Exelon Generation®

200 Exelon Way
Kennett Square, PA 19348

www.exeloncorp.com

10 CFR 50.55a

November 3, 2016

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: Submittal of Relief Request Associated with the Third Inservice Testing Interval – Pressure Isolation Valve Leakage Testing Frequency

In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), Exelon Generation Company, LLC (EGC) hereby requests NRC approval of the attached relief request associated with the third inservice testing (IST) interval for Limerick Generating Station (LGS), Units 1 and 2. The third interval of the LGS, Units 1 and 2, IST Program began on February 18, 2010, and complies with the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code), 2004 Edition, no addenda.

Proposed Relief Request No. GVRR-8 requests authorization to perform pressure isolation valve leakage testing at frequencies consistent with 10 CFR 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Option B, "Performance-Based Requirements." The basis for this request is provided in the Attachment.

EGC requests approval by April 3, 2017 to support the LGS Unit 2 refueling outage, which is scheduled to start April 17, 2017.

There are no regulatory commitments contained in this submittal.

If you have any questions or require additional information, please contact Stephanie J. Hanson at (610) 765-5143.

Respectfully,

D. P. Helker

David P. Helker
Manager - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Attachment: 10 CFR 50.55a Relief Request No. GVRR-8

cc: USNRC Region I, Regional Administrator
USNRC Senior Resident Inspector, LGS
USNRC Project Manager, LGS
R. R. Janati, Pennsylvania Bureau of Radiation Protection

ATTACHMENT

LIMERICK GENERATING STATION
UNITS 1 AND 2

PROPOSED RELIEF REQUEST ASSOCIATED WITH THE THIRD INSERVICE TESTING INTERVAL – PRESSURE ISOLATION VALVE LEAKAGE TESTING FREQUENCY

RELIEF REQUEST GVRR-8

10 CFR 50.55a Request Number GVRR-8
Proposed Alternative In Accordance with 10 CFR 50.55a(z)(1)
Alternative Provides Acceptable Level of Quality and Safety
(Page 1 of 9)

1. ASME Code Component(s) Affected

Component	System	Code Class	Category
HV-51-1(2)F041A-D	RHR	1	A/C
HV-51-1(2)F017A-D	RHR	1	A
HV-51-1(2)42A-D	RHR	1	A
HV-51-1(2)F050A/B	RHR	1	A/C
HV-51-1(2)F015A/B	RHR	1	A
HV-51-1(2)51A/B	RHR	1	A
51-1(2)200A/B	RHR	1	A/C
HV-51-1(2)F008	RHR	1	A
HV-51-1(2)F009	RHR	1	A
HV-52-1(2)F005	CS	1	A
HV-52-1(2)F006A/B	CS	1	A/C
HV-52-1(2)F039A/B	CS	1	A
HV-52-1(2)08	CS	1	A/C

2. Applicable Code Edition and Addenda

ASME OM Code-2004 Edition, no addenda.

3. Applicable Code Requirement

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.

ISTC-3630(a), "Frequency," requires licensees to conduct these leakage rate tests at least once every two (2) years.

4. Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and standards", paragraph (z)(1), relief is requested from the requirement of ASME OM Code ISTC-3630(a). The basis of the relief request is that the proposed alternative would provide an acceptable level of quality and safety.

ISTC-3630 requires that leakage rate testing for Pressure Isolation Valves (PIVs) be performed at least once every two years. PIVs 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, air-operated and check valve PIVs are all Containment Isolation Valves (CIVs), but are not all tested per Appendix J based on a justification of the penetration being a single CIV within a Closed Loop.

Limerick Generating Station (LGS) Technical Specification 6.8.4.g, "Primary Containment Leakage Rate Testing Program," states, in part:

> A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leakage Test program," dated September 1995. . .

NRC Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," endorses NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," Revision 0, dated July 26, 1995, as an acceptable method for complying with the provisions of Option B to 10 CFR 50, Appendix J, with certain exceptions. Sections 10.1 and 11.3 of NEI 94-01 allow an extension of up to 25 percent of the test interval (not to exceed 15 months).

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 passing their leak rate tests for two consecutive cycles, further failures would 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 (less than 0.1 percent of total risk)."

The valves identified in this relief request are all in water applications. Testing is performed with water pressurized to the functional maximum pressure differential. This relief request is intended to provide for a performance-based scheduling of PIV tests at LGS. The reason for requesting this relief is dose reduction to comport with NRC and industry As-Low-As Reasonably Achievable (ALARA) radiation dose principles. The review of historical data identified that PIV testing each refueling outage results in a total personnel dose of approximately 700 millirem. The proposed extended test interval (assuming all PIVs are on extended frequency) would provide for a savings of approximately 1.4 rem over three refuel outages.

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 historical failures of applicable valves industry-wide. These failures all involved human errors in either operations or maintenance. None of these failures involved in-service 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, full stroke testing is performed in accordance with the ASME OM Code Section ISTC-5100, "Power Operated Valves (POVs)" to ensure

their functional capabilities. Performance of the separate two-year PIV leak rate testing does not contribute any additional assurance of functional capability; it only determines the seat tightness of the closed valves.

5. Proposed Alternative and Basis for Use

LGS 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. For those valves that are also Appendix J leak tested, a conservative control will be established such that if any valve fails either the Appendix J or PIV test, the test interval for both tests will be reduced consistent with Appendix J, Option B requirements until good performance is reestablished.

The primary basis for this relief request is the historically good performance of the PIVs with the exceptions of the HV-51-2F050A/B check valves. HV-51-2F050A/B are the shutdown cooling injection header check valves. Several modifications have been implemented to improve the leak tightness of these valves. Based on the test data presented in Table 2, certain valves demonstrating unsatisfactory performance will remain on a two year test frequency until satisfactory performance is achieved.

The functional capability of the active check valves is demonstrated by the opening and closing of the valves each refueling outage. These tests are separate and distinct from the PIV seat leakage testing and are performed in accordance with ASME OM Code, Section ISTC-3522.

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 similar to the requested alternative method.

Tables 1 through 4 below present historical test data that documents PIV performance for the Residual Heat Removal (RHR) and Core Spray (CS) systems.

Table 1: Historical Leak Rate test Performance for RHR MOV PIVs

Component	Date of Test	Measured Value (gpm)	Required Action Limit (gpm)	Comments
HV-51-1F008	03/29/2016	0.07	1	
	03/24/2014	0.01	1	
	03/01/2012	0.09	1	
HV-51-1F009	03/29/2016	0.07	1	
	03/24/2014	0.01	1	
	03/01/2012	0.08	1	
HV-51-1F015A	03/25/2016	0.01	1	
	03/27/2014	0.01	1	

Table 1: Historical Leak Rate test Performance for RHR MOV PIVs

Component	Date of Test	Measured Value (gpm)	Required Action Limit (gpm)	Comments
	03/01/2012	0.02	1	
HV-51-1F015B	04/03/2016	0.1	1	
	03/18/2014	0.0	1	
	02/23/2012	0.012	1	
HV-51-1F017A	03/22/2016	0.01	1	
	03/28/2014	0.0	1	
	03/02/2012	0.0	1	
HV-51-1F017B	04/04/2016	0.0	1	
	03/19/2014	0.0	1	
	02/22/2012	0.06	1	
HV-51-1F017C	03/25/2016	0.0	1	
	03/29/2014	0.01	1	
	03/03/2012	0.0	1	
HV-51-1F017D	03/31/2016	0.0	1	
	03/18/2014	0.0	1	
	02/22/2012	0.0	1	
HV-51-2F008	04/25/2015	0.0	1	
	03/31/2013	0.0	1	
	04/09/2011	0.04	1	
HV-51-2F009	04/25/2015	0.0	1	
	03/31/2013	0.0	1	
	04/09/2011	0.0	1	
HV-51-2F015A	04/22/2015	0.0	1	
	03/29/2013	0.0	1	
	04/01/2011	0.0	1	
HV-51-2F015B	04/16/2015	0.02	1	
	04/05/2013	0.0	1	
	04/11/2011	0.0	1	
HV-51-2F017A	04/26/2015	0.0	1	
	03/28/2013	0.0	1	
	03/30/2011	0.0	1	

Table 1: Historical Leak Rate test Performance for RHR MOV PIVs

Component	Date of Test	Measured Value (gpm)	Required Action Limit (gpm)	Comments
HV-51-2F017B	04/17/2015	0.0	1	
	04/06/2013	0.0	1	
	04/11/2011	0.0	1	
HV-51-2F017C	04/27/2015	0.03	1	
	03/30/2013	0.06	1	
	03/31/2011	0.06	1	
HV-51-2F017D	04/18/2015	0.01	1	
	04/04/2013	0.059	1	
	04/13/2011	0.02	1	

Table 2: Historical Leak Rate test Performance for RHR Check Valve/AOV PIVs

Component	Date of Test	Measured Value (gpm)	Required Action Limit (gpm)	Comments
HV-51-1F050A HV-51-151A	03/25/2016	0.2	2	
	03/27/2014	0.4	2	
	03/01/2012	0.3	2	
HV-51-1F050B HV-51-151B	04/03/2016	0.6	2	
	03/18/2014	0.5	2	
	02/23/2012	0.38	2	
51-1200A	03/25/2016	0.7	1	
	03/27/2014	0.1	1	
	03/01/2012	0.23	1	
51-1200B	04/03/2016	0.2	1	
	03/18/2014	0.05	1	
	02/23/2012	0.32	1	
HV-51-1F041A HV-51-142A	03/22/2016	Unsat	2	Excessive Leakage
	03/28/2014	0.17	2	
	03/02/2012	0.14	2	
HV-51-1F041B HV-51-142B	04/04/2016	0.08	2	
	03/19/2014	0.05	2	
	02/22/2012	0.06	2	
HV-51-1F041C HV-51-142C	03/25/2016	0.4	2	
	03/29/2014	0.236	2	

Table 2: Historical Leak Rate test Performance for RHR Check Valve/AOV PIVs

Component	Date of Test	Measured Value (gpm)	Required Action Limit (gpm)	Comments
	03/03/2012	0.2	2	
HV-51-1F041D HV-51-142D	03/31/2016	0.2	2	
	03/18/2014	0.1	2	
	02/22/2012	0.07	2	
HV-51-2F050A HV-51-251A	04/22/2015	Unsat	2	Off scale
	03/29/2013	0.0	2	
	04/01/2011	0.0	2	
HV-51-2F050B HV-51-251B	04/16/2015	Unsat	2	Off scale
	04/05/2013	Unsat	2	Unable to pressurize
	04/11/2011	Unsat	2	Off scale
51-2200A	04/22/2015	0.0	1	
	03/29/2013	0.0	1	
	04/01/2011	0.0	1	
51-2200B	04/16/2015	0.0	1	
	04/05/2013	0.0	1	
	04/11/2011	0.0	1	
HV-51-2F041A HV-51-242A	04/26/2015	0.0	2	
	03/28/2013	0.0	2	
	03/30/2011	0.01	2	
HV-51-2F041B HV-51-242B	04/17/2015	0.0	2	
	04/06/2013	0.0	2	
	04/11/2011	0.0	2	
HV-51-2F041C HV-51-242C	04/27/2015	0.06	2	
	03/30/2013	0.06	2	
	03/31/2011	0.1	2	
HV-51-2F041D HV-51-242D	04/18/2015	Unsat	2	Off scale
	04/04/2013	0.0	2	
	04/13/2011	0.02	2	

Table 3: Historical Leak Rate test Performance for Core Spray MOV PIVs

Component	Date of Test	Measured Value (gpm)	Required Action Limit (gpm)	Comments
HV-52-1F005	03/23/2016	0.0	1	
	03/30/2014	0.0	1	
	03/04/2012	0.0	1	
HV-52-2F005	04/24/2015	0.0	1	
	03/27/2013	0.035	1	
	04/01/2011	0.0	1	

Table 4: Historical Leak Rate test Performance for Core Spray Check Valve/AOV PIVs

Component	Date of Test	Measured Value (gpm)	Required Action Limit (gpm)	Comments
HV-52-1F006A HV-52-1F039A	03/23/2016	0.06	2	
	03/30/2014	0.1	2	
	03/04/2012	0.1	2	
HV-52-1F006B HV-52-1F039B	04/05/2016	0.0	2	
	03/15/2014	0.118	2	
	02/23/2012	0.06	2	
HV-52-108	04/05/2016	0.1	1	
	03/15/2014	0.0	1	
	02/23/2012	0.0	1	
HV-52-2F006A HV-52-2F039A	04/24/2015	0.1	2	
	03/27/2013	0.035	2	
	04/01/2011	0.1	2	
HV-52-2F006B HV-52-2F039B	04/15/2015	0.0	2	
	04/08/2013	0.05	2	
	04/10/2011	0.09	2	
HV-52-208	04/15/2015	0.1	1	
	04/08/2013	0.0	1	
	04/10/2011	0.0	1	

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, Paragraph 10.2.3.2, "Extended Test Interval," which 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 120 months[1]. Test intervals for Type C valves are determined in accordance with NEI 94-01, Section 11.0, "Basis for Performance and Risk-Based Testing Frequencies for Type A, Type B, and Type C Tests.""

Additional basis for this relief request is provided below:

- Separate functional testing of motor-operated valve (MOV) PIVs, air-operated (AOV) PIVs and Check valve PIVs per ASME OM Code.
- Low likelihood of valve mis-positioning 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 a present ISLOCA and to take appropriate actions.

6. Duration of Proposed Alternative

The proposed alternative will be utilized for the remainder of the third 120-month interval which is currently scheduled to end on January 7, 2020.

7. Precedents

1. A similar relief request was approved for Peach Bottom Atomic Power Station for the Fourth Inservice Testing Interval in a letter from D. A. Broaddus (NRC) to B. C. Hanson (EGC), Peach Bottom Atomic Power Station, Units 2 and 3 Safety Evaluation of Relief Request GVRR-2 regarding the Fourth 10-Year Interval of the Inservice Testing Program (CAC NOS. MF7630 AND MF7631) dated September 21, 2016 (ADAMS Accession No. ML16235A340).

2. A similar relief request was approved for Fermi Power Station for the Third 120-month Interval in a letter from R. J. Pascarelli (NRC) to J. M. Davis (Detroit Edison), "Fermi 2 Evaluation of In-Service Testing Program Relief Requests VRR-011, VRR-012, and VRR-013 (TAC Nos. ME2558, ME2557, and ME2556)," dated September 28, 2010 (ADAMS Accession No. ML102360570).

3. A similar relief request was approved for Quad Cities Nuclear Power Station, Units 1 and 2, for the Fifth 120-month IST interval in a letter from J. Wiebe (NRC) to M. J. Pacilio (EGC), "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, ME7987, ME7988, ME7989, ME7990, ME7991, ME7992, ME7993, ME7994, ME7995)," dated February 14, 2013 (ADAMS Accession No.ML13042A348).

[1] Note that interval extensions would not go beyond three refueling outages.

4. A similar relief request was approved for Dresden Nuclear Power Station, Units 2 and 3, for the Fifth 120-month IST interval in a letter from T. L. Tate (NRC) to B. Hanson (EGC), "Dresden Nuclear Power Station, Units 2 and 3 – Relief Request to Use An Alternative from the American Society of Mechanical Engineers Code Requirements (CAC Nos. MF5089 AND MF5090) dated October 27, 2015 (ADAMS Accession No. ML15174A303).