to dynamic flow conditions in the reactor coolant system under normal steaming conditions repeatable full-stroke test results for these valves are not possible; thus, these valves can only be tested during cold shutdown periods when stable test conditions can be established. (These conditions include securing RCP's and depressurizing the RCS, both of which minimize variations in flow through, and differential pressure across, these valves which could affect their performance.) Additionally, full-stroking these valves while the plant is pressurized will cause significant and unacceptable reactor coolant system pressure transients. These valves are part-stroked on an on-going basis in order to maintain pressure control while the plant is pressurized. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised and fail-safe tested closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves quarterly because the test would result in a RCS pressure decrease which could cause a transient or plant shutdown. The alternative provides full-stroke exercising to the closed position and fail-safe testing during cold shutdowns, and partial-stroke exercising quarterly in accordance with OM Part 10, ¶4.2.1.2 (b).

CSJ-32	1(2)-RC-103-SV and 1(2)-RC-104-SV Reactor Vessel Vent Valves	"These valves are opened as needed to vent non-condensible gases trapped in the reactor vessel head during natural recirculation to enhance core cooling. If opened during accident recovery, they will require re-closing in order to conserve reactor coolant inventory. Testing is required per Technical Specification 4.4.13. 1 (ITS Technical Requirements Manual). These valves are administratively controlled in the closed position to prevent inadvertent operation. Since these are Class 1 reactor coolant system isolation valves, failure of a valve to close or leakage following closure could result in a loss of coolant in excess of the limits imposed by the Plant Technical Specifications necessitating a plant shutdown. Furthermore, failure of the valve to indicate a return to the fully closed position following exercising could likely result in a containment entry at power or a plant shutdown. Partial-stroke exercising of these valves presents the same risks and problems that are associated with full-stroke exercising, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed, and fail-safe tested at cold shutdowns.	It is impractical to full- or partial-stroke exercise these valves quarterly because testing during power operation could jeopardize the integrity of the RCS pressure boundary. The alternative provides full-stroke exercising to the open and closed position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).
CSJ-33	1(2)-RC-402-ERV and 1(2)-RC-404-ERV ERV Power-Operated Relief Valves	"These valves provide overpressure protection for the reactor coolant system without lifting a pressurizer safety (these are redundant to the pressurizer safety valves and are not credited in the FSAR, although Technical Specifications allow crediting a PORV for a limited time if the pressurizer vapor vent path is inoperable). Also, they protect the reactor coolant system from over-pressurization when the reactor coolant system is cooled down to less than MPT (LTOP). Either full- or part-stroking of these valves during power operation can cause significant and unacceptable reactor coolant pressure transients. Additionally, such stroking could also result in the failure of one of these valves to reseat properly which would lead to system/equipment damage, reduced plant reliability, and a possible plant shutdown. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open, fail-safe tested and set-point tested at cold shutdowns.	The PORVs are located downstream of the block valves. Therefore, exercising these valves will not directly result in reactor coolant pressure transients. However, given the single failure of the PORV block valve, it is impractical to exercise these valves quarterly. Generic Letter 90-06 (Ref. 21) states that testing of the PORVs should not be performed during power operation due to the risk associated with challenging these valves in this condition. The alternative provides full-stroke exercising to the open position and fail-safe testing during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2 (c).

CSJ-34	1(2)-SI-113, 1(2)-SI-123, 1(2)-SI-133, and 1(2)-SI-143 HPSI Header Isolation Check Valves	"These check valves open to provide flowpaths for HPSI into the reactor coolant system. They close to prevent diversion of LPSI into the HPSI headers and can serve as an optional reactor coolant pressure isolation valve. These are simple check valves with no means of external position indication or operation. In order to open these valves, the HPSI pumps must be operated with injection into the reactor coolant system. This cannot be performed during plant operation at power because normal RCS pressure is above the shut-off head of the HPSI pumps. RCS pressure cannot be lowered sufficiently to permit full-stroke testing these valves unless the plant is shut down. These valves are part-stroked exercised open quarterly and whenever the associated HPSI pump is operated to fill the safety injection tanks. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at refueling and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves open during plant operation because the HPSI pump discharge pressure cannot overcome the RCS pressure. The licensee has included these valves in a Cold Shutdown Justification, however, the Valve Tables indicate that these valves will be full-stroke exercised during refueling. The Justification does not discuss the impracticality of testing these valves during cold shutdowns. Additionally, the licensee has not provided justification for deferring closure verification of these valves. The licensee should revise the Table or Justification accordingly.
CSJ-35	1(2)-SI-401 and 1(2)-SI-410 HPSI Pump Suction Check Valves	"These check valves open to provide flowpaths for water from the RWTs or containment sumps to the HPSI pumps during SIAS or RAS. These are simple check valves with no means of external position indication or operation. In order to open these valves, the HPSI pumps must be operated with injection into the reactor coolant system. This cannot be performed during plant operation at power because normal RCS pressure is above the shut-off head of the HPSI pumps, RCS pressure cannot be lowered sufficiently to permit full-stroke testing these valves unless the plant is shut down. These valves are part-stroked exercised quarterly. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at refueling and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves open during plant operation because the HPSI pump discharge pressure cannot overcome the RCS pressure. The licensee has included these valves in a Cold Shutdown Justification, however, the Valve Tables indicate that these valves will be full-stroke exercised during refueling. The Justification does not discuss the impracticality of testing these valves during cold shutdowns. The licensee should revise the Table or Justification accordingly.
CSJ-36	1(2)-SI-405, 1(2)-SI-414, and 1(2)-SI-427 HPSI Pump Discharge Check Valves	"These check valves open to provide flowpaths for water from the HPSI pumps to the HPSI discharge headers during SIAS or RAS. These are simple check valves with no means of external position indication or operation. In order to open these valves the HPSI pumps must be operated with injection into the reactor coolant system. This cannot be performed during plant operation at power because normal RCS pressure is above the shut-off head of the HPSI pumps. RCS pressure cannot be lowered sufficiently to permit full-stroke testing these valves unless the plant is shut down. These valves are part-stroked exercised quarterly. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at refueling and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves open during plant operation because the HPSI pump discharge pressure cannot overcome the RCS pressure. The licensee has included these valves in a Cold Shutdown Justification, however, the Valve Tables indicate that these valves will be full-stroke exercised during refueling. The Justification does not discuss the impracticality of testing these valves during cold shutdowns. The licensee should revise the Table or Justification accordingly.

CSJ-37	1(2)-SI-434 and 1(2)-SI-446 LPSI Pump Discharge Check Valves	"These valves open to provide flowpaths from the LPSI pumps to the low pressure injection header. They close to prevent recirculation flow through an idle pump and minimum flow line that could adversely impact the effectiveness of the operating pump. These are simple check valves with no external means of exercising, thus exercising (open) requires operating a LPSI pump at full flow and injecting into the reactor coolant system. At power operation, this is not possible because the LPSI pumps cannot develop sufficient discharge pressure to overcome reactor coolant system pressure. These valves are part-stroked exercised quarterly. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves open quarterly because the LPSI pump discharge pressure cannot overcome the RCS pressure. The alternative provides partial-stroke exercising quarterly and full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (b). The licensee has not however, discussed the impracticality of performing a closure test quarterly. The Valve Tables identify that the valves will be exercised closed during cold shutdowns. The Valve Tables or Justification should be revised accordingly.
CSJ-38	1(2)-SI-659-MOV and 1(2)-SI-660-MOV SI Pump Mini-Flow Return to RWT Isolation Valves	"These valves provide flowpaths for minimum flow protection. When power is restored, these valves close on a RAS to block recirculation flow from returning to the RWT. Closure of either of these valves isolates the minimum recirculation flowpath for all the ECCS pumps from both trains causing all safety injection and containment spray pumps to be inoperable. Failure of either of these valves in the closed position during testing will prohibit flow through the minimum flow recirculation lines for all of the safety injection and containment spray pumps. Due to the probability of damage should these pumps be started and operated in this condition (no flow), exercising of these valves should only be performed during cold shutdown periods when these pumps are not required to be operable. Partial closure of these valves presents the same risks and problems that are associated with full closure; thus, it is also not feasible during operation. This position is consistent with that of NUREG-1482, Paragraph 3.1.1 (1)."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise these valves quarterly due to the potential for pump damage and system failure if the valves should fail closed during testing. The alternative provides full-stroke exercising during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c).

CSJ-39	1(2)-SI-114, 1(2)-SI-124, 1(2)-SI-134, and 1(2)-SI-144 LPSI Header Isolation Check Valves	"These normally-closed check valves open to provide flowpaths for borated water from the LPSI pumps to each of the RCS cold legs. They close to isolate the LPSI system from the HPSI injection headers to prevent diversion of HPSI flow to the low-pressure-rated LPSI piping and loss through the associated relief valve and can serve as an optional reactor coolant pressure isolation valve. These are simple check valves with no external means of exercising, thus exercising (open) requires operating a LPSI pump at full flow and injecting into the reactor coolant system. At power operation, this is not possible because the LPSI pumps cannot develop sufficient discharge pressure to overcome reactor coolant system pressure. These valves are part-stroked exercised and verified closed quarterly. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to full-stroke exercise these valves quarterly because the LPSI pump discharge pressure cannot overcome the RCS pressure. The alternative provides partial-stroke exercising quarterly and full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2 (b). The basis for this justification states that these valves will be verified closed quarterly. The Valve Table, however, indicates that these valves will be full-stroke exercised closed at cold shutdowns. The licensee should exercise/verify closure quarterly, or provide additional information to justify deferring this test to cold shutdowns.
CSJ-40	1(2)-SI-118, 1(2)-SI-128, 1(2)-SI-138, and 1(2)-SI-148 Safety Injection Header Isolation Check Valves	"These valves provide flowpaths for borated water from the HPSI and LPSI pumps to each of the RCS cold legs. They close to isolate the safety injection system from the reactor coolant system. They also serve as pressure isolation valves (PIVS) during normal operation. These are simple check valves with no external operator for exercising, thus exercising (open) requires operating a LPSI pump at full flow and injecting into the reactor coolant system. At power operation this is not possible because the LPSI pumps cannot develop sufficient discharge pressure to overcome reactor coolant system pressure. These valves are part-stroked exercised open whenever the associated HPSI pump is run to fill a safety injection tank and verified closed quarterly. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open and closed at cold shutdowns, and are partial-stroke exercised quarterly.	It is impractical to exercise the valves fully open quarterly because the LPSI pump discharge pressure cannot overcome the RCS pressure. In the basis for the deferral, the licensee states that the valves will be partial-stroke exercised whenever the associated HPSI pump is run to fill a safety injection tank. In the Valve Table, the licensee indicates that the valves will be partial-stroke exercised quarterly. If the HPSI pump is not run quarterly to fill the SITs, then the justification should provide additional information to support the bases that partial-stroke exercising is impractical to perform quarterly. The basis of CSJ-34 states that these valves will be partial-stroke exercised open quarterly <u>and</u> whenever the HPSI pump is operated to fill the SITs.

CSJ-41	1(2)-SI-651-MOV and 1(2)-SI-652-MOV SDC Return Header Isolation Valves	"These normally-closed valves are opened to initiate shutdown cooling. These are pressure isolation valves which isolate the high pressure RCS piping from the low pressure shutdown cooling piping. They are interlocked with RCS pressure and cannot be opened at power. Partial-stroke exercising of these valves presents the same problems that are associated with full-stroke exercising; thus, it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns.	It is impractical to full- or partial-stroke exercise the valves open quarterly due to the potential for equipment damage due to overpressurization. The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c).
CSJ-42	1(2)-SI-491, 1(2)-SI-492, 1(2)-SI-493, and 1(2)-SI-494 Safety Injection Tank Nitrogen Inlet Check Valves	"These valves close to ensure the integrity of the safety-related pressure boundary of the safety injection system. These check valves are normally closed and only need to perform their active closure function in the event an accident requiring the SITs is initiated while nitrogen pressure to one of the SITs is being increased. (Additionally, these check valves are in series with O-N2-344 & O-N2-347.) Since this is a relatively infrequent and short duration evolution affecting only one SIT at a time, testing these check valves quarterly would significantly increase the time during which the plant is dependent upon their active closure function. Such a test would also increase the time during which the administratively controlled upstream containment isolation control valves (1/2-CV-612, 622, 632, & 642) are open. More frequent testing would require increased personnel radiation exposure and present more frequent situations in which potential component failure or human error could affect the operability of a SIT and place the plant in a very short-duration action statement. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	These normally closed check valves are located inside containment and provide isolation between the SI and nitrogen systems. Two containment isolation valves (a check valve and an air-operated valve) are located upstream of the subject valves. It does not appear to be impractical to verify closure of these valves during power operation. The test connections are located outside containment and there is no restriction to opening one CIV, unless the other CIV is inoperable (See discussion in NUREG-1482, Section 3.1.1(2)). The licensee has stated that there is a concern with radiation exposure, however, the licensee has not provided specific information as discussed in NUREG-1482, Section 2.5.1. The licensee has stated that these valves are opened relatively infrequently and for a short duration. The licensee should note that valves need not be considered active if they are only temporarily removed from their safety position for a short period of time, as discussed in NUREG-1482, Section 2.4.2. If the valve is routinely repositioned during power operation it would be considered active. The licensee should review the classification of these valves and, if necessary, revise the IST Program to include quarterly testing, or provide additional justification.

CSJ-43	1(2)-SI-313 and 1(2)-SI-323 Containment Spray Pump Discharge Check Valves	"There are simple check valves with no means of external position indication or operation. In order to open these valves, the containment spray pumps must be operated with injection into the containment spray headers. This is undesirable as it would result in spraying contaminated borated water into the containment resulting in equipment contamination and damage. The containment spray pump discharge bypass lines do not allow sufficient flow to full-stroke these valves during quarterly pump testing. These valves are part-stroked quarterly. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at refueling and are partial-stroke exercised quarterly.	The licensee states that "In order to open these valves, the containment spray pumps must be operated with injection into the containment spray headers." However, it is impractical to full-stroke exercise these valves in any operational mode using the containment spray header. These valves are discussed in Cold Shutdown Justification Number 43, however, in the Valve Tables, these valves are identified as being full-stroke exercised during refueling. The licensee does not discuss how or when the valves will be tested in the justification. However, as discussed in Relief Request PR-06 addressing the containment spray pumps, these valves can be full-flow tested substituting the CS pumps for the LPSI pumps in shutdown cooling lineup after sufficient decay heat has been removed. It appears that these valves will be full-stroke exercised during cold shutdowns of sufficient length. The licensee should provide additional information in this CSJ to support deferring quarterly testing.

CSJ-44	1(2)-SW-5149-CV Emergency Saltwater Discharge to Bay Isolation Valve	"These normally-closed valves remain closed to isolate the 11 (21) saltwater supply headers from the Emergency Overboard saltwater discharge flowpaths to the bay in order to ensure normal flow of saltwater is maintained to the components and heat exchangers cooled by the 11 (21) saltwater trains. Under Emergency Overboard operations, they are opened to provide proper overboard flowpaths. Operation of these valves is tied to operation of the three valve pairs CV5155 & CV5156, CV5165 & CV5166, and CV5177 & CV5178. The normal way to stroke CV5149 is to open one of these valve pairs using the appropriate handswitch. However, each of these valve pairs is operated from a single handswitch and preventing them from opening in order to operate CV5149 alone would require placing them in an abnormal configuration (e.g., securing air to their actuators or installing jumpers in the valves' control circuit). Opening of any of these valve pairs during plant operation at power is not acceptable (see CSJ-45). These valves also have a back-up nitrogen bottle available for emergency operation. However, the size of this nitrogen bottle is such that there is only sufficient gas for approximately two valve strokes. This would necessitate replacing the bottle after each test. More importantly, the nitrogen bottle is not permanently tied to the valve actuator. Stroking these valves with nitrogen requires installation of an air jumper and pressure regulator. Installing the air jumper and replacing the nitrogen bottle quarterly increases the potential for damaging piping/tubing connections and is considered a hardship consistent with NUREG-1482 Section 3.1.1."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns.	The licensee states that the normal way to open these valves is to open one of the valve pairs. It is not apparent from the P&ID whether the valves can be opened using the override handswitch HS-5149, without opening a valve pair. As evaluated in CSJ-45, it is impractical to operate these valves if it requires one of the three valve pairs to be opened due to a loss of system function. Additionally, it is impractical to operate these valves with the backup nitrogen tanks given the test setup. Therefore, provided that the valves cannot be operated using HS-5149, the alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c). The licensee should ensure that the valves cannot be operated using HS-5149 such that the valve pairs would not be opened.

CSJ-45	1(2)-SW-5155-CV and 1(2)-SW-5156-CV Service Water Heat Exchanger 11 (21) Emergency Overboard Bypass Valves 1(2)-SW-5165-CV and 1(2)-SW-5166-CV Component Cooling Water Heat Exchanger 11 (21) Emergency Overboard Bypass Valves 1(2)-SW-5177-CV and 1(2)-SW-5178-CV ECCS Pump Room Air Cooler 11 (21) Emergency Overboard Bypass Valves	"These normally-closed valves remain closed to isolate the 12 (22) saltwater discharge headers from the 11 (21) saltwater supply headers, at the Emergency Overboard discharge flowpath cross-connects between the Service Water Heat Exchangers, Component Cooling Heat Exchangers, and ECCS Pump Room Air Coolers, to ensure the normal cooling water flow is maintained to the components and heat exchangers cooled by the 11 (21) saltwater trains. They are opened when cooling is required in the emergency overboard lineup. Each pair of valves is operated from a single handswitch and neither valve in each pair can be individually opened without placing the other valve in an abnormal configuration (e.g., securing air to the actuator or installing jumpers in a valve control circuit). Exercising any of these valve pairs during plant operation at power would allow significant bypass flow between the headers at the respective heat exchanger or cooler. Depending on saltwater header pressure, hot discharge flow from the 12 (22) header could be introduced into the 11 (21) supply header, or supply flow from the 11 (21) header could bypass each respective heat exchanger or cooler and pass into the 12 (22) discharge header. In either case, flow between the saltwater headers would significantly degrade the heat removal capacity of the heat exchangers or coolers supplied by the 11 (21) saltwater headers. Additionally, while these valves are open, the two saltwater headers are not independent. As a result, both saltwater headers are considered inoperable and the plant is placed in a short-duration action statement. Should any valve pair fail to re-close after being opened, the saltwater system would no longer remain capable of performing its safety function in view of the associated single failure requirements, thereby necessitating a plant shutdown and cooldown. Partial opening of these valves presents the same risk as full opening, thus it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised open at cold shutdowns.	It is impractical to exercise the valves individually quarterly due to test setup and the need to secure air or install jumpers. It is also impractical to exercise the valves as pairs because if the valve pair failed during the test, both trains of saltwater cooling system would be declared inoperable and a loss of system function would occur. The alternative provides exercising during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c).

CSJ-46	1(2)-SRW-323, 1(2)-SRW-324, and 1(2)-SRW-325 Service Water Return from Turbine Building Check Valves	"These normally-open valves provide flowpaths for normal cooling water return from non-essential components in the turbine building critical to the continued operation of the generating plant. They close to isolate the non-classed return piping from the essential load return piping during an accident when the turbine building headers are isolated. Closing any of these valves during plant operation at power requires interrupting cooling flow from the turbine auxiliaries and associated components. This would ultimately result in a plant shutdown and overheating and damage to plant equipment. Partial closure of these valves presents the same risk as full closure; t[illegible], it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5."	Per the Valve Tables, these valves are full-stroke exercised closed at cold shutdowns.	It is impractical to exercise these normally open valves closed quarterly during power operation because this would result in a plant shutdown and potential damage to components such as the condenser vacuum pump, condensate booster pump, generator, feed pump, and nitrogen compressors. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.3.2.2(c).
CSJ-47	1(2)-SRW-1600-CV, 1(2)-SRW-1637-CV, 1(2)-SRW-1638-CV, and 1(2)-SRW-1639-CV Service Water Supply to Turbine Building	"These normally-open valves provide flowpaths for normal cooling water to non-essential components in the turbine building critical to the continued operation of the generating plant. They close on a SIAS to isolate non-essential heat loads and ensure adequate cooling water flow to critical heat loads. During an accident when the turbine building headers are isolated, these valves must close to isolate the non-classed piping from the critical load piping. Closing any of these valves during plant operation at power will interrupt cooling flow to the turbine auxiliaries and associated components. This would ultimately result in a plant shutdown and overheating and damage to equipment. Partial closure of these valves presents the same risk as full closure; thus, it is also not feasible during operation. This is consistent with the position stated in NUREG-1482, Paragraph 2.4.5. Note that some of these valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed and fail-safe tested at cold shutdowns.	It is impractical to exercise normally open valves SRW-1600 and 1637-CV closed quarterly during power operation because this would result in a plant shutdown and potential damage to components such as the condenser vacuum pump, condensate booster pump, generator, feed pump, and nitrogen compressors. The alternative provides full-stroke exercising to the closed position during cold shutdowns in accordance with OM Part 10, ¶4.2.1.2(c). Evaluation not required for valves 1(2)-SRW-1638, 1639. These valves are not ASME Code Class 1, 2, or 3.
RFJ-1	1(2)-HP-104 Hydrogen Purge Supply Check Valves	"These are simple check valves with no external means of exercising or position indication; thus verifying the ability of these check valves to close requires containment access to exercise them open, followed by a back-leakage test (which requires installation of a blank flange). This is not practical during normal operation and is also not considered practical during a cold shutdown period. This agrees with the NRC position per NUREG-1482, Paragraph 4.1.4. Note that these valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-2	1-IA-337 and 2-IA-175 Instrument Air Supply to Containment Isolation Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Operation of numerous air-operated control valves in containment during normal operation, including quarterly surveillance testing of selected air-operated control valves in containment, verifies the ability of these check valves to open on an ongoing basis. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. However, this secures at least one, and sometimes the only, flowpath for safety-related air to the downstream air loads. Verifying closure of these valves requires containment access and a back-leakage test. Such access is not practical on a routine basis during plant operation at power. The coordination and resources needed to secure instrument air to the containment to permit testing during cold shutdown periods would be an unreasonable burden with no appreciable gain in plant safety. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-3	1-IA-650 and 2-IA-310 Normal Air Supply to Containment Air Header Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. Verifying closure of these valves requires isolation of the normal air supply to critical system components inside containment. Although there is a backup supply of air stored in the associated containment air receiver, failure to return the normal supply to service in a timely manner could result in equipment failure and plant shutdown. Also, the backup air supply is capable of providing air to only a limited number of critical loads. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-4	1-IA-721, 1-IA-722, 2-IA-741, and 2-IA-743 Saltwater Air Compressor (SWAC) Discharge Check Valve	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke open other than passing the required air flow in the forward direction. This can only be achieved by either isolating the normal non-safety-related sources of air and operating the downstream air loads simultaneously. However, operating all the downstream air loads simultaneously is not typically practical. Alternatively, the forward flowrate through each check valve may individually measured. In order to do this, the downstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a flow instrument after passing through the check valve. These check valves are part-stroked open whenever the SWACs are operated. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised open and closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-5	1-IA-1333, 1-IA-1338, 2-IA-1101, and 2-IA-1106 Normal (NSR) Instrument Air Supply Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-6	1-IA-729, 1-IA-732, 2-IA-300, and 2-IA-301 Instrument Air Supply to AFW Supply Valves Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke open other than passing the required air flow in the forward direction. This can only be achieved by either isolating the normal non-safety-related sources of air and operating the downstream air loads simultaneously. However, operating all the downstream air loads simultaneously is not typically practical. Alternatively, the forward flowrate through each check valve may individually measured. In order to do this, the downstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a flow instrument after passing through the check valve. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. Testing these valves requires significant re-alignment of the air supplies to the AFW flow control valves, including securing the safety-related air supply to each set of AFW Blocking valves and Flow Control valves (one set at a time). The air headers/safety-related accumulators are configured such that one of the two AFW Blocking valves in each AFW Flow Leg is supplied by independent air headers/accumulators. As a result, isolating one safety-related air accumulator isolates air to one AFW Blocking valve in each AFW Flow Leg. Since the AFW Blocking valves fail open, this would result in limited capacity of the AFW supply system to respond to an ASFAS in the event steam generator isolation should be required. Therefore, all AFW Flow Legs would be rendered inoperable. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform every outage during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised open and closed at refueling, and are partial-stroke exercised quarterly.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-7	1-IA-730 and 2-IA-315A Instrument Air Supply to AFW Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform every outage during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.
RFJ-8	1-IA-736, 1-IA-738, 2-IA-304, and 2-IA-305 Instrument Air Supply to AFW System Valve Accumulators Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform every outage during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFI-9	1-IA-1432, 1-IA-1448, 2-IA-1213, and 2-IA-1228 Instrument Air Supply to 4070A/4071A Air Accumulators Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform every outage during normal operation or during cold shutdown periods. This is consistent with NUREG-1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-10	1-IA-1444, 1-IA-1460, 2-IA-1203, and 2-IA-1220 Instrument Air Supply to Steam Supply Valve Check Valves	"These are small spring-loaded piston-type check valves with no external position indication or other means of easily verifying their position. Due to their size, design, and system configuration, they cannot be non-intrusively monitored. There are no means of verifying their ability to full-stroke open other than passing the required air flow in the forward direction. This can only be achieved by either isolating the normal non-safety-related sources of air and operating the downstream air loads simultaneously. However, operating all the downstream air loads simultaneously is not typically practical. Alternatively, the forward flowrate through each check valve may individually measured. In order to do this, the downstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a flow instrument after passing through the check valve. There are no means of verifying their ability to full-stroke closed other than by performing a back seat leakage test. In order to do this, the upstream side of each check valve must be isolated and a test connection removed through which air flow can be measured using a leak rate monitor after passing back through the check valve. The number of instrument air valves, the complex system realignments, the necessity of removing and replacing numerous test connection caps, and the difficulty of installing, removing, and relocating a flow instrument and leak rate monitor to test each check valve is considered impractical to perform every outage during normal operation or during cold shutdown periods. This is consistent with NUREG- 1482 Sections 3.1.1 and 4.1.4. Note that these check valves are not within the ASME/ISI class boundaries."	Per the Valve Tables, these valves are full-stroke exercised open and closed at refueling.	Evaluation not required. Valves are not ASME Code Class 1, 2, or 3.

RFJ-11	1A1-DSA-38, 1A2-DSA-46, 1A2-DSA-38, and 1A2-DSA-46 1A1/1A2 Emergency Diesel Generator (EDG) Starting Air Receiver Check Valves	"These valves close to isolate the non-safety grade air supply piping when the ED air compressors are not operating. These are simple check valves with no external means of exercising or position indication; thus verifying closure of these valves requires a back-leakage test. Due to the system configuration and the lack of vent valves, performing such a test requires realignment of the starting air receivers and bleeding down of one receiver. This would result in the plant entering a LCO condition for an extended period of time (probably in excess of 3-4 hours). In consideration of the staff support and time elements of this test, testing quarterly and at cold shutdown frequencies is impractical and would impose an excessive burden on the plant staff. Additionally, frequent de-pressurization and re-pressurization of these air receivers would result in significantly increased run-time on the associated air compressors and increases the potential of contaminating the EDG Starting Air System."	Per the Valve Tables, these valves are full-stroke exercised closed at refueling. (Note: The Valve Table incorrectly identifies the Refueling Justification Number as RFJ-08).	The licensee's basis for deferring testing is that a LCO would need to be entered for an extended period of time (probably in excess of 3-4 hours). As discussed in NUREG-1482, Section 3.1.2, a required entry into a LCO to perform IST would not justify deferring testing until a cold shutdown or refueling. With one diesel generator inoperable during operation, Calvert Cliffs Tech Spec 3.8.1.1 requires both EDGs be restored within 72 hours. Tech Spec 3.8.1.2 only requires one EDG to be operable during cold shutdowns and refueling. Additionally, the licensee states that testing quarterly would result in increased run time on the compressors and the potential for air system contamination. There does not appear to be sufficient basis for deferring testing to refueling. On review of the EDG Starting Air P&ID, it appears that the supply header could be depressurized through SV-10247 and 10275 and the silencers used for air dryer regeneration. Testing in this manner would probably not require the air receivers or EDGs to be declared inoperable. The licensee should review the test method and revise the request accordingly.