



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

September 10, 2019

Mr. Bryan C. Hanson  
Senior Vice President  
Exelon Generation Company, LLC  
President and Chief Nuclear Officer  
Exelon Nuclear  
LaSalle County Station  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 – REQUEST FROM THE REQUIREMENTS OF THE ASME CODE RELATED TO PRESSURE ISOLATION VALVE TESTING FREQUENCY  
(EPID L-2019-LLR-0062)

Dear Mr. Hanson:

By letter dated June 28, 2019, Exelon Generation Company, LLC (EGC or licensee) submitted an alternative request to the U.S. Nuclear Regulatory Commission (NRC). The licensee requested an alternative test plan in lieu of 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 programs at LaSalle County Station (LSCS), Units 1 and 2, during the fourth 10-year IST program intervals.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(z)(1), the licensee requested to use proposed alternative RV-03 for testing certain pressure isolation valves on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed the subject request and concludes, and as set forth in the enclosed safety evaluation, that the proposed alternative described in request RV-03 provides an acceptable level of quality and safety for the components listed in Table 1 of this safety evaluation. Accordingly, the NRC staff concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(z)(1).

All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable.

Therefore, the NRC staff authorizes the proposed alternative RV-03 for the fourth 10-year IST interval at LCSC, Units 1 and 2, which began on October 12, 2017, and is currently scheduled to end on October 11, 2027.

If you have any questions, please contact the Project Manager Bhalchandra K. Vaidya at 301-415-3308.

Sincerely,

/RA/

Lisa M. Regner, Acting Branch Chief  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosure: Safety Evaluation

cc: ListServ



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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST RV-03

RELATED TO THE INSERVICE TESTING PROGRAM

FOURTH 10-YEAR INTERVAL

EXELON GENERATION COMPANY, LLC

LASALLE COUNTY STATION, UNITS 1 AND 2

DOCKET NOS. 50-373 AND 50-374

1.0 INTRODUCTION

By letter dated June 28, 2019, Agencywide Documents Access and Management System (ADAMS) Accession No. ML19179A125, Exelon Generation Company, LLC (EGC), the licensee, requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) for the IST programs at LaSalle County Station (LSCS), Units 1 and 2, during the fourth 10-year inservice testing (IST) program intervals.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(z)(1), the licensee requested to use proposed alternative RV-03 for testing certain pressure isolation valves on the basis that the alternative provides an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

Regulation in 10 CFR 50.55a(f), "Inservice Testing Requirements," 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 pursuant to paragraphs 10 CFR 50.55a(z)(1) or 10 CFR 50.55a(z)(2).

In proposing alternatives, a licensee must demonstrate that the proposed alternatives provide an acceptable level of quality and safety (10 CFR 50.55a(z)(1)) or compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety (10 CFR 50.55a(z)(2)).

### 3.0 TECHNICAL EVALUATION

#### 3.1 Applicable ASME OM Code

The licensee's request is an alternative test plan in lieu of certain IST requirements of the 2004 Edition through the 2006 Addenda of the ASME OM Code for the IST program at LSCS, Units 1 and 2, for the fourth interval which began on October 12, 2017, and is currently scheduled to end on October 11, 2027.

#### 3.2 Licensee's Relief Request RV-03

ASME OM Code Requirements:

- Section ISTC-3522 "Category C Check Valves" (a), states in part that "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."
- Section ISTC-3522 "Category C Check Valves" (c), states that "If exercising is not practicable during operation at power and cold shutdowns, it shall be performed during refueling outages."
- Section ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves," states that "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."
- Section ISTC-3630(a), "Frequency," states that "Tests shall be conducted at least once every 2 years."

Alternative testing is requested for the following valves:

**Table 1**

<b>Valve ID</b>	<b>Function</b>	<b>Class</b>	<b>Cat</b>
1(2)E21-F006	Low Pressure Core Spray (LPCS)	1	A/C
1(2)E21F005	LPCS	1	A
1(2)E22-F005	High Pressure Core Spray (HPCS)	1	A/C
1(2)E22-F004	HPCS	1	A
1(2)E12-F041A	Residual Heat Removal (RHR)	1	A/C
1(2)E12-F041B	RHR	1	A/C
1(2)E12-F041C	RHR	1	A/C
1(2)E12-F042A	RHR	1	A
1(2)E12-F042B	RHR	1	A
1(2)E12-F042C	RHR	1	A
1(2)E12-F050A	RHR	1	A/C
1(2)E12-F050B	RHR	1	A/C
1(2)E12-F053A	RHR	1	A
1(2)E12-F053B	RHR	1	A
1(2)E12-F009	RHR	1	A

1(2)E12-F008	RHR	1	A
1(2)E51-F066	Reactor Core Isolation Cooling (RCIC)	1	A/C
1(2)E51-F065	RCIC	1	A/C

The licensee's request states, in part:

Reason for Request

ISTC-3630 requires that leakage rate testing for PIVs be performed at least once every 2 years. Pressure Isolation Valves are not specifically included in the scope for performance-based testing as provided for in 10 CFR 50 Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Option B, "Performance-Based Requirements." These motor-operated and pressure isolation valves (PIVs) are, in some cases, containment isolation valves (CIVs), but are not within the Appendix J scope since the reactor shutdown cooling system valves are considered water-sealed.

The LSCS technical specification (TS) Section 5.5.13 contains a requirement to establish the leakage rate testing program in accordance with the guidelines contained in Nuclear Energy Institute (NEI) 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 2012.

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, NEI 94-01 describes the risk-informed basis for the extended test intervals under Option B. That justification shows that for CIVs, which have demonstrated good performance by the successful completion of two consecutive leakage rate tests over two consecutive cycles, may increase their test frequencies. Furthermore, it states that if the component does not fail within two operating 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 conclusion that "the risk impact associated with increasing [leak rate] test intervals, is negligible (i.e., less than 0.1 percent of total risk)."

The valves identified in this relief request are all in water applications. Testing is currently performed with water pressurized to pressures between 950 pounds per square inch gauge (psig) and 1050 psig as required by TS surveillance requirement (SR) 3.4.6.1. This relief request is intended to provide for a performance-based scheduling of PIV tests at LSCS. The reason for requesting this relief is to allow for divisional outages to reduce the required resources and dose required for testing.

NUREG-0933, "Resolution of Generic Safety Issues," Issue 105, "Interfacing Systems LOCA at LWRs," discussed the need for PIV leak rate testing based primarily on three pre-1985 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 reposition from open to closed. For check valves, functional testing is accomplished in accordance with ASME OM Code Section ISTC-3520, "Exercising Requirements," and Section ISTC-3522, "Category C Check Valves." For power-operated valves, testing is full stroke testing in accordance with the ASME OM Code to ensure their functional capabilities. For the Category C check valves, the closed functional testing is credited to the PIV leak rate test. Performance of the separate 2-year PIV leak rate testing provides assurance that the Category C PIV check valves are capable of closing but otherwise does not contribute any additional assurance of functional capability.

#### Proposed Alternative

LSCS proposes to perform PIV testing at intervals ranging from every refueling outage to every third refueling outage. 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. A conservative control will be established such that if any valve fails the PIV test, the test interval for the test will be reduced consistent with Appendix J, Option B, requirements until good performance is reestablished. The primary basis for this request is the historically good performance of the PIVs.

The functional capability of the check valves is demonstrated by the open and close exercise test. The open testing is separate and distinct from PIV testing and is performed at a refuel outage frequency in accordance with Section ISTC-3522 of the ASME OM Code. The closed testing takes credit for the PIV leak rate testing and will be on the same frequency as the PIV leak rate testing. The fact that the PIVs have had good historical performance shows that the Category C check valves are exhibiting the required obturator movement to close and remain closed .

Note that NEI 94-01 is not the sole basis for this relief request, given that NEI 94-01 does not address seat leakage testing with water. This document was cited as an approach that was similar to the requested alternative method.

If the proposed alternative is authorized, and the valves exhibit good performance, there is the possibility that the PIV test frequency could be extended so that the test would not be required each refueling outage.

Testing history of the LSCS PIVs for past three outages on each unit has shown that 1E12-F050A and 2E12-F050A failed their leakage test requiring maintenance to correct excessive leakage. All other PIVs had satisfactory leakage of less than 1 gallon per minute.

The extension of test frequencies will be consistent with the guidance provided for Appendix J, Type C, leak rate tests as detailed in NEI 94-01, Revision 3-A, paragraph 10.2.3.2, "Extended Test Interval" (as approved by letter dated June 8, 2012 (ADAMS Accession No. ML121030286)), states:

Test intervals for Type 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 passing tests used to determine performance shall be 24 months or the nominal test interval (e.g., refueling cycle) for the valve prior to implementing Option B to Appendix J. 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 75 months. Test intervals for Type C valves should be determined by the licensee in accordance with Section 11.0.

Additional basis for this relief request is provided below:

- Separate functional testing of motor-operated valve and check valve PIVs per the ASME OM Code will continue.
- The low likelihood of valve mispositioning during power operations (e.g., procedures, interlocks).
- Relief valves in the low pressure (LP) piping - these relief valves may not provide inter-system loss-of-coolant accident (ISLOCA) mitigation for inadvertent PIV mispositioning but their relief capacity can accommodate conservative PIV seat leakage rates.
- Alarms that identify high pressure (HP) to LP leakage - Operators are highly trained to recognize symptoms of the presence of a ISLOCA and to take appropriate actions.

Duration of proposed Alternative:

Relief is requested for the fourth 10-year IST interval for LSCS, Units 1 and 2, which began on October 12, 2017, and is currently scheduled to end October 11, 2027.

3.3 NRC Staff Evaluation

The licensee has proposed an alternative test in lieu of the requirements found in the 2004 Edition of the ASME OM Code Section ISTC-3630(a) for 18 PIVs noted in Table 1 of this safety evaluation (SE). Specifically, the licensee proposes to functionally test and verify the leakage rate of these PIVs using 10 CFR 50 Appendix J, Option B, performance-based schedule. Valves would initially be tested at the required interval schedule which is every refueling outage or 2 years as specified by ASME OM Code Section ISTC-3630(a). In transitioning to an Appendix J, Option B, schedule as detailed in NEI 94-01, Revision 3-A, the licensee proposes to perform PIV testing at intervals (frequencies) ranging from every refueling outage up to every third refueling outage. Valves that have demonstrated good performance for two consecutive cycles may have their test interval extended up to 75 months. Any PIV leakage test failure would require the component to return to the initial interval of every 30 months until good performance can again be established.

The PIVs are defined as two valves in series within the reactor coolant pressure boundary which separate the HP reactor coolant system from an attached lower 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 ISLOCA research program. The purpose of NUREG/CR-5928 was to quantify the risk associated with an ISLOCA event. NUREG/CR-5928 analyzed boiling-water

reactor (BWR) and pressurized-water reactor designs. The conclusion of the analysis resulted in ISLOCA not being a risk concern for the LSCS, Units 1 and 2, BWR design.

Regulation 10 CFR 50, Appendix J, Option B, is a performance-based leakage test program. Guidance for implementation of acceptable leakage rate test methods, procedures, and analyses is provided in Regulatory Guide (RG) 1.163, "Performance-based Containment Leak Test Program" (ADAMS Accession No. ML003740058). RG 1.163 endorses NEI Topical Report 94-01, Revision 0, "Industry Guideline for Implementing Performance-based Option of 10 CFR 50, Appendix J," dated July 26, 1995, with the limitation that Type C components test interval cannot extend greater than 60 months. The current version of NEI 94-01 is Revision 3-A which allows Type C containment isolation valves test intervals to be extended to 75 months with a permissible extension for nonroutine emergent conditions of 9 months (84 months total). By letter dated June 8, 2012, the NRC staff found the guidance in NEI 94-01, Revision 3-A, to be acceptable (ADAMS Accession Nos. ML121030286 and ML12226A546), with the following conditions:

- (1) Extended interval for Type C LLRTs may be increased to 75 months with the requirement that a licensee's post outage report include the margin between Type B and Type C leakage rate summation and its regulatory limit. In addition, a corrective action plan shall be developed to restore the margin to an acceptable level. Extensions of up to 9 months (total maximum interval of 84 months for Type C tests) are permissible only for nonroutine emergent conditions. This provision (a 9-month extension) does not apply to valves that are restricted and/or limited to 30 month intervals in Section 10.2 (such as BWR main steam isolation valves or to valves held to the base interval (30 months) due to unsatisfactory LLRT performance).
- (2) When routinely scheduling any local leak rate test (LLRT) valve interval beyond 60 months and up to 75 months, the primary containment leakage rate testing program trending or monitoring must include an estimate of the amount of understatement in the Types B and C total and must be included in a licensee's post-outage report. The report must include the reasoning and determination of the acceptability of the extension, demonstrating that the LLRT totals calculated represent the actual leakage potential of the penetrations.

The 18 PIVs are currently being leak tested every refueling outage or 2 years. The valves have a history of good performance. In addition, performance of the leakage test of the 18 PIVs places a burden on test personnel being exposed to radiation. Extending the leakage test interval based on good performance and the low risk factor as noted in NUREG/CR-5928 is a logical progression to a performance-based program. Based on the above considerations, the NRC staff finds the alternative request to test 18 PIVs per the guidance of NEI 94-01, Revision 3A, provides an acceptable level of quality and safety for the components listed in Table 1 of this SE.

The licensee is authorized to implement a performance-based program for the 18 PIVs at LSCS, Units 1 and 2. The performance-based program interval shall not exceed three refueling outages or 75 months. Nonroutine emergent conditions may extend the program interval to 9 months.

#### 4.0 CONCLUSION

As set forth above, the NRC staff finds that the proposed alternative described in request RV-03 provides an acceptable level of quality and safety for the components listed in Table 1 of this SE. Accordingly, the NRC staff concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(z)(1) and is in compliance with the ASME Code's requirements.

All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable.

Therefore, the NRC staff authorizes the proposed alternative RV-03 for the fourth 10-year IST interval at LCSC, Units 1 and 2, which began on October 12, 2017, and is currently scheduled to end on October 11, 2027.

Principle Contributor: Michael Farnan, NRR

Date of issuance: September 10, 2019

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 – REQUEST FROM THE REQUIREMENTS OF THE ASME CODE RELATED TO PRESSURE ISOLATION VALVE TESTING FREQUENCY  
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