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

February 7, 2017

Mr. Bryan C. Hanson
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 – PROPOSED RELIEF REQUEST GVRR-8 REGARDING INSERVICE TESTING PROGRAM THIRD 10-YEAR INTERVAL (CAC NOS. MF8787 AND MF8788)

Dear Mr. Hanson:

By letter dated November 3, 2016 (Agencywide Documents Access and Management System Accession No. ML16308A329), Exelon Generation Company, LLC (the licensee) submitted proposed Relief Request GVRR-8 for the Limerick Generating Station (LGS), Units 1 and 2. The licensee requested an alternative test plan in lieu of certain inservice testing (IST) requirements of the 2004 Edition of the American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants for the IST programs.

Specifically, the request proposes to perform pressure isolation valve (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 containment isolation valve process under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 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 request applies to the third 10-year IST interval at LGS, Units 1 and 2, which began on February 18, 2010, and ends on January 7, 2020.

The U.S. Nuclear Regulatory Commission staff has completed its review of Relief Request GVRR-8 and has determined that the proposed alternative provides an acceptable level of quality and safety. Consequently, pursuant to 10 CFR 50.55a(z)(1), the alternative is authorized to implement a performance-based program for the 56 PIVs at LGS, Units 1 and 2. The performance-based program interval shall not exceed three refueling outages, or 75 months. Non-routine emergent conditions may extend the program interval 9 months.

If you have any questions, please contact the Project Manager, Dr. V. Sreenivas, at 301-415-2597 or by email to V.Sreenivas@nrc.gov.

Sincerely,

Stephen S. Koenick, Acting Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST GVRR-8

REGARDING INSERVICE TESTING PROGRAM THIRD 10-YEAR INTERVAL

EXELON GENERATION COMPANY, LLC

LIMERICK GENERATING STATION, UNITS 1 AND 2

DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By letter dated November 3, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16308A329), Exelon Generation Company, LLC (the licensee) submitted proposed Relief Request GVRR-8 to the U.S. Nuclear Regulatory Commission (NRC or the Commission). The licensee requested an alternative test plan in lieu of certain inservice testing (IST) requirements of the 2004 Edition of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) for the IST programs at the Limerick Generating Station (LGS), Units 1 and 2, during the third 10-year IST program interval, which began on February 18, 2010, and is currently scheduled to end on January 7, 2020.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), the licensee requested to use proposed Relief Request GVRR-8 on the basis that the alternative provides an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

The 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, incorporated by reference in the regulations. Exceptions are allowed where alternatives have been authorized by the NRC pursuant to 10 CFR 50.55a(z)(1) and 10 CFR 50.55a(z)(2).

In proposing alternative requests for relief, the licensee must demonstrate that (1) the proposed alternatives provide an acceptable level of quality and safety (10 CFR 50.55a(z)(1)) or (2) 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)). Section 50.55a, "Codes and standards," allows the NRC to authorize alternatives from the ASME OM Code requirements upon making necessary findings.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request, and the Commission to authorize, the alternative requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Relief Request GVRR-8

ASME OM Code Requirements

ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valve," 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 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 that, "Tests shall be conducted at least once every 2 years."

Alternative testing is requested for the following valves:

Table 1

Valve ID	System	Category	Class
HV-51-1F041A	Residual Heat Removal (RHR)	A/C	1
HV-51-1F041B	RHR	A/C	1
HV-51-1F041C	RHR	A/C	1
HV-51-1F041D	RHR	A/C	1
HV-51-1F017A	RHR	A	1
HV-51-1F017B	RHR	A	1
HV-51-1F017C	RHR	A	1
HV-51-1F017D	RHR	A	1
HV-51-142A	RHR	A	1
HV-51-142B	RHR	A	1
HV-51-142C	RHR	A	1
HV-51-142D	RHR	A	1
HV-51-1F050A	RHR	A/C	1
HV-51-1F050B	RHR	A/C	1
HV-51-1F015A	RHR	A	1
HV-51-1F015B	RHR	A	1
HV-51-151A	RHR	A	1
HV-51-151B	RHR	A	1
51-1200A	RHR	A/C	1
51-1200B	RHR	A/C	1
HV-51-1F008	RHR	A	1
HV-51-1F009	RHR	A	1
HV-52-1F005	Core Spray (CS)	A	1

Table 1			
Valve ID	**System**	**Category**	**Class**
HV-52-1F006A	CS	A/C	1
HV-52-1F006B	CS	A/C	1
HV-52-1F039A	CS	A	1
HV-52-1F039B	CS	A	1
HV-52-108	CS	A/C	1
HV-51-2F041A	RHR	A/C	1
HV-51-2F041B	RHR	A/C	1
HV-51-2F041C	RHR	A/C	1
HV-51-2F041D	RHR	A/C	1
HV-51-2F017A	RHR	A	1
HV-51-2F017B	RHR	A	1
HV-51-2F017C	RHR	A	1
HV-51-2F017D	RHR	A	1
HV-51-242A	RHR	A	1
HV-51-242B	RHR	A	1
HV-51-242C	RHR	A	1
HV-51-242D	RHR	A	1
HV-51-2F050A	RHR	A/C	1
HV-51-2F050B	RHR	A/C	1
HV-51-2F015A	RHR	A	1
HV-51-2F015B	RHR	A	1
HV-51-251A	RHR	A	1
HV-51-251B	RHR	A	1
51-2200A	RHR	A/C	1
51-2200B	RHR	A/C	1
HV-51-2F008	RHR	A	1
HV-51-2F009	RHR	A	1
HV-52-2F005	CS	A	1
HV-52-2F006A	CS	A/C	1
HV-52-2F006B	CS	A/C	1
HV-52-2F039A	CS	A	1
HV-52-2F039B	CS	A	1
HV-52-208	CS	A/C	1

Proposed Alternative

LGS proposes to perform pressure isolation valve (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 containment isolation valve (CIV) process under 10 CFR Part 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.

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 recent historical data identified that PIV testing each refueling outage (RFO) 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 roentgen equivalent man (rem) over three refuel outages.

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.

3.2 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 56 PIVs. Specifically, the licensee proposes to functionally test and verify the leakage rate of 56 PIVs using 10 CFR Part 50, Appendix J, Option B, performance-based schedule. Valves would initially be tested at the required interval schedule, which is currently every RFO, or 2 years, as specified by ASME OM Code, Section ISTC-3630(a). Valves that have demonstrated good performance for two consecutive cycles may have their test interval extended to every three RFOs, not to exceed 6 years. Any PIV leakage test failure would require the component to return to the initial interval of every RFO, or 2 years, until good performance can again be established.

PIVs are defined as two valves in series within the reactor coolant pressure boundary, which separate the high pressure reactor coolant system from an attached lower pressure 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 interfacing-system loss-of-coolant accident (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 BWR design. LGS, Units 1 and 2, are both a BWR design.

Option B of Appendix J to 10 CFR Part 50 is a performance-based leakage test program. Guidance for implementation of acceptable leakage rate test methods, procedures, and analyses is provided in RG 1.163, which endorses NEI 94-01, with the limitation that Type C component test intervals cannot extend greater than 60 months. The current version of NEI 94-01 is Revision 3-A (ADAMS Accession Nos. ML121030286 and ML12226A546), which allows Type C containment isolation valve test intervals to be extended to 75 months, with a permissible extension for non-routine emergent conditions of 9 months (84 months total). The NRC staff finds the guidance in NEI 94-01, Revision 3-A, is acceptable, with the following conditions:

(1) Extended interval for Type C local leak-rate tests (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 non-routine emergent conditions. This provision (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 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 Type B and Type 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 PIVs identified in Table 1 above have maintained a history of good performance with the exception of certain valves. Based on the test data presented in Table 2 of this application (ADAMS Accession No. ML16308A329), certain valves demonstrating unsatisfactory performance will remain on a two year test frequency until satisfactory performance is achieved. These 56 PIVs are currently being leak tested every RFO or 2 years. In addition, the licensee routinely tests the PIVs in accordance with the ASME OM Code to ensure their functional capabilities. By extending the test interval would provide for a savings of approximately 1.4 rem over three RFOs. The NRC staff finds that 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. In summary, the alternative testing plan provides an acceptable level of quality and safety.

With low level of risk associated with ISLOCA and Option B of Appendix J to 10 CFR Part 50, the NRC staff concludes that they provide an acceptable level of quality and safety for testing valves performing the functions considered in this proposed alternative. Additionally, the staff notes that the licensee identified an ALARA hardship associated with the current test interval. While hardship is not a consideration in authorizing an alternative under 10 CFR 50.55a(z)(1), and is not the basis for this authorization, the existence of this hardship is noted by the NRC staff.

The licensee is authorized to implement a performance-based program for the 56 PIVs at LGS, Units 1 and 2. The performance-based program interval shall not exceed three RFOs, or 75 months. Non-routine emergent conditions may extend the program interval 9 months.

4.0 CONCLUSION

As set forth above, the NRC staff finds that the proposed alternative described in Relief Request GVRR-8 provides an acceptable level of quality and safety for components listed in Table 1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, on the basis of the above determinations, the NRC staff authorizes the proposed alternative in Relief Request GVRR-8 for the remainder of the third IST interval at LGS, Units 1 and 2, currently scheduled to end on January 7, 2020.

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

Principal Contributor: M. Farnan

Date: February 7, 2017

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 – PROPOSED RELIEF REQUEST GVRR-8 REGARDING INSERVICE TESTING PROGRAM THIRD 10-YEAR INTERVAL (CAC NOS. MF8787 AND MF8788) DATED FEBRUARY 7, 2017

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