



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

August 11, 2009

Mr. Thomas Joyce  
President and Chief Nuclear Officer  
PSEG Nuclear  
P.O. Box 236, N09  
Hancocks Bridge, NJ 08038

SUBJECT: SAFETY EVALUATION OF RELIEF REQUESTS FOR THE FOURTH 10-YEAR INTERVAL OF THE INSERVICE TESTING PROGRAM FOR SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 (TAC NOS. ME0322, ME0323, ME0324, ME0325, ME0326, ME0327, ME0328, ME0329, ME0330, ME0331, ME0332 AND ME0333)

Dear Mr. Joyce:

By letter dated December 31, 2008, PSEG Nuclear LLC submitted relief requests P-02, V-01, V-02, V-04, V-05 and V-06 which proposed alternatives to certain requirements specified in the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) for Salem Nuclear Generating Station (Salem), Unit Nos. 1 and 2. The subject relief requests are for the fourth 10-year interval of the inservice testing (IST) program at Salem.

The U.S. Nuclear Regulatory Commission staff has completed its review of the subject relief requests as documented in the enclosed Safety Evaluation (SE). Our SE concludes the following.

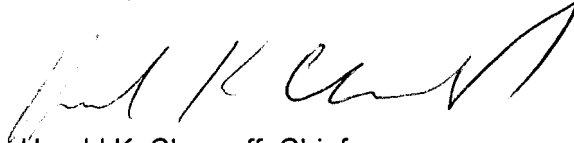
- 1) With respect to relief requests P-02, V-01, V-02, V-05 and V-06, the proposed alternatives will provide an acceptable level of quality and safety. Therefore, pursuant to Section 50.55a(a)(3)(i) of Title 10 of the Code of Federal Regulations (10 CFR), the proposed alternatives are authorized for the fourth 10-year IST interval at Salem.
- 2) With respect to relief request V-04, imposition of the code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety. The proposed alternative provides reasonable assurance of the operational readiness of the valves. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative is authorized for the fourth 10-year IST interval at Salem.

T. Joyce

- 2 -

If you have any questions concerning this matter, please contact the Salem Project Manager, Mr. Richard Ennis, at (301) 415-1420.

Sincerely,

A handwritten signature in black ink, appearing to read "Harold K. Chernoff". The signature is fluid and cursive, with a large, sweeping initial "H" and a long, horizontal tail.

Harold K. Chernoff, Chief  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via ListServ



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUESTS FOR THE

FOURTH 10-YEAR INTERVAL OF THE INSERVICE TESTING PROGRAM

PSEG NUCLEAR LLC

SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-272 AND 50-311

1.0 INTRODUCTION

By letter dated December 31, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML090130527), PSEG Nuclear LLC (PSEG or the licensee) submitted relief requests P-02, V-01, V-02, V-04, V-05 and V-06 which proposed alternatives to certain requirements specified in the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) for Salem Nuclear Generating Station (Salem), Unit Nos. 1 and 2. The subject relief requests are for the fourth 10-year interval of the inservice testing (IST) program at Salem.

2.0 REGULATORY EVALUATION

Section 50.55a of Title 10 of the *Code of Federal Regulations* (10 CFR), requires that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed at 120-month (10-year) IST program intervals in accordance with the specified ASME *Boiler and Pressure Vessel Code* (Code) and applicable addenda incorporated by reference in the regulations, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Nuclear Regulatory Commission (NRC or the Commission) pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In accordance with 10 CFR 50.55a(f)(4)(ii), licensees are required to comply with the requirements of the latest edition and addenda of the ASME Code incorporated by reference in the regulations 12 months prior to the start of each 120-month IST program interval. In accordance with 10 CFR 50.55a(f)(4)(iv), IST of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to NRC approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions and addenda are met.

In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for the facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance

Enclosure

on Developing Acceptable Inservice Testing Programs," provides alternatives to ASME Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidance for Inservice Testing at Nuclear Power Plants."

As discussed in the licensee's letter dated December 31, 2008, the fourth 10-year interval for the IST program at Salem Unit Nos. 1 and 2 begins on August 31, 2009. The program is being developed in accordance with the requirements in the ASME OM Code, 2001 Edition through 2003 Addenda.

### 3.0 TECHNICAL EVALUATION

The NRC's evaluation of relief requests P-02, V-01, V-02, V-04, V-05 and V-06 is provided in Safety Evaluation (SE) Sections 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6, respectively.

#### 3.1 Pump Relief Request P-02

This relief request is applicable to all Class 2 and 3 pumps included in the licensee's IST program.

##### 3.1.1 Code Requirements

ISTA-3130(b) states that Code Cases shall be applicable to the edition and addenda specified in the test plan.

ISTB-3510(b)(2) states that digital instruments shall be selected such that the reference value does not exceed 70% of the calibrated range of the instrument.

##### 3.1.2 Licensee's Basis for Requesting Relief

The licensee provided the following information regarding the reason and basis for the request:

Salem requests permission to use ASME Code Case OMN-6, "Alternate Rules for Digital Instruments" which allows digital instruments to be selected such that the reference value does not exceed 90% of the calibrated range of the instrument in lieu of 70% as specified in ISTB-3510(b)(2). [Regulatory Guide (RG)] 1.192 unconditionally accepts this Code Case for use and allows licensees with an applicable Code of record to implement Code Case OMN-6 without submitting request for relief from their Code of record. The Code of record for Salem Fourth 10-Year IST Interval is OM Code-2001 Edition with Addenda through Omb-2003 and the applicable Code for OMN-6, as stated in the Code Case, is ASME OM Code-1990 Edition through Omb Code-1997.

Pursuant to the alternative rules for digital instruments provided in Code Case OMN-6, Salem proposes to use digital instruments where the reference value does not exceed 90% of the calibrated range of the instrument. Code Case OMN-6 has been determined by the NRC to provide an acceptable level of quality and safety by its acceptance in RG 1.192. Additionally, it should be noted that the Code Case has been incorporated into 2006 Addenda to the ASME OM Code.

Using the provisions of this relief request as an alternative to the range requirement for digital instruments specified in ISTB-3510(b)(2) provides an acceptable level of quality for data collection. Code Case OMN-6 should be considered acceptable for use with OM Code-2001 through OMB-2003 Addenda as the Code of record.

### 3.1.3 Licensee's Proposed Alternative Testing

The licensee is proposing to use digital instruments where the reference value does not exceed 90% of the calibrated range of the instrument in accordance with ASME OM Code Case OMN-6.

### 3.1.4 Evaluation

The licensee requested relief from ASME OM Code paragraph ISTB-3510(b)(2), which states that digital instruments shall be selected such that the reference value does not exceed 70% of the calibrated range of the instrument. The licensee proposes to use ASME OM Code Case OMN-6 for the fourth 10-year IST interval at Salem. Code Case OMN-6 allows the use of digital instruments where the reference value does not exceed 90% of the calibrated range of the instrument. The licensee's IST program is based upon the 2001 Edition through the 2003 addenda of the OM Code, and the Code Case OMN-6 contained in this edition expired on March 30, 2004.

Code Case OMN-6 was reaffirmed in the 2006 Addenda to the 2004 Edition of the OM Code with a new expiration date of March 30, 2008. This reaffirmed Code Case OMN-6 was modified to reference the 1998 Edition up to and including OMA-2005 Addenda of the Code. Application of ASME OM Code cases is also addressed in 10 CFR 50.55a(b)(6) through reference to RG 1.192, which lists acceptable and conditionally acceptable Code Cases for implementation in IST programs. RG 1.192, dated June 2003, Table 1, lists Code Case OMN-6 as an acceptable OM Code Case with the 1999 Addenda of the OM Code as the applicable Code. There is no technical reason for prohibiting the use of Code Case OMN-6 with the 2001 Edition through 2003 Addenda. Therefore, the NRC staff finds that use of Code Case OMN-6 at Salem is consistent with RG 1.192 and the ASME OM Code, and provides an acceptable level of quality and safety for testing of pumps.

### 3.1.5 Conclusion

Based on the above evaluation, the NRC staff concludes that the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative would provide an acceptable level of quality and safety for testing of the pumps. This alternative is authorized for the fourth 10-year IST interval.

## 3.2 Valve Relief Request V-01

### 3.2.1 Code Requirements

ISTC-5221(a)(1) states, in part, that check valves that have a safety function in both the open and closed directions shall be exercised by initiating flow and observing that the obturator has traveled to the full open position or to the position required to perform its intended safety

function(s). Relief was requested for safety injection accumulator outlet line to cold leg check valves 11SJ55, 21SJ55, 12SJ55, 22SJ55, 13SJ55, 23SJ55, 14SJ55, and 24SJ55.

### 3.2.2 Licensee's Basis for Requesting Relief

The licensee provided the following information regarding the reason and basis for the request:

These Category AC check valves are located in the discharge lines from the respective safety injection accumulators. The valves perform an active safety function in the open and closed positions. The valves must be capable of opening during a large break [loss-of-coolant accident (LOCA)] to provide a flow path for the [safety injection (SI)] accumulator discharge to the [reactor coolant system (RCS)] cold legs when reactor pressure drops below accumulator pressure. The valve must be capable of closure to prevent divergence of safety injection and recirculation flow subsequent to the accumulators dumping their contents. These valves also function as RCS pressure isolation valves. This function prevents exposing the SI accumulators to RCS pressure which would compromise accumulator pressure boundary integrity.

To exercise these valves to the full open position by passing the maximum required accident condition flow through the valves is impractical due to the potential for complete discharge of the accumulator water volume and subsequent nitrogen injection into the reactor coolant system.

In attempting to utilize the guidance in NUREG 1482, Rev. 1, Section 4.1.2 - "Exercising Check Valves with Flow and Nonintrusive Techniques," nonintrusive equipment was used during informational testing. These valves are Darling Valve & Manufacturing Co. "Clear Waterway" swing checks that are fabricated without a backstop. The valve design permits the disc to move sufficiently out of the flow path without contacting the valve body. Nonintrusive testing using acoustic and magnetic technology provides sufficient data for monitoring degradation on a periodic basis; however, full open acoustic indication is not detected or expected to show on the test trace. Nonintrusive testing is impractical since it does not verify full stroke exercising; however occasional use of this equipment during the pressure decay test provides useful condition monitoring information.

To comply with the Code requirements for observation of obturator travel during full stroke exercising with flow or by the use of a mechanical exerciser would require replacement of the valves with a design that is more compatible with non-intrusive testing or with a design that is provided with an external arm. Valve replacement to facilitate Code required testing is a significant burden. Valve disassembly, for the purpose of exercising, would expose maintenance personnel to unnecessary radiation exposure, inconsistent with the need to keep occupational doses as low as reasonably achievable (ALARA).

### 3.2.3 Licensee's Proposed Alternative Testing

The licensee proposed the following alternative testing:

These check valves shall be full stroke exercised to the open position during refueling outages utilizing a reduced pressure, partial accident flow test method. This controlled method is performed with the reactor vessel head removed. The test method establishes accumulator pressure between 67 and 70 psig, accumulator level between 96 and 100% and refueling cavity level between 125.5 and 126.5 feet. After establishment of the fixed parameters the test then measures the time interval required for the pressure in the associated safety injection accumulator to drop from the initial pressure to 35 psig. Engineering calculations S-1-SJ-MDC-1539/S-2-SJ-MDC-1394, "Accumulator Pressure Decay during Discharge Test," establish the test conditions and acceptance criteria and conclude that this methodology is adequate in determining that the associated check valve disk moves to the full open position. The testing performed at Salem provides a valid methodology for verifying the open function. Additionally, if the acceptance criteria are not satisfied during the test then both valves associated with the affected accumulator shall be subject to corrective action.

Regarding reverse flow exercise testing, these valves shall be verified in the closed position during the process of performing seat leakage testing at the frequency specified in Unit 1 [Technical Specification (TS)] 4.4.6.3 and Unit 2 TS 4.4.7.2.2.

### 3.2.4 Evaluation

Testing of the check valves during power operation is not possible. During power operation, the valves are maintained in a closed position by the significant pressure differential between the RCS and the accumulators. The valves are only capable of being exercised when accumulator pressure overcomes RCS pressure. Additionally, exercising during cold shutdowns may not be practical due to low temperature overpressure considerations.

The NRC staff has reviewed the licensee's proposed alternative and has determined that exercising the check valves during refueling outages meets the intent of the ASME OM Code, which states that if it is not practical to exercise check valves during plant operation or cold shutdowns, they may be exercised during refueling outages.

The licensee has proposed to use a timed partial accumulator dump test to verify that each pair of accumulator check valves is exercised to the position required to fulfill their open safety function. The acceptance criterion, the time it takes for accumulator pressure to decay from approximately 70 psig to 35 psig, was mathematically derived through approved calculations. The calculation is an analysis of the motion of the applicable check valve disks; flow of water from the accumulator to the reactor vessel, including accounting for resistance from valves and piping; change in pressure of the accumulator; and the effect on the water level in the accumulator and RCS. A series of equations were derived and solved simultaneously in a computer program. Accumulator pressure as a function of time for various check valve swing angles (angle of check valve disk in flow stream) is calculated. The established acceptance

criterion ensures that the flow rate required for full disk lift is exceeded during the partial accumulator dump test.

The NRC staff finds that the calculation method used to establish the proposed check valve acceptance criterion is an acceptable alternative to the ASME OM Code requirements. The method is acceptable because, if a check valve's condition degrades or otherwise becomes obstructed, the time it takes for the associated accumulator to dump is expected to increase. Thus, if accumulator decay time increases to the point where it will no longer meet the proposed acceptance criterion, corrective action will be performed on the associated accumulator check valves.

The licensee's test method of using a calculation does not fully meet the ASME OM Code requirements because it does not verify directly that the check valve has moved to its safety position or passed the required accident flow rate. However, the NRC staff finds that the licensee's test methodology meets the intent of the ASME OM Code for verifying obturator movement, and provides an acceptable level of quality and safety for testing the applicable accumulator check valves. Regarding reverse flow exercise testing, verifying the valves in the closed position during the process of performing seat leakage testing at the frequency specified in Unit 1 TS 4.4.6.3 and Unit 2 TS 4.4.7.2.2 meets ASME OM Code requirements.

### 3.2.5 Conclusion

Based on the above evaluation, the proposed alternative to full stroke exercise to the open position during refueling outages utilizing a reduced pressure, partial accident flow test method and verifying the closed position during the process of performing seat leakage testing, is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. This alternative is authorized for the fourth 10-year IST interval.

## 3.3 Valve Relief Request V-02

### 3.3.1 Code Requirements

ISTC-5221(a)(1) states, in part, that check valves that have a safety function in both the open and closed directions shall be exercised by initiating flow and observing that the obturator has traveled to the full open position or to the position required to perform its intended safety function(s). Relief was requested for safety injection accumulator outlet line to cold leg check valves 11SJ56, 21SJ56, 12SJ56, 22SJ56, 13SJ56, 23SJ56, 14SJ56, and 24SJ56.

### 3.3.2 Licensee's Basis for Requesting Relief

The licensee provided the following information regarding the reason and basis for the request:

These Category AC check valves are located in the discharge lines from the respective safety injection accumulators downstream of the branch connection from [the residual heat removal (RHR) system]. The valves perform an active safety function in the open position. The valves must be capable of opening during a large break LOCA to provide a flow path for SI accumulator discharge to



the RCS cold legs when reactor pressure drops below accumulator pressure. The valve must also be capable of opening to provide a path for low head safety injection and cold leg recirculation flow. These valves also function as RCS pressure isolation valves. This function prevents exposing the SI accumulators and RHR system piping to RCS pressure.

To exercise these valves to the full open position by passing the maximum required accident condition flow through the valves is impractical due to the potential for complete discharge of the accumulator water volume and subsequent nitrogen injection into the reactor coolant system.

In attempting to utilize the guidance in NUREG 1482, Rev. 1, Section 4.1.2 - "Exercising Check Valves with Flow and Nonintrusive Techniques," nonintrusive equipment was used during informational testing. These valves are Darling Valve & Manufacturing Co. "Clear Waterway" swing checks that are fabricated without a backstop. The valve design permits the disc to move sufficiently out of the flow path without contacting the valve body. Nonintrusive testing using acoustic and magnetic technology provides sufficient data for monitoring degradation on a periodic basis; however, full open acoustic indication is not detected or expected to show on the test trace. Nonintrusive testing is impractical since it does not verify full stroke exercising; however occasional use of this equipment during the pressure decay test provides useful condition monitoring information.

To comply with the Code requirements for observation of obturator travel during full stroke exercising with flow or by the use of a mechanical exerciser would require replacement of the valves with a design that is more compatible with non-intrusive testing or with a design that is provided with an external arm. Valve replacement to facilitate Code required testing is a significant burden. Valve disassembly, for the purpose of exercising, would expose maintenance personnel to unnecessary radiation exposure, inconsistent with the need to keep occupational doses as low as reasonably achievable (ALARA).

### 3.3.3 Licensee's Proposed Alternative Testing

The licensee proposed the following alternative testing:

These check valves shall be full stroke exercised to the open position during refueling outages utilizing a reduced pressure, partial accident flow test method. This controlled method is performed with the reactor vessel head removed. The test method establishes accumulator pressure between 67 and 70 psig, accumulator level between 96 and 100% and refueling cavity level between 125.5 and 126.5 feet. After establishment of the fixed parameters the test then measures the time interval required for the pressure in the associated safety injection accumulator to drop from the initial pressure to 35 psig. Engineering calculations S-1-SJ-MDC-1539/S-2-SJ-MDC-1394, "Accumulator Pressure Decay during Discharge Test," establish the test conditions and acceptance criteria and conclude that this methodology is adequate in determining that the associated check valve disk moves to the full open position. The testing performed at Salem

provides a valid methodology for verifying the open function. Additionally, if the acceptance criteria is not satisfied during the test then both valves associated with the affected accumulator shall be subject to corrective action.

Regarding reverse flow exercise testing, these valves shall be verified in the closed position during the process of performing seat leakage testing at the frequency specified in Unit 1 TS 4.4.6.3 and Unit 2 TS 4.4.7.2.2.

### 3.3.4 Evaluation

Testing of the check valves during power operation is not possible. During power operation, the valves are maintained in a closed position by the significant pressure differential between the RCS and the accumulators. The valves are only capable of being exercised when accumulator pressure overcomes RCS pressure. Additionally, exercising during cold shutdowns may not be practical due to low temperature overpressure considerations.

The NRC staff has reviewed the licensee's proposed alternative and has determined that exercising the check valves during refueling outages meets the intent of the ASME OM Code, which states that that if it is not practical to exercise check valves during plant operation or cold shutdowns, they may be exercised during refueling outages.

The licensee has proposed to use a timed partial accumulator dump test to verify that each pair of accumulator check valves is exercised to the position required to fulfill their open safety function. The acceptance criterion, the time it takes for accumulator pressure to decay from approximately 70 psig to 35 psig, was mathematically derived through approved calculations. The calculation is an analysis of the motion of the applicable check valve disks; flow of water from the accumulator to the reactor vessel, including accounting for resistance from valves and piping; change in pressure of the accumulator; and the effect on the water level in the accumulator and RCS. A series of equations were derived and solved simultaneously in a computer program. Accumulator pressure as a function of time for various check valve swing angles (angle of check valve disk in flow stream) is calculated. The established acceptance criterion ensures that the flow rate required for full disk lift is exceeded during the partial accumulator dump test.

The NRC staff finds that the calculation method used to establish the proposed check valve acceptance criterion is an acceptable alternative to the ASME OM Code requirements. The method is acceptable because, if a check valve's condition degrades or otherwise becomes obstructed, the time it takes for the associated accumulator to dump is expected to increase. Thus, if accumulator decay time increases to the point where it will no longer meet the proposed acceptance criterion, corrective action will be performed on the associated accumulator check valves.

The licensee's test method of using a calculation does not fully meet the ASME OM Code requirements because it does not verify directly that the check valve has moved to its safety position or passed the required accident flow rate. However, the NRC staff finds that the licensee's test methodology meets the intent of the ASME OM Code for verifying obturator movement, and provides an acceptable level of quality and safety for testing the applicable accumulator check valves. Regarding reverse flow exercise testing, verifying the valves in the

closed position during the process of performing seat leakage testing at the frequency specified in Unit 1 TS 4.4.6.3 and Unit 2 TS 4.4.7.2.2 meets ASME OM Code requirements.

### 3.3.5 Conclusion

Based on the above evaluation, the proposed alternative to full stroke exercise to the open position during refueling outages utilizing a reduced pressure, partial accident flow test method and verifying the closed position during the process of performing seat leakage testing, is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. This alternative is authorized for the fourth 10-year IST interval.

## 3.4 Valve Relief Request V-04

### 3.4.1 Code Requirements

ISTC-3700 states in part that valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve position is accurately indicated.

### 3.4.2 Licensee's Basis for Requesting Relief

Relief was requested for the following affected components:

11SJ44 – Safety Injection Containment Sump Suction Valve  
12SJ44 – Safety Injection Containment Sump Suction Valve  
21SJ44 – Safety Injection Containment Sump Suction Valve  
22SJ44 – Safety Injection Containment Sump Suction Valve

These valves are located in separate compartments in the containment. The compartments are accessible from outside the containment through 4-foot diameter manways which must be unbolted and manually removed for entry. These manways are sealed by gaskets on the flange surface to which they are bolted. The proper sealing of this surface is necessary to ensure containment integrity. If the valves are verified for proper remote position indication every 2 years, hatch removal would be required for remote position indication verification only. In order to minimize the potential for damage to flange surfaces and gaskets, the valves should be verified for remote position indication accuracy when other scheduled maintenance/inspection activities are performed. Gaining access to these compartments for verification of remote position indication by direct observation every 2 years presents a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

### 3.4.3 Licensee's Proposed Alternative Testing

Remote position indication will be verified once every other refueling concurrent with environmental qualification inspections, or at any other time the manways are removed, but in no case more often than once every 2 years.

#### 3.4.4 Evaluation

The ASME OM Code requires that valves with remote position indication be observed locally at least once every 2 years to verify that valve position is adequately indicated. In lieu of the 2-year test, the licensee proposes to verify the remote position indication locally once every other refueling concurrent with environmental qualification inspections, or at any other time the manways are removed, but in no case more often than once every 2 years.

The licensee's relief request provided the following information regarding the function of the valves:

These Category B motor operated valves are located in the supply lines from the containment sump to the respective residual heat removal pump suction. The valves perform an active safety function in the open position. They must be capable of opening to align the containment sump to the emergency core cooling system (ECCS) subsystems during the recirculation phase of emergency core cooling. The valves perform a passive safety function in the closed position to properly align ECCS subsystems to the [refueling water storage tank (RWST)] during the injection phase of emergency core cooling, and to prevent the RWST inventory from back flowing to the containment sump.

As discussed above, the valves are located in separate compartments in the containment. The compartments are accessible from outside the containment through 4-foot diameter manways which must be unbolted and manually removed for entry. These manways are sealed by gaskets on the flange surface to which they are bolted. The proper sealing of this surface is necessary to ensure containment integrity. If the valves are verified for proper remote position indication every 2 years, hatch removal would be required for remote position indication verification only. The additional activities associated with local observation of the valves are time consuming and performed in a radiation area. The NRC staff finds that requiring removal of the compartment manway covers every 2 years just for the purpose of local verification of the valve position indication, which is not likely to be disturbed, would result in a hardship without a compensating increase in the level of quality and safety. The additional time beyond that required by the ASME OM Code should not impair the valves operational readiness.

The licensee's proposed alternative to verify remote position indication locally once every other refueling concurrent with environmental qualification inspections, or at any other time the manways are removed, but in no case more often than once every 2 years provides reasonable assurance that valve position is accurately indicated.

#### 3.4.5 Conclusion

Based on the above evaluation, the proposed alternative to verify remote position indication once every other refueling concurrent with environmental qualification inspections, or at any other time the manways are removed, but in no case more often than once every 2 years, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in quality and safety. The proposed alternative provides reasonable assurance of the operational

readiness of the valves. The proposed alternative is authorized for the fourth 10-year IST interval.

### 3.5 Valve Relief Request V-05

This relief request is applicable to certain motor-operated valve assemblies currently included in the Salem Motor-Operated Valve (MOV) Program.

#### 3.5.1 Code Requirements

ISTA-3130(b) states that code cases be applicable to the edition and addenda specified in the test plan.

ISTC-3100 states that any valve that has undergone maintenance that could affect its performance after the preservice test be tested in accordance with ISTC-3310.

ISTC-3310 states that a new reference value be determined or the previous reference value be reconfirmed by an inservice test after a valve has been replaced, repaired, or has undergone maintenance that could affect the valve's performance.

ISTC-3510 states that active Category A and B valves be exercised nominally every 3 months.

ISTC-3521 states that active Category A and B valves be exercised during cold shutdowns if it is not practicable to exercise the valves at power or that active Category A and B valves be exercised during refueling outages if it is not practicable to exercise the valves during cold shutdowns.

ISTC-5120 states that MOVs be stroke-time tested when exercised in accordance with ISTC-3500.

ISTC-3700 states that valves with remote position indicators be observed locally at least once every 2 years to verify that valve operation is accurately indicated.

#### 3.5.2 Licensee's Basis for Requesting Relief

NUREG-1482, Revision 1, "Alternatives to Stroke-Time Testing," Section 4.2.5 states in part, that "As an alternative to MOV stroke-time testing, ASME developed Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor-Operated Valve Assemblies in LWR [light-water reactor] Power Plants," which provides periodic exercising and diagnostic testing for use in assessing the operational readiness of MOVs." Section 4.2.5 recommends that licensees implement ASME OM Code Case OMN-1, as accepted by the NRC (with certain conditions) in the regulations, or RG 1.192, Revision 0, "Operation and Maintenance Code Case Acceptability, ASME OM Code," as alternatives to the stroke-time testing provisions in the ASME OM Code for MOVs.

RG 1.192 allows licensees with an applicable code of record to implement ASME OM Code Case OMN-1 (in accordance with the provisions in the RG) as an alternative to the ASME OM Code provisions for MOV stroke-time testing, without submitting request for relief from their code

of record. The code of record for Salem Fourth 10-Year IST Interval is OM Code 2001 Edition with Addenda through OMB-2003.

### 3.5.3 Licensee's Proposed Alternative Testing

Pursuant to the guidelines provided in NUREG-1482, Revision 1, Section 4.2.5, the licensee proposes to implement Code Case OMN-1, Revision 0 in lieu of the stroke-time provisions specified in ISTC-5120 for MOVs as well as the position verification testing in ISTC-3700. Code Case OMN-1 has been determined by the NRC to provide an acceptable level of quality and safety when implemented in conjunction with the conditions imposed in RG 1.192.

### 3.5.4 Evaluation

Application of code cases is addressed in 10 CFR 50.55a(b)(6) through references to RG 1.192, which lists acceptable and conditionally acceptable code cases for implementation in IST programs. RG 1.192, Table 2, conditionally approves the use of Code Case OMN-1 and states that the code case is applicable to the 2000 Addenda and earlier editions and addenda of the Code. There is no technical reason for prohibiting the use of Code Case OMN-1 with the 2001 Edition through the 2003 Addenda of the Code. Code Case OMN-1 provides an acceptable level of quality and safety for testing of MOVs and is an acceptable alternative for use in the licensee's IST program. This conclusion is consistent with the staff position in NUREG-1482, Revision 1, and RG 1.192.

The NRC staff considers that activities conducted as part of the implementation of Code Case OMN-1 will achieve valve position verification as intended in ISTC-3700. For example, Paragraph 3.6, "MOV Exercising Requirements," in Code Case OMN-1 specifies that MOVs within the scope of the code case are to be exercised on an interval not to exceed 1 year or one refueling cycle (whichever is longer). In particular, paragraph 3.6.3 states that each MOV is to be full-stroke exercised to the position(s) required to fulfill its function(s). Further, item (j) of Paragraph 9.1, "Test Information," in Code Case OMN-1 indicates that significant observations, such as abnormal or erratic MOV action noted either during or preceding performance testing, are to be considered.

### 3.5.5 Conclusion

Based on the above evaluation, the NRC staff concludes that the licensee's proposed alternative to the Code MOV exercising, stroke-time testing, and remote position verification requirements is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the alternative provides an acceptable level of quality and safety. This alternative is authorized for the fourth 10-year IST interval.

## 3.6 Valve Relief Request V-06

This relief request is applicable to power-operated valves (POVs) that are used for system control and have a safety function per ISTA-1100.

### 3.6.1 Code Requirements

ISTA-3130(a) states that code cases to be used during a preservice or inservice test or examination shall be identified in the test plan.

ISTA-3130(b) states that code cases be applicable to the edition and addenda specified in the test plan.

ISTA-3130(c) states that code cases to be in effect at the time the test plan is filed, except as provided in ISTA 3130(d).

ISTA-3130(d) states that code cases be issued subsequent to filing the test plan may be proposed for use in amendments to the test plan.

ISTC-5131(a) states that active valves shall have their stroke times measured when exercised in accordance with ISTC-3500.

ISTC-5131(b) states that the limiting value(s) of full-stroke time of each valve shall be specified by the Owner.

ISTC-5131(c) states that the stroke time of all valves shall be measured to at least the nearest second.

ISTC-5131(d) states that any abnormality or erratic action shall be recorded, and an evaluation shall be made regarding need for corrective action.

ISTC-5132 states that test results shall be compared to established reference values.

ISTC-5132(a) states that valves with reference stroke times of greater than 10 seconds shall exhibit no more than  $\pm 25$  percent change in stroke time when compared to the reference value.

ISTC-5132(b) states that valves with reference stroke times of less than or equal to 10 seconds shall exhibit no more than  $\pm 50$  percent change in stroke time when compared to the reference value.

ISTC-5132(c) states that valves that stroke in less than 2 seconds may be exempted from ISTC-5132(b). In such cases the maximum limiting stroke time shall be 2 seconds.

ISTC-5133(b) states that valves with measured stroke times that do not meet the acceptance criteria of ISTC-5132 shall be immediately retested or declared inoperable. If the valve is retested and the second set of data also does not meet the acceptance criteria, the data shall be analyzed within 96 hours to verify that the new stroke time represents acceptable valve operation, or the valve shall be declared inoperable. If the second set of data meets the acceptance criteria, the cause of the initial deviation shall be analyzed and the results documented in the record of tests.

### 3.6.2 Licensee's Basis for Requesting Relief

The licensee is requesting to apply Code Case OMN-8, "Alternative Rules for Preservice and Inservice Testing of Power-Operated Valves That Are Used for System Control and Have a Safety Function per OM-10," in lieu of the ISTC Code provisions for valve stroke testing, stroke time acceptance criteria, and stroke test corrective action for pneumatically-operated valves that are used for system control and have a safety function per ISTA-1100.

The licensee's Reason for Request is as follows:

In NUREG-1482, Revision 1, Section 4.2.9, the NRC staff recommends that licensees should apply ASME Code Case OMN-8, as accepted in RG 1.192, if concerns exist regarding IST of control valves with fail-safe functions. Code Case OMN-8 states that stroke-time testing need not be performed for POVs when the only safety-related function of those valves is to fail safe. Any abnormality or erratic action experienced during the valve exercising should be recorded in the test record and an evaluation should be performed. RG 1.192 unconditionally accepts this Code Case for use and allows licensees with an applicable Code of record to implement Code Case OMN-8 without submitting request for relief from their Code of record. The Code of record for the Salem Fourth 10-year IST interval is OM Code 2001 Edition with Addenda through OMB-2003 and the applicable Code for OMN-8, as stated in the Code Case, is ASME/ANSI OMA-1988, Part 10 through OM Code-1995.

### 3.6.3 Licensee's Proposed Alternative Testing

The licensee proposes to test these valves in accordance with Code Case OMN-8. The valves shall be exercised in accordance with Subsection ISTC requirements and the fail-safe position on a loss-of-power signal shall be verified. Any abnormality or erratic action experienced during the valve exercising shall be evaluated per the Corrective Action Program.

### 3.6.4 Evaluation

Pursuant to 10 CFR 50.55a(b)(3), the Salem IST program will comply with the ASME OM Code, 2001 Edition through 2003 Addenda. In accordance with the recommendations of NUREG-1482, Revision 1, Section 4.2.9, the licensee desires to apply Code Case OMN-8 in lieu of the ISTC Code provisions.

Application of ASME OM Code cases is addressed in 10 CFR 50.55a(b)(6) through reference to RG 1.192, which lists acceptable and conditionally acceptable Code Cases for implementation in IST programs. RG 1.192 (June 2003), Table 1, approves the use of Code Case OMN-8 in lieu of stroke-time testing of power-operated control valves that have only a fail-safe safety function in subsection ISTC of the ASME OM Code and references the version of the Code Case that was issued with the 2000 Addenda of the Code. This version of Code Case OMN-8 states that it is applicable to ASME/ANSI OMA-1988 Part 10 through OM Code-1995. It also states that the Code Case shall expire on November 20, 2006, unless previously annulled or reaffirmed.



Paragraph ISTA-3130 (Application of Code Cases) of the ASME OM Code, 2001 Edition through 2003 Addenda delineates two requirements that cannot be met by the licensee and therefore require relief. Specifically, paragraph ISTA-3130(b) and (c) require that Code Cases be applicable to the edition and addenda specified in the test plan and that Code Cases be in effect at the time the test plan is filed. As stated above, the approved Code Case version is not applicable to the ASME OM Code, 2001 Edition through 2003 Addenda and is expired.

In accordance with 10 CFR 50.55a(a)(3), proposed alternatives to the stated code requirements may be authorized provided the applicant demonstrates that the proposed alternative provides an acceptable level of quality and safety. The provisions and requirements of Code Case OMN-8 provide an acceptable level of quality and safety because all of the requirements from the ASME/ANSI OMa-1988, Part 10, paragraph 4.2, through OM Code 1995, ISTC 4.2 have been captured in OM Code 2001 Edition through 2003 addenda in article ISTC-5100. Furthermore, Code Case OMN-8 was amended and issued with the ASME OM Code 2006 Addenda. This version of the Code Case expanded the applicability to include the OM Code 2004 edition and was given a new expiration date of November 20, 2009. While this version of the code case is not approved by inclusion in RG 1.192, it does support the technical basis for accepting the proposed change.

Code Case OMN-8 provides an acceptable level of quality and safety for testing of power-operated control valves that have only a fail-safe safety function and is an acceptable alternative for use in the licensee's IST program.

### 3.6.5 Conclusion

Based on a review of the information provided by the licensee, the NRC staff concludes that the licensee's proposed alternative to use Code Case OMN-8 in lieu of the requirements of Code paragraphs ISTC-5131, ISTC-5132, and ISTC-5133(b) for pneumatically operated valves that are used for system control and have a safety function per ISTA-1100, is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the alternative provides an acceptable level of quality and safety. This alternative is authorized for the fourth 10-year IST interval.

## 4.0 CONCLUSION

The following summarizes the NRC staff conclusions based on the technical evaluation discussed above in SE Section 3.1 through 3.6.

- 1) With respect to relief requests P-02, V-01, V-02, V-05 and V-06, the proposed alternatives will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternatives are authorized for the fourth 10-year IST interval at Salem.
- 2) With respect to relief request V-04, imposition of the code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety. The proposed alternative provides reasonable assurance of the operational readiness of the valves. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative is authorized for the fourth 10-year IST interval at Salem.

Principal Contributors: M. Farnan  
R. Lake  
W. Poertner  
R. Wolfgang  
R. Ennis

Date: August 11, 2009

T. Joyce

- 2 -

If you have any questions concerning this matter, please contact the Salem Project Manager, Mr. Richard Ennis, at (301) 415-1420.

Sincerely,

*/ra/*

Harold K. Chernoff, Chief  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via ListServ

DISTRIBUTION:

PUBLIC  
LPL1-2 R/F  
RidsNrrDorlLpl1-2 Resource  
RidsNrrLAABaxter Resource  
RidsNrrPMREnnis Resource  
LTrocine, EDO Region I  
RLake, DCI/CPTB

RidsOgcRp Resource  
RidsAcrcAcnw\_MailCTR Resource  
RidsRgn1MailCenter Resource  
RidsNrrDciCptb Resource  
MFarnan, DCI/CPTB  
RWolfgang, DCI/CPTB

ADAMS Accession No.: ML092030464

\*Not required per ML092220406

OFFICE	LPL1-2/PM	LPL1-2/LA	CPTB/BC	OGC	LPL1-2/BC
NAME	REnnis	ABaxter	JMcHale (JHuang for)	N/A*	HChernoff
DATE	8/10/09	7/27/09	7/23/09		8/11/09

OFFICIAL RECORD COPY