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

February 14, 2013

Mr. Michael J. Pacilio
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO)
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 - SAFETY EVALUATION IN SUPPORT OF REQUEST FOR RELIEF ASSOCIATED WITH THE FIFTH 10 YEAR INTERVAL INSERVICE TESTING PROGRAM (TAC NOS. ME7981, ME7982, ME7983, ME7984, ME7985, ME7986, ME7986, ME7987 ME7988, ME7990, ME7991, ME7992, ME7993, ME7994, AND ME7995)

Dear Mr. Pacilio:

PBy letter dated February 15, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12046A334), Exelon Generation Company, LLC (the licensee), submitted relief requests RV-01, RV-02, RV-03, RV-04, RV-05, RV-06, and RV-07, to the U.S. Nuclear Regulatory Commission (NRC). By letters dated September 13, October 8, December 7, 2012, and January 25, 2013 (ADAMS Accession Nos. ML12257A163, ML12283A083, ML12342A389, and ML13028A263, respectively), the licensee submitted additional information at the NRC staff's request needed to fully evaluate the relief. The licensee proposed alternatives to or requested relief from certain inservice testing (IST) requirements of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code), for the IST program at Quad Cities Nuclear Power Station, Units 1 and 2, for the fifth 10-year IST program interval.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(i), the licensee requested to use the proposed alternatives in RV-02, RV-03, RV-05, and RV-07, on the basis that the alternatives provide an acceptable level of quality and safety. Pursuant to 10 CFR Part 50, Section 50.55a(a)(3)(ii), the licensee requested to use the proposed alternatives in RV-01 and RV-06 on the basis that the alternatives provide reasonable assurance that the components are operationally ready. Pursuant to 10 CFR Part 50, Section 50.55a(f)(5)(iii), the licensee requested relief, in RV-04, from certain Code requirements on the basis that compliance with the ASME OM Code is impractical.

The NRC staff has reviewed the subject request and concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i) for requests RV-02, RV-03, RV-05, RV-06, and RV-07 and 10 CFR 50.55a(a)(3)(ii) for requests RV-01 and RV-04, and is in compliance with the ASME OM Code requirements. Therefore, the NRC staff authorizes alternative requests RV-01, RV-02, RV-03, RV-04, RV-05, RV-06, and RV-07, at QCNPS Units 1 and 2, for the fifth 10-year IST program interval, which begins on February 18, 2013 and is scheduled to end on February 17, 2023. All other ASME OM Code

requirements for which relief was not specifically requested and approved in the subject requests remain applicable.

If you have any questions on this action, please contact the NRC Project Manager, Brenda Mozafari, at (301) 415-2020.

Sincerely,

Joel S. Wiebe, Acting Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-254 and 50-265

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

RELIEF REQUESTS RV-01, RV-02, RV-03, RV-04, RV-05, RV-06, AND RV-07

FOR THE FIFTH 10-YEAR INTERVAL INSERVICE TESTING PROGRAM

EXCELON GENERATION COMPANY, LLC

QUAD CITIES NUCLEAR POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-254 AND 50-265

1.0 INTRODUCTION

By letter dated February 15, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12046A334), Exelon Generation Company, LLC (the licensee), submitted relief requests RV-01, RV-02, RV-03, RV-04, RV-05, RV-06, and RV-07 to the U.S. Nuclear Regulatory Commission (NRC). By letters dated September 13, October 8, December 7, 2012, and January 25, 2013 (ADAMS Accession Nos. ML12257A163, ML12283A083, . ML12342A389 and ML13028A263, respectively), the licensee submitted additional information at the NRC staff's request needed to complete the evaluation of these relief requests. The licensee proposed alternatives to or requested relief from certain inservice testing (IST) requirements of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code), for the IST program at Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2, for the fifth 10-year IST program interval.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(i), the licensee requested to use the proposed alternatives in RV-02, RV-03, RV-05, and RV-07 on the basis that the alternatives provide an acceptable level of quality and safety. Pursuant to 10 CFR Part 50, Section 50.55a(a)(3)(ii), the licensee requested to use the proposed alternatives in RV-01 and RV-06 on the basis that the alternatives provide reasonable assurance that the components are operationally ready. Pursuant to 10 CFR Part 50, Section 50.55a(f)(5)(iii), the licensee requested relief in RV-04 from certain Code requirements on the basis that compliance with the ASME OM Code is impractical.

2.0 REGULATORY EVALUATION

In 10 CFR 50.55a(f), "Inservice Testing Requirements," the regulation requires, in part, that IST of certain ASME Code Class 1, 2, and 3 components must meet the requirements of the ASME OM Code and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the NRC pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a.

In proposing alternatives or requesting relief, a licensee must demonstrate that: (1) the proposed alternative provides an acceptable level of quality and safety (10 CFR 50.55a(a)(3)(i)); (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety (10 CFR 50.55a(a)(3)(ii)); or (3) conformance is impractical for the facility (10 CFR 50.55a(f)(5)(iii)). Section 50.55a allows the NRC to authorize alternatives to and grant relief from ASME OM Code requirements upon making necessary findings.

The QCNPS, Units 1 and 2, fifth 10-year IST interval will begin on February 18, 2013, and is scheduled to end on February 17, 2023. The applicable ASME OM Code edition and addenda for QCNPS Unit Nos. 1 and 2, is the 2004 Edition through the 2006 Addenda.

The NRC's findings with respect to authorizing the alternatives, RV-01, RV-02, RV-03, RV-04, RV-05, RV-06, and RV-07 are given below:

3.0 TECHNICAL EVALUATION

3.1.1 Licensee's Alternative Request RV-01

This request applies to the frequency specifications of the ASME OM Code. The frequencies for tests given in the ASME OM Code include the following but does not include a tolerance band:

ISTA-3120, "Inservice Test Interval," (a) states, "The frequency for inservice testing shall be in accordance with the requirements of Section IST."

ISTB-3400, "Frequency of Inservice Tests," states, "An inservice test shall be run on each pump as specified in Table ISTB-3400-1."

Table ISTB-3400-1, "Inservice Test Frequency," notes that Group A and Group B pump tests are to be conducted quarterly and comprehensive pump tests are to be conducted biennially.

ISTC-3510, "Exercising Test Frequency," states, "Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months, except as provided by ISTC-3520, ISTC-3540, ISTC-3550, ISTC-3570, ISTC-5221, and ISTC-5222. Power-operated valves shall be exercise tested once per fuel cycle."

ISTC-3540, "Manual Valves," states, "Manual valves shall be full-stroke exercised at least once every 2 years, except where adverse conditions may require the valve to be tested more frequently to ensure operational readiness. Any increased testing frequency shall be specified by the Owner. The valve shall exhibit the required change of obturator position."

ISTC- 3630, "Leakage Rate for Other Than Containment Isolation Valves," (a) "Frequency," states, "Tests shall be conducted at least once every 2 years."

ISTC-3700, "Position Verification Testing," states, in part, "Valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated."

ISTC-5221"Valve Obturator Movement," (c)(3), states, "At least one valve from each group shall be disassembled and examined at each refueling outage; all valves in each group shall be disassembled and examined at least once every 8 years."

Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," I-1320, "Test Frequencies, Class 1 Pressure Relief Valves," (a), "5-Year Test

Interval," states, in part, "Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation."

Mandatory Appendix I, I-1330, "Test Frequency, Class 1 Nonreclosing Pressure Relief Devices," states, "Class 1 nonreclosing pressure relief devices shall be replaced every 5 years unless historical data indicates a requirement for more frequent replacement."

Mandatory Appendix I, I-1340, "Test Frequency, Class 1 Pressure Relief Valves That Are Used for Thermal Relief Application," states, "Tests shall be performed in accordance with I-1320, Test Frequencies, Class 1 Pressure Relief Valves."

Mandatory Appendix I, I-1350, "Test Frequency, Classes 2 and 3 Pressure Relief Valves," (a), "10-Year Test Interval," states, in part, "Class 2 and 3 pressure relief valves, with the exception of PWR main steam safety valves, shall be tested every ten years, starting with initial electric power generation."

Mandatory Appendix I, I-1360, "Test Frequency, Classes 2 and 3 Nonreclosing Pressure Relief Devices," states, "Classes 2 and 3 nonreclosing pressure relief devices shall be replaced every 5 years, unless historical data indicates a requirement for more frequent replacement."

Mandatory Appendix I, I-1370, "Test Frequency, Classes 2 and 3 Primary Containment Vacuum Relief Valves," states, "(a) Tests shall be performed on all Classes 2 and 3 containment vacuum relief valves at each refueling outage or every 2 years, whichever is sooner, unless historical data requires more frequent testing. (b) Leak tests shall be performed on all Classes 2 and 3 containment vacuum relief valves at a frequency designated by the Owner in accordance with Table ISTC-3500-1."

Mandatory Appendix I, I-1380, "Test Frequency, Classes 2 and 3 Vacuum Relief Valves, Except for Primary Containment Vacuum Relief Valves," states, "All Classes 2 and 3 vacuum relief valves shall be tested every 2 years, unless performance data suggest the need for a more appropriate test interval."

Mandatory Appendix I, I-1390, "Test Frequency, Classes 2 and 3 Pressure Relief Devices That Are Used for Thermal Relief Application," states, "Tests shall be performed on all Classes 2 and 3 relief devices used in thermal relief application every 10 years, unless performance data indicate more frequent testing is necessary. In lieu of tests the Owner may replace the relief devices at a frequency of every 10 years, unless performance data indicate more frequent replacements are necessary."

Mandatory Appendix II, "Check Valve Condition Monitoring Program," II-4000, "Condition-Monitoring Activities," (a), "Performance Improvement Activities," (1), states, in part, "If sufficient information is not currently available to complete the analysis required in II-3000, or if this analysis is inconclusive, then the following activities shall be performed at sufficient intervals over an interim period of the next 5 years or two refueling outages, whichever is less, to determine the cause of failure or the maintenance patterns."

Mandatory Appendix II, II-4000, (b), "Optimization of Condition-Monitoring Activities," (1)(e), states, "Identify the interval of each activity. Interval extensions shall be limited to one fuel cycle per extension. Intervals shall not exceed the maximum intervals shown in Table II-4000-1. All valves in a group sampling plan must be tested or examined again, before the interval can be extended again, or until the maximum interval would be exceeded. The requirements of ISTA-3120, Inservice Test Interval, do not apply."

3.1.2 Reason for Request

The ASME OM Code Section IST establishes the IST frequency for all components within the scope of the Code. The frequencies (e.g., quarterly) have always been interpreted as "nominal" frequencies (generally as defined in the Table 3.2 of NUREG-1482, Revision 1) and owners routinely applied the surveillance extension time period (i.e., grace period) contained in the plant technical specification (TS) surveillance requirements (SRs). The TSs typically allow for a less than or equal to 25 percent extension of the surveillance test interval to accommodate plant conditions that may not be suitable for conducting a TS surveillance (SR 3.0.2). However, regulatory issues have been raised concerning the applicability of the TS "grace period" to ASME OM Code-required IST frequencies irrespective of allowances provided under TS Administrative Controls (i.e., TS 5.5.6, "Inservice Testing Program," invokes SR 3.0.2 for various OM Code frequencies).

The lack of a tolerance band on the ASME OM Code IST frequency restricts operational flexibility. There may be a conflict where IST could be required (i.e., the frequency could expire), but where it is not possible or not desired that it be performed until after a plant condition or associated limiting condition for operation is within its applicability. Therefore, to avoid this conflict, the IST should be performed when it can and should be performed.

The NRC recognized this potential issue in the TSs by allowing a frequency tolerance as described in TS SR 3.0.2. The lack of a similar tolerance applied to the ASME OM Code testing places an unusual hardship on the plant to adequately schedule work tasks without operational flexibility.

Thus, just as with TS-required surveillance testing, some tolerance is needed to allow adjusting ASME OM Code testing intervals to suit the plant conditions and other maintenance and testing activities. This assures operational flexibility when scheduling IST that minimize the conflicts between the need to complete the testing and plant conditions.

3.1.3 Proposed Alternative

The licensee proposed to adopt the wording of ASME Board of Nuclear Codes and Standards (BNCS)-Approved OM Code Case OMN-20, repeated below, for determining acceptable tolerances for pump and valve test frequencies. This Code Case was approved by the ASME OM Code Standards Committee in February 2012. The proposed alternative will be utilized for the entire fifth 10-year interval and will apply to the various frequency specifications of the ASME OM Code for all pumps and valves contained within the IST Program scope.

BNCS-Approved OMN-20

The IST and earlier editions and addenda of ASME OM Code specify component test frequencies based either on elapsed time periods (e.g., quarterly, two years, etc.) or based on the occurrence of plant conditions or events (e.g., cold shutdown, refueling outage, upon detection of a sample failure, following maintenance, etc.).

(a) Components, whose test frequencies are based on elapsed time periods, shall be tested at the frequencies specified in Section IST with a specified time period between tests as shown in the table below. The specified time period between tests may be reduced or extended as follows:

(b) The specified time period between tests may be reduced or extended as follows:

(1) For periods specified as less than two years, the period may be extended by up to 25 percent for any given test.

(2) For periods specified as greater than or equal to two years, the period may be extended by up to six months for any given test.

(3) All periods specified may be reduced at the discretion of the Owner (i.e., there is no minimum period requirement).

Period extension is to facilitate test scheduling and considers plant operating conditions that may not be suitable for performance of the required testing (e.g., performance of the test would cause an unacceptable increase in the plant risk profile due to transient conditions or other ongoing surveillance, test or maintenance activities). Period extensions are not intended to be used repeatedly, merely as an operational convenience, to extend test intervals beyond those specified.

Period extensions may also be applied to accelerated test frequencies (e.g., pumps in Alert Range) and other less than 2-year test frequency not specified in the table.

Period extensions may not be applied to the test frequency requirements specified in Subsection ISTD, *Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-water Reactor Nuclear Power Plants*, as Subsection ISTD contains its own rules for period extensions.

Frequency	Specified Time Period Between Tests
Quarterly (or every 3 months)	92 days
Semiannually (or every 6 months)	184 days
Annually (or every year)	366 days
x Years	x calendar years where 'x' is a whole number of years ≥ 2

(c) Components whose test frequencies are based on the occurrence of plant conditions or events may not have their period between tests extended except as allowed by ASME OM Code 2004 Edition through OMb-2006 Addenda and earlier and addenda of ASME OM Code.

3.1.4 NRC Staff Evaluation

Historically, licensees have applied and the NRC staff has accepted the standard TS definitions for IST intervals (including allowable interval extensions) to ASME OM Code required testing (Reference NUREG-1482, Revision 1, Section 3.1.3). Recently, the NRC staff reconsidered the allowance of the TS testing intervals and interval extensions, for IST not associated with TS SRs. As noted in Regulatory Issue Summary (RIS) 2012-10, "NRC Staff Position on Applying Surveillance Requirements 3.0.2 and 3.0.3 to Administrative Controls Program Tests," the NRC staff determined that programmatic test frequencies can't be extended in accordance with

TS SR 3.0.2. This includes all IST described in the ASME OM Code not specifically required by the TS SRs.

Following this development, the NRC staff sponsored and co-authored an ASME OM Code inquiry and Code Case to modify the ASME OM Code to include TS-like test interval definitions and interval extension criteria. The resultant BNCS-Approved Code Case OMN-20, as shown above, was approved by the ASME Operation and Maintenance Standards Committee on February 15, 2012, with the NRC representative voting in the affirmative on this proposed Code Case. The licensee proposed to adopt the language of the BNCS-Approved Code Case OMN-20 in its entirety.

Requiring the licensee to meet the ASME OM Code requirements, without an allowance for defined frequency and frequency extensions for IST of pumps and valves, results in a hardship without a compensating increase in the level of quality and safety. Based on the prior acceptance by the NRC staff of the similar SR test interval definitions and interval extension criteria, the staff finds that implementation of the test interval definitions and interval extension criteria contained in the ASME BNCS-Approved OM Code Case OMN-20 is acceptable. Allowing usage of Code Case OMN-20 provides reasonable assurance of operational readiness of pumps and valves subject to the ASME OM Code IST.

3.2.1 Licensee's Alternative Request RV-02

This request applies to the motor-operated valves (MOVs) scoped into the IST program as referenced in the following ASME OM Code Sections:

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

ISTC-3100, "Preservice Testing," (a), states that, "Any valve that has undergone maintenance that could affect its performance after the preservice test shall be tested in accordance with ISTC-3310."

ISTC-3310, "Effects of Valve Repair, Replacement, or Maintenance on Reference Values," states, in part, "When a valve or its control system has been replaced, repaired, or has undergone maintenance that could affect the valve's performance, a new reference value shall be determined or the previous reference value be reconfirmed by an inservice test run before it is returned to service or immediately if not removed from service."

ISTC-3510, "Exercising Test Frequency," states, in part, "Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months."

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

ISTC-3700, "Position Verification Testing," states, in part, "Valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated."

ISTC-5120, "Motor-Operated Valves: Valve Stroke Testing," (a), states that, "Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500."

In ASME OM Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Active Electric Motor-Operated Valve Assemblies in Light-Water Reactor (LWR) Power Plants," (2006 Addenda) it provides periodic exercising and diagnostic testing for use in assessing the operational readiness of MOVs. Regulatory Guide (RG) 1.192 allows licensees to implement ASME Code Case OMN-1, Revision 0, in accordance with the provisions in the RG 1.192as an alternative to the ASME OM Code provisions for MOV stroke-time testing in the ASME OM Code 1995 Edition through 2000 Addenda.

3.2.2 Reason for Request

The licensee proposes to adopt the requirements of Code Case OMN-1, (as delineated in the 2004 ASME OM Code through 2006 Addenda of the ASME OM Code) in lieu of the performance of stroke time testing and position indication testing as described by ASME OM Code, Subsection ISTC, 2004 Edition through the 2006 Addenda as the proposed alternative would provide an acceptable level of quality and safety. The provisions to allow for motor control center (MCC) testing, as contained in Section 6.1 of Code Case OMN-1(2006 Addenda) are excluded from this request.

3.2.3 Proposed Alternative

The QCNPS MOV testing program was developed as a result of NRC Generic Letter (GL) 89-10, "Safety Related Motor Operated Valve Testing and Surveillance," and GL 96-05, "Periodic Verification of Design Basis Capability of Safety Related Motor Operated Valves," utilizing Topical Report MPR-1807, "Joint BWR, Westinghouse and Combustion Engineering Owners' Group Program on Motor-Operated Valve (MOV) Periodic Verification," Revision 2. QCNPS is currently utilizing MPR-2524-A, "Joint Owners' Group (JOG) Motor Operated Valve Periodic Verification Program Summary," (November 2006) as guidance for the MOV program. The adoption of OMN-1 will consolidate testing between the QCNPS's IST and MOV programs.

Section 4.2.5 "Alternatives to Stroke-Testing," of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, notes that Code Case OMN-1, which provides periodic exercising and diagnostic testing for use in assessing the operational readiness of MOVs, may be used. Section 4.2.5 recommends that licensees implement ASME Code Case OMN-1 as an alternative to the MOV stroke-time testing. The periodic exercising and diagnostic testing requirements in OMN-1 provide an improved method for assessing the operational readiness of MOVs.

Code Case OMN-1 was revised in the 2006 Addenda to the ASME OM Code. Most of the revisions are enhancements such as clarification of valve remote position indication requirements and ball/plug/diaphragm valve test requirements, and the expansion of risk-informed provisions. However, there was one significant revision in Section 6.1, "Acceptance Criteria," that notes that MCC testing is acceptable if correlation with testing at the MOV has been established. MCC diagnostic testing was not specifically addressed in the original version of OMN-1. Historically, diagnostic testing of MOVs has been conducted using at-the-valve

tests. Although there may be potential benefits of testing conducted at the MCC, the ASME OM Code does not address any method for the correlation of MCC-based measurements to diagnostic test measurements conducted at-the-valve. For these reasons, QCNPS has excluded the provision for MCC testing from this relief request. Therefore, the MCC test method will not be used as an acceptance criterion to determine the operational readiness of MOVs.

The following positions describe how QCNPS interprets and complies with the various requirements of OMN-1 (ASME OMb Code-2006):

1. OMN-1, Section 3.1, allows for the use of testing that was conducted prior to the implementation of OMN-1 if it meets the requirements of the Code Case. QCNPS intends to utilize the testing credited under its GL 89-10/96-05 responses to satisfy the requirement for a one-time test to verify the capacity of each individual or group of MOV's safety-related design basis requirements.

2. OMN-1, Section 3.2, requires that each MOV be tested during the preservice test period or before implementing inservice inspection. QCNPS intends to utilize the testing credited under its GL 96-05 response to satisfy this requirement.

3. OMN-1, Section 3.3(b), notes that IST's shall be conducted in the as-found condition, and activities shall not be conducted if they might invalidate the as-found condition for inservice testing. QCNPS maintenance activities that would affect the as-found condition of the valve, such as motor operator preventive maintenance or stem lubrication, are typically scheduled to occur in conjunction with the performance of the MOV periodic verification testing, and are performed after as-found testing. Any other activities that could affect the as-found test results are not performed until after the as-found testing has been conducted.

4. OMN-1, Section 3.3(c), requires that the inservice test program include a mix of static and dynamic MOV performance testing. QCNPS has utilized the mix of static and dynamic MOV performance testing in the JOG program (i.e., MPR-2524-A) to develop the current MOV testing program. Additionally, QCNPS will continue to utilize the existing engineering standards, which are consistent with the JOG standards, to justify any changes to the mix of required MOV performance testing. The use of such an evaluation will serve to ensure that QCNPS continues to meet this requirement.

5. OMN-1, Section 3.3(e), requires that Remote Position Indication shall be verified locally during IST or maintenance activities. QCNPS will continue to verify the operability of the position indication system for each MOV as part of the diagnostic test. In addition, the function of the position indication system for each MOV will be verified during the performance of maintenance activities affecting remote position indication.

6. OMN-1, Section 3.3.1(b), requires MOV IST to be conducted every two refueling cycles or three years (whichever is longer), if insufficient data exists to determine inservice test frequencies. QCNPS has sufficient MOV testing data to justify its current testing frequencies, and therefore meets this requirement. If in the future, modification or replacement results in the necessity to re-baseline a valve or group of valves, the requirements of Section 3.3.1(b) or 3.7.2.2(c), as applicable, will be followed.

7. Section 6.4.4 requires that calculations for determining the functional margin of the MOV are evaluated to account for potential performance-related degradation. The QCNPS MOV program, including Exelon's Motor-Operated Valve Design Database (MIDAS) Software (or similar updated product), takes into account performance-related degradation, to calculate valve margin.

8. The provisions of MCC testing, contained in Section 6.1 ("Acceptance Criteria") are excluded from this request ("i.e., MCC testing is acceptable if correlation with testing at the MOV has been established").

3.2.2 NRC Staff 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. Table 2 of RG 1.192 conditionally approves the use of Code Case OMN-1 and states that the code is applicable to the 2000 Addenda and earlier editions and addenda of the Code.

Code Case OMN-1 was revised in the 2006 Addenda to the ASME OM Code. Most of the revisions are enhancements such as clarification of valve remote position indication requirements and ball/plug/diaphragm valve test requirements, and the expansion of risk-informed provisions. However, there was one significant revision in Section 6.1, "Acceptance Criteria," that states that MCC testing is acceptable if correlation with testing at the MOV has been established. MCC diagnostic testing was not specifically addressed in the original version of OMN-1. Historically, diagnostic testing of MOVs has been conducted using at-the-valve tests. Although there may be potential benefits of testing conducted at the MCC, the ASME OM Code does not address any method for the correlation of MCC-based measurements to diagnostic test measurements conducted at-the-valve. The licensee has excluded the provision for MCC testing from this alternative request. Therefore, the MCC test method will not be used as an acceptance criterion to determine the operational readiness of MOVs at the QCNPS.

There are recognized weaknesses in the stroke-time testing requirements for MOVs in the ASME OM Code, and the use of Code Case OMN-1 (2006 Addenda) by the licensee resolves these weaknesses. Code Case OMN-1 (2006 Addenda) permits licensees to replace stroke-time and position verification testing of MOVs with a program of exercising MOVs every refueling outage (not to exceed two years) and diagnostically testing on longer intervals. The NRC staff considers the proposed alternative to be acceptable because Code Case OMN-1 (2006 Addenda) provides a superior method than the stoke-time method required by the ASME OM Code for assessing the operational readiness of MOVs. The NRC staff has recommended that licensees implement Code Case OMN-1 as an alternative to the MOV stroke-time and position verification testing provisions in the ASME OM Code.

There are no significant differences between the version of Code Case OMN-1 that is currently approved for use in RG 1.192, and the Code Case OMN-1 (2006 Addenda). The NRC staff has determined that there is no technical reason for prohibiting the use of Code Case OMN-1 (2006 Addenda). This is consistent with the NRC staff position in NUREG-1482, Revision 1, and RG 1.192.

The NRC staff also considered Section 4.2.5, "Alternatives to Stroke-Testing," of NUREG-1482, Revision 1, in its review of the licensee's proposed alternative. Section 4.2.5 notes that as an alternative to MOV stroke-time testing, ASME developed Code Case OMN-1, which provides periodic exercising and diagnostic testing for use in assessing the operational readiness of MOVs, which may be used. Section 4.2.5 recommends that licensees implement ASME Code Case OMN-1 as an alternative to the MOV stroke-time testing. The periodic exercising and diagnostic testing requirements in OMN-1 provide an improved method for assessing the operational readiness of MOVs.

Since there are no significant differences between the version of Code Case OMN-1 that is currently approved for use in RG 1.192 and the version of Code Case OMN-1, in the 2006 Addenda of the ASME OM Code, the NRC staff finds that Code Case OMN-1 (2006 Addenda), with the conditions specified in RG 1.192 and the exclusion of MCC diagnostic testing, provides an acceptable level of quality and safety for testing of MOVs and is an acceptable alternative for use in QCPNS, Unit 1 and Unit 2, IST programs.

3.3.1 Licensee's Alternative Request RV-03

This request applies to the pressure isolation valve (PIV) leak test frequency referenced in the following requirements:-

ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves (CIV)," states, in part, "Category A valves with a leakage requirement not based on an Owner's 10 CFR 50, Appendix J, program, shall be tested to verify their seat leakages are within acceptable limits. Valve closure before seat leakage testing shall be by using the valve operator with no additional closing force applied."

ISTC-3630(a), "Frequency," states, "Tests shall be conducted at least once every 2 years."

ISTC-3630(b), "Differential Test Pressure" (4), states, in part, "Leakage tests involving pressure differential lower than function pressure differentials are permitted in those types of valves in which service pressure will tend to diminish the overall leakage channel opening, as by pressing the disk into or onto the seat with greater force."

ISTC-3522, "Exercising Requirements: Category C Check Valves," states, in part, "Category C check valves shall be exercised as follows: (a) During operation at power, each check valve shall be exercised or examined in a manner that verifies obturator travel by using the methods in ISTC-5221. Each check valve exercise test shall include open and close tests. Open and close tests need only be performed at an interval when it is practicable to perform both tests. (b) If exercising is not practicable during operation at power, it shall be performed during cold shutdowns. (c) If exercising is not practicable during operation at power and cold shutdowns, it shall be performed during refueling outages. "

ISTC-5222, "Condition-Monitoring Program," states, in part, "As an alternative to the testing or examination requirements of paragraphs ISTC-3510, ISTC-3520, ISTC-3530, ISTC-3550, and ISTC-5221, the Owner may establish a condition-monitoring program. The program shall be implemented in accordance with Mandatory Appendix II, Check Valve Condition Monitoring Program."

The ASME OM Code Mandatory Appendix II, "Check Valve Condition Monitoring Program," states, "This Appendix establishes the requirements for implementing and maintaining a check valve condition monitoring program as defined in ISTC-5222."

The licensee requested to use an alternative leak rate testing schedule for the following Category A and A/C Pressure Isolation Valves (PIVs):

1(2)-1001-047- MO – RHR - Gate Valve – Category A – CIV and PIV
1(2)-1001-050- MO - RHR - Gate Valve – Category A – CIV and PIV
1(2)-1001-029A-MO- RHR - Gate Valve – Category A – CIV and PIV
1(2)-1001-029B-MO- RHR - Gate Valve – Category A – CIV and PIV
1(2)-1001-068A-MO- RHR - Check Valve – Category A/C - PIV
1(2)-1001-068B-MO- RHR - Check Valve – Category A/C - PIV
1(2)-1402-009A- Core Spray (CS) – RHR - Check Valve – Category A/C - PIV
1(2)-1402-009B- Core Spray (CS) – RHR - Check Valve – Category A/C - PIV
1(2)-1402-025A-MO- Core Spray (CS) – Gate Valve – Category A – CIV and PIV
1(2)-1402-025B-MO – Core Spray (CS) – Gate Valve – Category A– CIV and PIV

3.3.2 Reason for Request

ISTC-3630 requires that leakage rate testing for PIVs be performed at least once every 2 years. PIVs are not specifically included in the scope for performance-based testing as provided for in 10 CFR Part 50, Appendix J, Option B (hereafter referred to as Option B). While the motor-operated PIVs affected by this request are also CIVs and tested in accordance with the 10 CFR 50 Appendix J (Appendix J)pProgram, the check valve PIVs are not CIVs and not within the Appendix J scope. The concept behind the Option B alternative for CIVs is that licensees should be allowed to adopt cost-effective methods for complying with regulatory requirements.

Additionally, Nuclear Energy Institute (NEI) 94-01, "Industry Guideline for Implementing Performance-Based 10 CFR Part 50, Appendix J," describes the risk-informed basis for the extended test intervals under Option B. That justification shows that for valves which have demonstrated good performance by passing their leak rate tests for two consecutive cycles, further failures appear to be governed by the random failure rate of the component. NEI 94-01 also presents the results of a comprehensive risk analysis, including the statement that "the risk impact associated with increasing [leak rate] test intervals is negligible (less than 0.1 % of total risk)."

The valves identified in this relief request are all in water applications and testing is performed with water pressurized to pressures lower than maximum function pressure differential. However, the observed leakage is adjusted to the maximum function pressure differential value in accordance with ISTC-3630(b)(4). This request is intended to provide for performance-based scheduling of PIV tests at QCNPS.

NUREG 0933, "Resolution of Generic Safety Issues," Issue 105 [Interfacing Systems Loss of Coolant Accident (LOCA) at Light Water Reactors (LWRs)] discussed the need for PIV leak rate testing based primarily on three pre-1980 historical failures of applicable valves industry-wide. These failures all involved human errors in either operations or maintenance. None of these failures involved inservice equipment degradation. The performance of PIV leak rate testing

provides assurance of acceptable seat leakage with the valve in a closed condition. Typical PIV testing does not identify functional problems which may inhibit the valves ability to re-position from open to closed. For check valves, such functional testing is accomplished per ASME OM Code ISTC-3522. Power-operated valves are routinely full stroke tested per the ASME OM Code to ensure their functional capabilities. At QCNPS, these functional tests for motor operated PIVs are performed on a quarterly frequency. The functional testing of the PIV check valves will be monitored through a Condition Monitoring Plan in accordance with ISTC-5222, "Condition-Monitoring Program", and Mandatory Appendix II, "Check Valve Condition Monitoring Program". Performance of the separate 2-year PIV leak rate testing does not contribute any additional assurance of functional capability; it only determines the seat tightness of the closed valves.

3.3.3 Proposed Alternative and Basis for Use

The licencess proposes to perform PIV leak rate testing at intervals ranging from every refueling to every third refueling. The specific interval for each valve would be a function of its performance and would be established in a manner consistent with the CIV process under 10 CFR 50 Appendix J, Option B. All of the MOVs listed in this request are also classified as CIVs and are leak rate tested with air at intervals determined by Option B. The MOV PIV testing would be scheduled to coincide with the CIV testing at whatever interval is required for Option B. A controlled procedure will be established such that if any valve fails either the CIV or PIV test, the test interval for both tests will be reduced consistent with Option B requirements until good performance is reestablished.

The primary basis for this request is the historically good performance of the PIVs. The only recorded seat leakage failures of the PIVs listed in this request were determined to be a result of the test methodology and not due to any physical condition of the valves.

The additional basis for this request is provided below:

- Separate functional testing of MOV PIVs and condition monitoring of check valve PIVs per ASME OM Code will continue.

- There is a low likelihood of valve mispositioning during power operations due to procedures and valve interlocks.

- Degrading seat conditions tend to be identified sooner with air testing versus water testing.

- Dose reduction/ALARA: Recent historical data used to identify that PIV testing alone during each refuel outage incurs a total dose of approximately 600 MilliRem (Rem). Assuming all of the PIVs remain classified as good performers,the extended test intervals would provide for a savings of approximately 1.2 Rem over a 4-1/2 year period.

Additionally, the licensee provided the following in its October 8, and December 7, 2012, letters:

> Test intervals for Type A/C valves may be increased based upon completion of two consecutive periodic as-found Type C tests where the result of each test is within a licensee's allowable administrative limits. Elapsed time between the first and last tests in a series of consecutive tests, where the valves have passed the tests used to determine performance, shall be 24 months or the nominal test interval (e.g., refueling cycle), prior to implementing Option B. Intervals for Type C testing may be increased to a specific value in a range of frequencies from 30 months up to a maximum of 60 months (as limited by Regulatory Guide 1.163, "Performance Based Containment Leak-Test Program"). Test intervals for Type C tests are determined in accordance with Section 11.0 of NEI 94-01.
>
> The functional capability of check valves 1(2)-1001-068A/B is demonstrated by the opening and closing of the valves using a valve actuator each refueling outage. This test is separate and distinct from the PIV testing; therefore, there is no need for a Condition Monitoring Plan for these valves.
>
> The functional capability of the 1(2)-1402-009A/B check valves is verified through periodic testing. The valves open function is verified by injecting Core Spray into the reactor vessel. The testing frequency is Cold Shutdown in accordance with the ASME OM Code, Subsection ISTC-3522. The close function is verified during the performance of the PIV seat leakage pressure test where valve closure function is verified by the capability to build pressure against the valve disc. The intent of the Condition Monitoring Plan for these check valves is solely to align the closure test frequency to the same frequency as the PIV seat leakage pressure test.

3.3.4 NRC Staff Evaluation

The PIVs are defined as two valves in a series within the reactor coolant pressure boundary which separate the HP reactor coolant system from an attached LP system. Failure of a PIV could result in an over-pressurization event which could lead to a system rupture and possible release of fission products to the environment. This type of failure event was analyzed under NUREG/CR-5928, "Interfacing System LOCA (ISLOCA) Research Program," (Accession No. ML072430731). The purpose of NUREG/CR-5928 was to quantify the risk associated with an ISLOCA event. NUREG/CR-5928 analyzed BWR and PWR designs.

Option B references specific guidance concerning acceptable leakage rate test methods, procedures, and analyses that may be used to implement a performance-based leakage test program. The guidance and acceptance criteria are provided in RG 1.163, "Performance-Based Containment Leak-Test Program" (ADAMS Accession No. ML003740058). RG 1.163 endorsed NEI Topical Report 94-01, Revision 0, "Industry Guideline For Implementing Performance-Based Option of 10 CFR Part 50, Appendix J" dated July 26, 1995, with the limitation that "Type C Tests" intervals could not be extended beyond 60 months. "Type C Tests," per 10 CFR Part 50, Appendix J, are tests intended to measure CIV leakage rates. On June 8, 2012, NEI 94-01, Revision 3, was reviewed and endorsed by the NRC staff (ADAMS Accession No. ML121030286). Revision 3 of NEI 94-01 allowed the extension of Type C test intervals up to 75 months.

The licensee has proposed an alternative test in lieu of the requirements in the ASME OM Code Section ISTC-3630(a) for all 20 of the PIVs listed in the request. Specifically, the licensee proposed to verify the leakage rate of PIVs using the Option B performance-based schedule. Valves would initially be tested at the required interval schedule which is currently every refueling outage (RFO) or two years. Valves that have demonstrated good performance for two consecutive cycles may have their test interval extended from every RFO to every third RFO (i.e., six years). Any PIV leakage test failure would require the component to return to the initial interval of every RFO or two years until it can be reclassified as a good performer per the performance evaluation of Option B. The leakage test interval for these PIVs shall not exceed 60 months with a 15-month grace period based on the performance (i.e., a total of 75 months). The specific interval for each valve will be a function of its performance and will be established in a manner consistence with the CIV process under Option B.

Twelve of the PIVs listed in this request [1(2)-1001-047/050/029A/029B-MO, and 1(2)-1402-25A/025B-MO] are also classified as CIVs and are leak rate tested at intervals determined by Option B. If any of these 12 valves fail either their CIV or PIV test, the test interval for both tests will be reduced to every refueling outage, until the valve can be reclassified as a good performer per the Option B requirements. Upon completion of two successful tests, the component leakage test interval can be extended once again.

Currently, all 20 PIVs in this request are being leak tested every RFO or two years and have maintained a history of good performance. In addition, the licensee routinely functionally tests and/or performs a performance indicator test on each of the PIV check valves and full stroke tests the other PIVs in accordance with ASME OM Code requirements, to ensure their functional capabilities. Based on excellent valve maintenance history, coupled with stroking each valve every RFO and the low risk factor, as noted in NUREG/CR-5928, the proposed alternative provides an acceptable level of quality and safety.

3.4.1 License's Relief Request RV-04

This request applies to the following ASME OM Code Subsections:

ISTC-3500, "Valve Testing Requirements," states, "Active and passive valves in the categories defined in ISTC-1300 shall be tested in accordance with the paragraphs specified in Table ISTC-3500-1 and the applicable requirements of ISTC-5100 and ISTC-5200."

ISTC-3510, "Exercising Test Frequency," states, "Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months, except as provided by ISTC-3520, ISTC3540, ISTC-3550, ISTC-3560, ISTC-5221, and ISTC-5222. Power-operated relief valves shall be exercise tested once per fuel cycle."

ISTC-3560, "Fail-Safe Valves," states, "Valves with fail-safe actuators shall be tested by observing the operation of the actuator upon loss of valve actuating power in accordance with the exercising frequency of ISTC-3510."

ISTC-5150, "Solenoid- Operated Valves"

ISTC-5151, "Valve Stroke Testing" for Solenoid-Operated Valves (SOVs), states, in part, "Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500."

ISTC-5152, "Stoke Test Acceptance Criteria" for SOVs, states, in part, "Test results shall be compared to reference values established in accordance with ISTC-3300, ISTC-3310, or ISTC-3320."

ISTC-5153, "Stroke Test Corrective Action" for SOVs, states, in part, "If a valve fails to exhibit the required change of obturator position or exceeds the limiting values of full-stroke time, the valve shall be immediately declared inoperable. Valves with measured stroke times that do not meet the acceptance criteria of ISTC-5152 shall be immediately retested or declared inoperable."

3.4.2 Reason for Request

The licensee requested an alternative testing to ISTC-5151, ISTC-5152, and ISTC-5153, which requires that solenoid-operated valves have their stroke-times measured and compared to reference values. The alternative testing was requested for high-pressure coolant injection (HPCI) system valves 1-2301-032-SO and 2-2301-032-SO. These are Code Class 2, Category B, valves.

These solenoid valves 1(2)-2301-032-SO function as a backup to the exhaust line drain pot steam trap. During normal operation of the HPCI turbine using high quality steam, the drain path from the drain pot to the torus via the steam trap is adequate to remove condensate from the turbine exhaust line. However, during HPCI turbine operation with low pressure and low quality steam (e.g., during certain HPCI surveillance tests), condensate collects in the drain pot faster than it can be drained through the trap. Under these conditions, solenoid valves 1(2)-2301-032-SO open automatically to drain to the gland seal condenser upon receipt of a signal from a drain pot high level switch when the drain pot level reaches the high level alarm set point. The high level condition alarms a control room annunciator.

These valves are not equipped with hand switches or position indicators. Valve actuation may be indirectly verified by removing the HPCI system from service, filling the drain pot with water until the high level alarm is received, and observing that the high level alarm clears. It would be extremely difficult to assign a maximum limiting stroke time to these valves using this test method because the time for the alarm to clear would depend primarily on variables such as the rate of filling and the level of the drain pot when filling is secured. The steam line drain pot is not equipped with direct level indication; therefore, the time required for the alarm to clear may vary significantly.

Failure of these valves to perform their safety function would be indicated by a drain pot high level alarm. Additionally, condensate entrapped in the steam would cause significant fluctuations in exhaust steam header pressure.

Compliance with the quarterly exercising and stroke timing requirements of the ASME OM Code would require ether system modification to replace these valves with ones of testable design, or to purchase non-intrusive test equipment and develop new test methods and procedures.

The station design does not include remote light indication for the 1(2)-2301-032-SO valves. These valves are completely enclosed such that the valve position cannot be verified by direct observation. Due to the absence of a visible valve stem and light indication, "switch to light" stroke-timing cannot be performed. In addition, there are no known reliable non-intrusive test methods for measuring stroke-times for these valves.

In order to perform stroke timing of these valves, a design change would have to be implemented. The modification would include: (1) changing the valve design to include position limit switches, (2) routing light indication cabling from the plant through containment boundaries to the control room, and (3) installing position indication lights in the main control room panels. It is estimated that this modification would cost in excess of $300,000 per unit. This remote valve indication would be installed solely for meeting the ASME OM Code requirements and would serve no other operational purpose.

A quarterly exercise of the 1(2)-2301-032-SO valves is currently performed and its associated level switches operate as proven by the receipt of the "HPCI TURBINE EXH DRAIN POT HIGH LEVEL" alarm (i.e., water level increase) and reset (i.e., water level decrease due to the open exercise of valves 1(2)-2301-032-SO). During this same evolution, the valve solenoid is also verified as actuated (i.e., valve solenoid is magnetized) by use of a test probe. This testing approach provides adequate assurance that the valves function as required.

A review of the work and the IST history of these valves did not identify any cases of these valves failing to stroke-open since they were added to the IST program scope in November 1994.

The licensee has a preventive maintenance activity to replace these valves once every fifth refueling outage (i.e., approximately every 10 years). This activity was last performed on May 11, 2007, on Unit 1, and on April 3, 2008, on Unit 2, and no defects were noted.

3.4.3 Proposed Alternative

A functional verification test will be conducted on the drain pot level switches and the associated control room annunciators at least once every 92 days. Valve actuation will be indirectly verified by removing the HPCI system from service, filling the drain pot with water until the high level alarm is received, and observing a positive draining of the HPCI drain pot as indicated by a level increase in the gland seal condenser and the clearing of the high level alarm.

The following provisions of ISTC-5153, "Stroke Test Corrective Action" still apply:

- If a valve fails to exhibit the required change of obturator position, the valve shall be immediately declared inoperable.

- Valves declared inoperable may be repaired, replaced, or the data may be analyzed to determine the cause of the deviation and the valve shown to be operating acceptably.

- Valve operability based upon analysis shall have the results of the analysis recorded in the record of the tests.

- Before returning a repaired or replacement valve to service, a test demonstrating satisfactory operation shall be performed.

3.4.4 NRC Staff Evaluation

Solenoid valves 1-2301-032-SO and 2-23011-032-SO are not equipped with position indication or remote light indication and the valves are totally enclosed, so valve position cannot be verified by direct observation. Due to the absence of a visible valve stem and light indication, "switch to light" stroke timing cannot be performed. In addition, there are no reliable non-intrusive test methods for measuring stroke times for these valves. Therefore, it is not feasible to exercise and stroke time these valves in accordance with the requirements of the ASME OM Code. Compliance with the ASME OM Code requirements would require major system modifications.

In lieu of the ASME OM Code-required stroke-time test for 1-2301-032-SO and 2-23011-032-SO, the licensee proposed to perform a functional verification test. Valve actuation and operability will be indirectly verified by a test proposed by the licensee. This test will involve removing the HPCI system from service and filling the drain pot with water until the high level alarm is received. Valve actuation will be verified by positive draining of the HPCI drain pot via a level increase in the gland seal condenser and clearing of the high level alarm. Failure of these valves to perform their safety function can be indicated by a drain pot high level alarm during operation with low-pressure steam. A failure of either of these valves to open would not keep HPCI from fulfilling its required safety function. Additionally, condensate trapped in the steam would be detected by significant fluctuations in the exhaust steam header pressure.

The licensee exercises the 1-2301-032-SO and 2-23011-032-SO valves quarterly by performing HPCI pump testing and verifying that the level switches associated with these valves can operate. This is verified through the receipt of the "HPCI Turbine Exhaust Drain Pot High Level" alarm (i. e., water level increase) and reset (i.e., water level decrease due to open exercise of valves 1-2301-032-SO and 2-23011-032-SO). This testing provides adequate assurance that these valves function as required. During the same evolution, the solenoid in each valve is verified to have actuated by the use of a test probe.

The licensee performed a review of the work and inservice testing of these solenoid valves and did not identify any failure to stroke open since these were added to the IST program scope in November 1994. The licensee also has a preventive maintenance program to replace these valves once every fifth refueling outage (i.e., approximately every 10 years). The Unit 1 valve, 1-2301-032-SO, was last replaced on May 11, 2007, and the Unit 2 valve, 2-2301-032-SO, was replaced on April 2, 2008. No defects were noted with either valve that was replaced.

Additionally, the licensee will continue to use the stroke-test corrective action provisions of ISTC-5153 as follows:

- If a valve fails to exhibit the required change of obturator position, the valve shall be immediately declared inoperable.

- Valves declared inoperable may be repaired, replaced, or the data may be analyzed to determine the cause of the deviation and the valve shown to be operating acceptably.

-
- Valve operability based upon analysis shall have the results of the analysis recorded in the record of the tests.

- Before returning a repaired or replacement valve to service, a test demonstrating satisfactory operation shall be performed.

Imposition of the Code requirements would result in a burden on the licensee in that modification to the valves, valve replacement, or the purchase of more advance testing equipment would be necessary to comply with Code requirements, which would represent a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff finds that the proposed functional verification test and high water level alarms in the control room, and history of good performance of these valves, coupled with replacement of these valves every 10 years provide reasonable assurance of the operational readiness of valves, 1-2301-032-SO and 2-23011-032-SO.

3.5.1 Licensee's Alternative Request RV-05

This request applies to the following ASME OM Code, Subsections:

ISTC-3200, "Inservice Testing," states, "Inservice testing in accordance with this Subsection shall commence when the valves are required to be operable to fulfill their required function(s) (See ISTA-1100)."

ISTC-5240, "Safety and Relief Valves," states, "Safety and relief valves shall meet the inservice test requirements of Mandatory Appendix I."

Mandatory Appendix I, Paragraph I-1320 (a), states, "Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20 % of the valves from each valve group shall be tested within any 24-month interval. This 20 % shall consist of valves that have not been tested during the current 5-year interval, if they exist. The test interval for any individual valve shall not exceed 5 years."

ASME OM Code Case OMN-17, "Alternate Rules for Testing ASME Class 1 Pressure Relief/Safety Valves" from the 2009 Edition of ASME OM Code, allows an extended test interval of six years, for testing these relief valves, plus an additional six months grace period provided the licensee disassembles and inspects each valve after as-found set-pressure testing to verify that valve parts are free of defects resulting from time-related degradation or service-induced wear.

Alternative testing is requested for the following Class 1, Category C, Main Steam Safety Valves (MSSVs):

1-0203-004A
1-0203-004B
1-0203-004C

1-0203-004D
1-0203-004E
1-0203-004F
1-0203-004G
1-0203-004H
2-0203-004A
2-0203-004B
2-0203-004C
2-0203-004D
2-0203-004E
2-0203-004F
2-0203-004G
2-0203-004H

3.5.2 Reason for Request

Testing per Mandatory Appendix I, Paragraph I-1320, ensures that the MSSVs, which are located on each of the main steam lines between the reactor vessel and the first isolation valve within the drywell, will open at the pressures assumed in the safety analyses.

The physical locations of the MSSVs cause them to interfere with one another during transport of the valves in and out of containment. In order to create a transport path, the licensee elects to remove, test, and rebuild at least half of the subject valves during each refueling outage. This ensures compliance with the ASME OM Code requirements for testing Class 1 pressure relief valves within a 5-year interval.

To support these replacements, four spare MSSVs are required to be certified prior to the refuel outage during which they will be installed. These spare MSSVs are certified tested immediately after refurbishment and placed into stores. In order to meet the 5-year test-to-test interval requirement, each spare MSSV requires a second recertification test just before a refuel outage to mitigate the time the valve spent in stores. Extending the testing interval to six years with a grace period of six months to coincide with a refueling outage (i.e., 6.5 years total) will allow additional time for the spare MSSVs to reside in stores after their certification tests without an additional recertification test immediately prior to installation. This extension would reduce the number of recertification test actuations of the spare MSSVs and limit the potential of disc/seat damage and subsequent seat leakage due to these additional tests.

3.5.3 Proposed Alternative

As an alternative to the ASME OM Code required a 5-year test interval per Mandatory Appendix I, Paragraph I-1320(a), the licensee proposed that the Class 1 pressure relief valves (i.e., Dresser Model 3777Q MSSVs) at QCNPS Units 1 and 2 shall be tested at least every six years with a grace period of six months to coincide with a refueling outage (i.e., 6.5 years total). ASME Code Case OMN-17 requires a minimum of 20 percent of the pressure relief valves to be tested within any 24-month interval and that this 20 percent shall consist of valves that have not been tested during the current 6-year interval (with a 6-month grace period), if they exist. The licensee removes at least 50 percent of the four MSSVs in each Unit. The test interval for any

individual valve shall not exceed 6.5 years. This alternative is consistent with the alternative provided in ASME Code Case OMN-17.

The IST history for the Dresser Model 3777Q MSSVs at QCNPS, Units 1 and 2, from May 1997, to the present, indicate a good performance in that almost all the tested MSSVs (i.e., 77 MSSV tests) that have been installed in either QCNPS, Unit 1 or Unit 2, for two operating cycles have successfully passed the ASME OM Code and TS as-found lift set-point acceptance criteria within ± 3 percent (the historical test data indicates one of 77 tests did not remain within the as-left tolerance of ± 3 percent; however, it was found in the negative, more conservative, direction). The licensee stated that MSSV test data prior to 1997 is not indicative of the current MSSV performance. Since 1997, changes in refurbishment methods, testing methods, and improvements in reducing main steam system vibration (through the Acoustic Side Branch modification) have had a positive impact on MSSV performance.

After as-found set pressure testing, the MSSVs shall be disassembled and inspected to verify that parts are free of defects resulting from time-related degradation or service-induced wear. Each valve shall have been disassembled and inspected prior to the implementation of ASME OM Code Case OMN-17.

The licensee utilizes an ASME OM Code-certified offsite vendor to perform as-found and as-left testing, inspection, and refurbishment of the MSSVs. A licensee approved and qualified procedure is used for disassembly and inspection of the MSSVs. This procedure requires that each MSSV be disassembled and inspected upon removal from service, independent of the as-found test results. The procedure identifies the critical components that are required to be inspected for wear and defects, and the critical dimensions that are required to be measured during the inspection. If components are found worn or outside of the specified tolerance(s), the components are either reworked to within the specified tolerances, or replaced. All parts that are defective, outside-of-tolerance, and all reworked/replaced components are identified, and the licensee is notified of these components by the offsite vendor. The MSSV is then reassembled, the as-left test is performed, and the MSSV is returned to QCNPS.

3.5.4 NRC Staff Evaluation

ASME OM Code, Mandatory Appendix I requires that Class 1 safety relief valves (SRVs) be tested at least once every five years. However, Mandatory Appendix I does not require that SRVs be disassembled and inspected prior to the start of the five year test interval. In lieu of the 5-year test interval, the licensee proposed to implement ASME OM Code Case OMN-17, which allows a test interval of six years plus a 6-month grace period. The ASME Committee on OM developed Code Case OMN-17 and published it in the 2009 Edition of OM Code. OMN-17 imposes a special maintenance requirement to disassemble and inspect each SRV to verify that parts are free from defects resulting from time-related degradation or maintenance-induced wear prior to the start of the extended test interval. The purpose of this maintenance requirement is to reduce the potential for SRV set-point drift.

Code Case OMN-17 has not been added to Regulatory Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code," or included in 10 CFR 50.55a by reference. However, the NRC has allowed licensees to use OMN-17 provided all requirements in the Code Case are met. Consistent with the special maintenance requirement in Code Case

OMN-17, each MSSV will be refurbished to a like-new condition prior to the start of each 6.5-year test interval. Critical components will be inspected for wear and defects, and the critical dimensions will be measured during the inspection.

Components will be reworked to within the specified tolerance or replaced if found to be worn or outside of specified tolerances. Furthermore, Code Case OMN-17 is performance-based, in that it requires SRVs to be tested more frequently if test failures occur. For example, OMN-17 requires that two additional valves be tested when a valve in the initial test group exceeds the set pressure acceptance criteria. All remaining valves in the group are required to be tested if one of the additional valves tested exceeds its set pressure acceptance criteria. Therefore, the SRV test frequency would be equivalent to the current test frequency, if test failures occur.

The licensee has provided test data to show that the subject valves have historically exhibited very limited susceptibility to time-related degradation or set-point drift. The licensee has also committed to implement a disassembly and inspection program in conjunction with the extended test interval, as required by ASME OM Code Case OMN-17.

Based on the historical performance of the set-point testing of QCNPS, Units 1 and 2, MSSVs and the licensee's commitments to disassemble and inspect the MSSVs prior to use, the NRC staff finds that implementation of the ASME OM Code Case, OMN-17, for the testing of the designated MSSVs, in lieu of the requirements of ASME OM Code 2004 Edition through OMb-2006, Mandatory Appendix I, Section 1320 of the OM Code, provides an acceptable level of quality and safety.

3.6.1 Licensee's Alternative Request RV-06

This request applies to the following ASME Code and requirements:

Mandatory Appendix I, Paragraph I-1310, "General," (e), "Acceptance Criteria," states, "The Owner, based upon system and valve design basics or technical specification, shall establish and document acceptance criteria for tests required by this Appendix."

Mandatory Appendix I, Paragraph I-1320 (c), "Requirements for Testing Additional Valves," states, in part, "Additional valves shall be tested in accordance with the following requirements: (1) For each valve tested for which the as-found set-pressure (first test actuation) exceeds the greater of the ± tolerance limit of the Owner-established set-pressure acceptance criteria of I-1310(e) or ±3% of valve nameplate set-pressure, two additional valves shall be tested from the same valve group. (2) If the as-found set-pressure of any of the additional valves tested in accordance with I-1320(c)(1) exceeds the criteria noted therein, then all remaining valves of that same valve group shall be tested."

ASME OM Code Case OMN-17 (1)(c), "Test Frequencies, Class 1 Pressure Relief Valves: Requirements for Testing Additional Valves," requires the same expansion of the test group sample as Mandatory Appendix I, Paragraph I-1320 (c) when valve set-pressure criteria is exceeded.

Alternative testing is requested for the following Class 1, Category C, MSSVs:

1-0203-004A
1-0203-004B
1-0203-004C
1-0203-004D
1-0203-004E
1-0203-004F
1-0203-004G
1-0203-004H
2-0203-004A
2-0203-004B
2-0203-004C
2-0203-004D
2-0203-004E
2-0203-004F
2-0203-004G
2-0203-004H

3.6.2 Reason for Request

These MSSVs are used to terminate an abnormal pressure increase in the reactor vessel and the reactor coolant pressure boundary (i.e., they provide overpressure protection).

The physical locations of the safety valves cause them to interfere with one another during transport of the valves in and out of containment. In order to create a transport path, at least half of the subject valves are removed, tested, and rebuilt during each refueling outage. This accelerated maintenance schedule provides a high level of assurance that these safety valves will perform their safety function.

The licensee does not have the facilities required to perform set-point tests on large relief and safety valves. These valves are unbolted from their mounting flanges, decontaminated, and shipped to an off-site test facility. Because of the lengthy period required for removal, transportation, testing, and re-installation, the removal and testing of additional valves due to sample expansion would delay unit start-up from refueling outages by at least several days. This represents a significant hardship.

The sample expansion requirements of Mandatory Appendix I, or Code Case OMN-17, require two additional valves be tested if one valve failed its set-point test. Since no less than four of the safety valves are tested during each outage, the valves already being tested represent an increased (>20 percent of group) sample population. Therefore, based on the larger initial sample size (four vs. a minimum of two required), accelerated maintenance schedule, and the hardship associated with pulling additional valves, no additional valves will be tested if only one valve fails the set-point test. This methodology also should help ensure that 100 percent of the MSSV population is tested within the required test interval. This alternative request is intended to decrease the likelihood of an unplanned scope expansion of MSSV testing and maintenance and corresponding restart delays by preemptively removing and testing 50 percent of the MSSVs during each refuel outage.

3.6.3 Proposed Alternative

At least half of the eight safety valves will be removed and tested during each reactor refueling outage. If only one of the four safety valves removed for testing fails its set-point test, additional safety valves will not be tested. If more than one safety valve fails its as-found initial set-point test, the sample expansion criteria of Code Case OMN-17(1)(c) will be implemented, based on the NRC's authorization of alternative request RV-05.

3.6.4 NRC Staff Evaluation

Mandatory Appendix I, paragraph I-1320 of the ASME OM Code, requires that Class 1 valves be tested at least once every five years and that a minimum of 20 percent of the valves from a valve group be tested within a 24-month period. Code Case OMN-17(1)(a) from the ASME OM Code 2009 Edition, requires that Class 1 valves be tested at least once every six years with a six month grace period and that a minimum of 20 percent of the valves from a valve group be tested within a 24 month period. For each valve tested per Mandatory Appendix I or OMN-17 that fails its set-pressure test, an additional two valves must be tested. The licensee proposes to test, rebuild, and retest at least four of the eight safety valves each refueling outage. The minimum number of safety valves that the licensee proposes to test exceeds the number of valves that would be required to be tested per the ASME OM Code requirements. The ASME OM Code requires 20 percent of the eight safety valves, or two safety valves to be tested every 24 months, while the licensee proposes to test at least 50 percent of the safety valves each outage. In fact, the number of valves that the licensee proposes to test (at least four) equals the number of valves that would be required to be tested if one valve in the Code-required sample of two valves failed the test. The licensee proposes that if only one valve fails the test, the sample size will not be increased, but if a second valve fails, the size will be expanded as required by Code Case OMN-17(1)(c)(2), based on the NRC's authorization of alternative request RV-05. The licensee's proposal will test the subject valves at an equal or higher rate than that required by the ASME OM Code.

The NRC staff finds that the proposed alternative testing of the MSSVs noted in this request, provides reasonable assurance of adequate valve operation and readiness because it provides a test method equal to or higher than that required by the OM Code. The NRC staff finds that the licensee's proposed alternative provides an acceptable level of quality and safety.

3.7.1 Licensee's Alternative Request RV-07

This request applies to the following:

ISTC-5132(b), "Stroke Test Acceptance Criteria," states, "Valves with reference stroke times of less than or equal to 10 seconds shall exhibit no more than ±50% change in stroke time when compared to the reference value."

ISTC-5133, "Stroke Test Corrective Action," states, in part, "Valves declared inoperable may be repaired, replaced, or the data may be analyzed to determine the cause of the deviation and the valve shown to be operating acceptably."

TS SR 3.6.1.3.6 in TS 3.6.1.3, "Primary Containment Isolation Valves," requires an acceptable stroke time range for the main steam isolation valves (MSIVs) of > 3 seconds to < 5 seconds.

3.7.2 Reason for Request

The main steam isolation valves (MSIVs) open to admit reactor steam to the main turbine. They close to provide containment and reactor isolation.

The ISTC Code requirement 5132(b) bases the stroke-time acceptance criteria on a fixed reference value taken from a baseline test. However, TS SR 3.6.1.3.6 establishes an invariable stroke time range for the MSIVs of > 3 seconds to < 5 seconds. This fixed range is more conservative and consistent than that required by ISTC-5132(b) since the range is not dependent on a baseline value that may *vary* by as much as ±1 second."

3.7.3 Proposed Alternative

"TS SR 3.6.1.3.6 establishes an acceptable stroke-time range for the MSIVs of 3.0 seconds ≤ Tmsiv ≤ 5.0 seconds. QCNPS will utilize this range for evaluating an acceptable MSIV stroke time in lieu of establishing an acceptance band based on MSIV stroke time reference values. QCNPS has also established additional limitations on stroke time based on reactor power levels to ensure that the TS SR limits are always met. Any MSIV that fails to meet the TS SR limits will be considered inoperable and required action will continue to be in accordance with the QCNPS TSs and ISTC-5133,

3.7.4 NRC Staff Evaluation

In lieu of the Code-required stroke-time acceptance criteria based on a fixed reference value taken from a baseline test, the licensee proposes to use the TS SR 3.6.1.3.6 acceptable stroke-time range of greater than or equal to three seconds and less than or equal to five seconds for the MSIVs.

The TS provides the minimum system, subsystem, and component operability requirements for safe operation. The licensee's proposed acceptance stroke-time range specified in TS SR 3.6.1.3.6 is more conservative than the ASME OM Code-required acceptance criterion of plus or minus 50 percent change in stroke-time when compared to the reference value. Assuming a nominal reference value of four seconds for the MSIVs, the Code acceptance criterion would result in an acceptance band of two2 to six seconds, which is outside the TS acceptance band.

The NRC staff finds that the proposed alternative testing acceptance criteria for the MSIVs is more conservative than the ASME OM Code-required testing, provides reasonable assurance of adequate valve operation and readiness, and ensures that the MSIVs meet the operability requirements for safe operation. Therefore, the NRC staff determines that the proposed alternative testing acceptance criteria provided in the QCNPS TSs in lieu of the criteria required by ISTC-5132(b) is acceptable, and that the licensee's proposed alternative provides an acceptable level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff determines that for alternative requests RV-02, RV-03, RV-05, RV-06, and RV-07, the proposed alternatives provide an acceptable level of quality and safety. For proposed alternatives RV-01 and RV-04, the proposed alternatives provide reasonable assurance that the components are operationally ready. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i) for requests RV-02, RV-03, RV-05, RV-06, and RV-07 and 10 CFR 50.55a(a)(3)(ii) for requests RV-01 and RV-04, and is in compliance with the ASME OM Code requirements. Therefore, the NRC staff authorizes alternative requests RV-01, RV-02, RV-03, RV-04, RV-05, RV-06, and RV-07, at QCNPS Units 1 and 2, for the fifth 10-year IST program interval, which begins on February 18, 2013 and is scheduled to end on February 17, 2023. All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject requests remain applicable.

Principle Contributors: Robert Wolfgang, NRR
John Billerbeck, NRR
Gurjendra Bedi, NRR
John Huang, NRR
Mike Farnan, NRR

Date of issuance: February 14, 2013

requirements for which relief was not specifically requested and approved in the subject requests remain applicable.

If you have any questions on this action, please contact the NRC Project Manager, Brenda Mozafari, at (301) 415-2020.

Sincerely,

/ ***RA*** /

Joel S. Wiebe, Acting Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-254 and 50-265

Enclosure: Safety Evaluation

cc w/encl: Distribution via Listserv

DISTRIBUTION:
PUBLIC
LPL3-2 R/F
RidsNrrPMQuadCities Resource
RidsAcrsAcnw_MailCTR Resource
RidsRgn3MailCenter Resource
RidsOgcRp Resource
RidsNrrDorlLpl3-2 Resource
RidsNrrLASRohrer Resource
RidsNrrDeEvib Resource

ADAMS ACCESSION NO.: ML13042A348 *Memo Dated NRR-028

OFFICE	LPL3-2/PM	LPL3-2	LPL3-2/LA	DE/EVIB/BC	LPL3-2/BC
NAME	BMozafari	CFaria	SRohrer	AMcMurtray	JWiebe
DATE	2/14/13	2/7/13	2/14/13	1/15/13	2/ 14 /13

OFFICIAL RECORD COPY