

April 27, 2016

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

Peach Bottom Atomic Power Station, Units 2 and 3  
Renewed Facility Operating License Nos. DPR-44 and DPR-56  
NRC Docket Nos. 50-277 and 50-278

Subject: Submittal of Relief Request Associated with the Fourth 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 fourth inservice testing (IST) interval for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The fourth interval of the PBAPS, Units 2 and 3, IST Program began on August 15, 2008, and complies with the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code), 2001 Edition with addenda through Omb-2003.

Proposed Relief Request No. GVRR-2 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.

We are requesting your review and approval by October 3, 2016, to support the PBAPS Unit 2 refueling outage which is scheduled to start October 24, 2016.

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,



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

Attachment: 10 CFR 50.55a Relief Request No. GVRR-2

U.S. Nuclear Regulatory Commission  
Peach Bottom Atomic Power Station, Units 2 and 3  
Proposed Relief Request Associated with  
Fourth Inservice Testing Interval – PIV Testing  
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cc: USNRC Region I, Regional Administrator  
USNRC Senior Resident Inspector, PBAPS  
USNRC Project Manager, PBAPS  
R. R. Janati, Bureau of Radiation Protection  
S. T. Gray, State of Maryland

**ATTACHMENT**

**PEACH BOTTOM ATOMIC POWER STATION  
UNITS 2 AND 3**

**PROPOSED RELIEF REQUEST ASSOCIATED WITH THE  
FOURTH INSERVICE TESTING INTERVAL – PRESSURE ISOLVATION VALVE  
LEAKAGE TESTING FREQUENCY**

**RELIEF REQUEST GVRR-2**

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**10 CFR 50.55a Request Number GVRR-2**  
**Proposed Alternative In Accordance with 10 CFR 50.55a(z)(1)**  
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**1. ASME Code Component(s) Affected**

<b><u>Component Number</u></b>	<b><u>System</u></b>	<b><u>Code Class</u></b>	<b><u>Category</u></b>
MO-2(3)-10-17	RHR	1	A
MO-2(3)-10-18	RHR	1	A
MO-2(3)-10-25A	RHR	1	A
MO-2(3)-10-25B	RHR	1	A
AO-2(3)-10-46A	RHR	1	A/C
AO-2(3)-10-46B	RHR	1	A/C
HV-2-10-23451A/B	RHR	1	A
HV-3-10-33451A/B	RHR	1	A
MO-2(3)-14-12A	CS	1	A
MO-2(3)-14-12B	CS	1	A
AO-2(3)-14-13A	CS	1	A/C
AO-2(3)-14-13B	CS	1	A/C
HV-2-14-29046A/B	CS	1	A
HV-3-14-39046A/B	CS	1	A

**2. Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 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 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 and check valve PIVs are, in some cases, Containment Isolation Valves (CIVs), but are not within the Appendix J scope since the

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Residual Heat Removal (RHR) valves are considered water-sealed and the Core Spray (CS) system is not exposed to containment atmosphere.

Peach Bottom Atomic Power Station (PBAPS) Technical Specification 5.5.12, "Primary Containment Leakage Rate Testing Program," states, in part:

A program shall be established to implement the leakage 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 Leak-Testing 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 50, Appendix J," Revision 3, dated July 2012, 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 9 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 (i.e., 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 pressures lower than function maximum pressure differential; however, the observed leakage is adjusted to the function maximum pressure differential value in accordance with ISTC 3630(b)(4). This relief request is intended to provide for a performance-based scheduling of PIV tests at PBAPS. 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 nominal fuel cycle length at PBAPS Units 2 and 3 is 24 months. However, since refueling outages may be scheduled slightly beyond 24 months, a 4-1/2 year period is used to provide a bounding timeframe to encompass two refueling outages. The review of recent historical data identified that PIV testing each refueling outage results in a total personnel dose of approximately 550 millirem assuming all of the PIVs remain classified as good performers. The proposed extended test intervals would provide for a savings of approximately 1.1 rem over a 4-1/2 year period.

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-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

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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. 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**

PBAPS 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 either 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.

The functional capability of the check valves is demonstrated by the opening and closing of the valves each refueling outage using an external air actuator, which is directly coupled to the valve shaft and disc. This test is separate and distinct from the PIV testing and is performed at a Cold Shutdown frequency 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.

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.

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

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**Table 1: Historical Leak Rate Test Performance for RHR MOV PIVs**

<b>Component</b>	<b>Date of Test</b>	<b>Measured Value (gpm)</b>	<b>Required Action Limit (gpm)</b>	<b>Comments</b>
MO-2-10-17	10/5/2010	<1	5	SDC Suction Outboard
MO-2-10-17	10/18/2012	<1	5	
MO-2-10-17	11/27/2014	<1	5	
MO-2-10-18	10/5/2010	<1	5	SDC Suction Inboard
MO-2-10-18	10/18/2012	<1	5	
MO-2-10-18	11/27/2014	<1	5	
MO-2-10-25A	9/16/2010	<1	5	"A" Inboard Discharge
MO-2-10-25A	9/16/2012	<1	5	
MO-2-10-25A	10/22/2014	<1	5	
MO-2-10-25B	9/25/2010	<1	5	"B" Inboard Discharge
MO-2-10-25B	9/28/2012	<1	5	
MO-2-10-25B	11/9/2014	<1	5	
MO-3-10-17	10/8/2011	<1	5	SDC Suction Outboard
MO-3-10-17	10/16/2013	<1	5	
MO-3-10-17	10/21/2015	<1	5	
MO-3-10-18	10/8/2011	<1	5	SDC Suction Inboard
MO-3-10-18	10/16/2013	<1	5	
MO-3-10-18	10/21/2015	<1	5	
MO-3-10-25A	9/14/2011	<1	5	"A" Inboard Discharge
MO-3-10-25A	9/11/2013	<1	5	
MO-3-10-25A	9/24/2015	<1	5	
MO-3-10-25B	9/25/2011	<1	5	"B" Inboard Discharge
MO-3-10-25B	9/19/2013	<1	5	
MO-3-10-25B	10/11/2015	<1	5	

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**Table 2:** Historical Leak Rate Test Performance for RHR Check Valve PIVs

<b>Component</b>	<b>Date of Test</b>	<b>Measured Value (gpm)</b>	<b>Required Action Limit (gpm)</b>	<b>Comments</b>
AO-2-10-46A (1)	9/15/2010	<1	5	"A" Outboard Discharge
AO-2-10-46A	9/16/2012	<1	5	
AO-2-10-46A	10/22/2014	<1	5	
AO-2-10-46B (2)	9/25/2010	<1	5	"B" Outboard Discharge
AO-2-10-46B	9/28/2012	<1	5	
AO-2-10-46B	11/9/2014	<1	5	
AO-3-10-46A (3)	9/19/2011	<1	5	"A" Outboard Discharge
AO-3-10-46A	9/17/2013	<1	5	
AO-3-10-46A	9/24/2015	<1	5	
AO-3-10-46B (4)	9/25/2011	<1	5	"B" Outboard Discharge
AO-3-10-46B	9/19/2013	<1	5	
AO-3-10-46B	10/11/2015	<1	5	

- (1) - HV-2-10-23451A included in test boundary
- (2) - HV-2-10-23451B included in test boundary
- (3) - HV-3-10-33451A included in test boundary
- (4) - HV-3-10-33451B included in test boundary



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**Table 3:** Historical Leak Rate Test Performance for CS MOV PIVs

<b>Component</b>	<b>Date of Test</b>	<b>Measured Value (gpm)</b>	<b>Required Action Limit (gpm)</b>	<b>Comments</b>
MO-2-14-12A	9/16/2010	<1	5	"A" Inboard Discharge
MO-2-14-12A	9/13/2012	<1	5	
MO-2-14-12A	10/22/2014	<1	5	
MO-2-14-12B	9/25/2010	<1	5	"B" Inboard Discharge
MO-2-14-12B	9/22/2012	<1	5	
MO-2-14-12B	11/5/2014	<1	5	
MO-3-14-12A	9/14/2011	<1	5	"A" Inboard Discharge
MO-3-14-12A	9/28/2013	<1	5	
MO-3-14-12A	9/24/2015	<1	5	
MO-3-14-12B	9/24/2011	<1	5	"B" Inboard Discharge
MO-3-14-12B	9/24/2013	<1	5	
MO-3-14-12B	10/6/2015	<1	5	

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**Table 4:** Historical Leak Rate Test Performance for CS Check Valve PIVs

<b>Component</b>	<b>Date of Test</b>	<b>Measured Value (gpm)</b>	<b>Required Action Limit (gpm)</b>	<b>Comments</b>
AO-2-14-13A (1)	9/16/2010	<1	5	"A" Outboard Discharge
AO-2-14-13A	9/13/2012	<1	5	
AO-2-14-13A	10/22/2014	<1	5	
AO-2-14-13B (2)	9/25/2010	<1	5	"B" Outboard Discharge
AO-2-14-13B	9/22/2012	<1	5	
AO-2-14-13B	11/5/2014	<1	5	
AO-3-14-13A (3)	9/14/2011	<1	5	"A" Outboard Discharge
AO-3-14-13A	9/28/2013	<1	5	
AO-3-14-13A	9/24/2015	<1	5	
AO-3-14-13B (4)	9/24/2011	<1	5	"B" Outboard Discharge
AO-3-14-13B	9/24/2013	<1	5	
AO-3-14-13B	10/6/2015	<1	5	

- (1) - HV-2-14-29046A included in test boundary
- (2) - HV-2-14-29046B included in test boundary
- (3) - HV-3-14-39046A included in test boundary
- (4) - HV-3-14-39046B included in test boundary

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 75 months. 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."

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Additional basis for this relief request is provided below:

- Separate functional testing of motor-operated valve (MOV) 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 mis-positioning 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 fourth 120-month interval which is currently scheduled to end on August 14, 2018.

**7. Precedents**

1. 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).
2. 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).
3. 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. ML 15174A303).