Exelon Generation

4300 Winfield Road
Warrenville, IL 60555
630 657 2000 Office

10 CFR 50.55a

RS-20-006

January 2, 2020

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

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Submittal of Relief Request for Revision to RV-03 Associated with Fifth Inservice Testing Interval

Reference: Letter from J.S. Weibe (U.S. NRC) to M.J. Pacilio (Exelon Generation Company, LLC), "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, ME7990, ME7991, ME7992, ME7993, ME7994, and ME7995)," dated February 14, 2013 [ML13042A348]

In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), Exelon Generation Company, LLC (EGC), requests NRC approval of relief request RV-03 Revision 1. The referenced letter authorized the alternative described in RV-03 Revision 0 for the Fifth 10-Year Inservice Testing (IST) Interval for Quad Cities Nuclear Power Station (QCNPS), which began on February 18, 2013 and is scheduled to end on February 17, 2023. The fifth interval complies with the requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code (2004 Edition through 2006 Addenda).

The proposed revision of RV-03 removes previously described air testing of the motor-operated pressure isolation valves (PIVs) that are also containment isolation valves (CIVs) on the basis that these valves are exempt from air testing because their respective lines meet the requirements for designation as closed water loops. Other than the removal of the description of air testing, the basis for the previously granted relief to allow for performance-based scheduling of PIV tests at QCNPS is unchanged.

EGC requests approval of this request by January 4, 2021 to provide for continued performance-based scheduling of PIV testing consistent with 10 CFR 50 Appendix J, Option B without the additional air test.

There are no regulatory commitments contained within this letter.

Should you have any questions concerning this letter, please contact Ms. Rebecca L. Steinman at (630) 657-2831.

Sincerely,

Patrick R. Simpson
Sr Manager Licensing
Exelon Generation Company, LLC

Attachments:

1. 10 CFR 50.55a Relief Request RV-03 Revision 1
2. Leakage History for QCNPS Unit 1 and 2 PIVs

cc: U.S. NRC Region III, Regional Administrator
U.S. NRC Senior Resident Inspector, QCNPS
U.S. NRC Project Manager, QCNPS
Illinois Emergency Management Agency – Division of Nuclear Safety

**Proposed Alternative to the ASME Code to Revise Pressure Isolation Valve (PIV) Leak Test Frequency Consistent with Appendix J, Option B in Accordance with 10 CFR 50.55a(z)(1) "Alternate Provides Acceptable Level of Quality and Safety"**

## 1. ASME Code Component(s) Affected

| Component Number | Valve Type | CIV, PIV, Both | System | Code Class | Category |
|---|---|---|---|---|---|
| 1(2)-1001-047-MO | Gate | Both | RHR | 1 | A |
| 1(2)-1001-050-MO | Gate | Both | RHR | 1 | A |
| 1(2)-1001-029A-MO | Gate | Both | RHR | 1 | A |
| 1(2)-1001-029B-MO | Gate | Both | RHR | 1 | A |
| 1(2)-1001-068A | Check | PIV | RHR | 1 | A/C |
| 1(2)-1001-068B | Check | PIV | RHR | 1 | A/C |
| 1(2)-1402-009A | Check | PIV | CS | 1 | A/C |
| 1(2)-1402-009B | Check | PIV | CS | 1 | A/C |
| 1(2)-1402-025A-MO | Gate | Both | CS | 1 | A |
| 1(2)-1402-025B-MO | Gate | Both | CS | 1 | A |

## 2. Applicable Code Edition and Addenda

ASME OM Code 2004 Edition through 2006 Addenda

## 3. Applicable Code Requirement

ISTC-3522, "Category C Check Valves," requires licensees exercise Category C check valves to verify obturator travel with methods in ISTC-5221 during power operation, during cold shutdown if not practicable during power operation, or during refueling outages if not practicable during power and cold shutdowns.

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 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) for the subject valves. 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 2 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" (referred to here as Option B).

The QCNPS Technical Specification Section 5.5.12 contains a requirement to establish the leakage rate testing program in accordance with the guidelines contained in NEI 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 2012, and conditions and limitations specified in NEI 94-01, Revision 2-A, dated October 2008.

The concept behind the Option B alternative for containment isolation valves (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 valves which have demonstrated good performance by the successful completion of two consecutive leak rate tests for 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 statement that "the risk impact associated with increasing [leak rate] test intervals are negligible (less than 0.1 % of total risk)."

The valves identified in this relief request are installed in water applications. While the motor-operated PIVs affected by this relief request are also CIVs they are exempt from air testing because their respective lines meet the requirements for designation as closed water loops. The check valve PIVs are not CIVs and not within the Appendix J scope. The PIV 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 QCNPS. The reason for requesting this relief is dose reduction / ALARA. Recent historical data was used to identify that PIV testing alone incurs a total dose of approximately 600 millirem each refuel outage. Assuming the subject PIVs continue to 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 (a bounding timeframe encompassing two refueling outages). In addition, this relief aids the station in the implementation of a division-based outage schedule.

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 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, such functional testing is

accomplished per ASME OM Code ISTC-3522, "Category C Check Valves," and ISTC-3520, "Exercising Requirements." Power-operated valves are routinely full stroke tested per ASME OM Code to ensure their functional capabilities. At QCNPS, these functional tests for motor-operated PIVs are performed on a 2-year frequency in accordance with OM Code Case OMN-1 Section 3.6, "MOV Exercising Requirements." 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.

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 refuel 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 check valves 1(2)-1402-009A/B is demonstrated by:

1. The injection of Core Spray Flow into the Reactor Vessel on a Cold Shutdown frequency verifies the valves capability of opening.
2. The capability of building pressure against the valve during Pressure Isolation Valve Seat Leakage Testing verifies the valves are closed.

These tests provide reasonable assurance of operational readiness.

The use of a Condition Monitoring Plan is intended to align the frequency for the closure exercise testing with the pressure isolation valve test. By use of a Condition Monitoring Plan, the check valve closure test, based on performance, would be verified concurrently with the PIV seat leakage test. The frequency of the check valve closure test would then be the same as the PIV seat leakage test since closure performance and seat leakage performance are linked. The PIV seat leakage test would not pass if the valve failed to close.

## 5. Proposed Alternative and Basis for Use

QCNPS 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 Option B. A conservative control will be established such that if any valve fails their PIV test, the test interval will be reduced consistent with Option B requirements until good performance is reestablished.

The primary basis for this relief request is the historically good performance of the PIVs. The tables in Attachment 2 present test data that demonstrate acceptable historical PIV performance for the Residual Heat Removal (RHR) and Core Spray (CS) systems. The only recorded seat leakage failures of PIVs at QCNPS were determined to be a result of the test methodology and not due to any physical condition of the valves.

The extension of test frequencies will be consistent with the guidance provided for Appendix J, Type C leak rate tests as detailed in paragraph 10.2.3.2, "Extended Test

Interval," of NEI 94-01 "Nuclear Energy Institute - Industry Guideline for Implementing Performance Based Option of 10 CFR Part 50, Appendix J," 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 60 months (as limited by Regulatory Guide 1.163, "Performance Based Containment Leak-Test Program"). Test intervals for Type C valves are determined in accordance with Section 11.0 of NEI 94-01.

Additional basis for this relief request is provided below:

- Separate functional testing of MOV PIVs and Condition Monitoring of Check Valve PIVs per ASME OM Code.

- 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 Inner-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 or incipient ISLOCA and to take appropriate actions.

## 6. Duration of Proposed Alternative

The proposed alternative will be utilized for the remainder of the Fifth 120-month Interval beginning February 18, 2013 and ending February 17, 2023.

## 7. Precedents

1. Letter from R. J. Pascarelli (U.S. Nuclear Regulatory Commission) 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. Letter from J. Wiebe (U.S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Nuclear), "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, ME7990, ME7991, ME7992, ME7993, ME7994, and ME7995)," dated February 14, 2013 (ADAMS Accession No. ML13042A348).

3. Letter from T. L. Tate (U.S. Nuclear Regulatory Commission) to B. Hanson (Exelon Generation, LLC), "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).

4. Letter from D. A. Broaddus (U.S. Nuclear Regulatory Commission) to B. Hanson (Exelon Generation, LLC), "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).

5. Letter from J. G. Danna (U.S. Nuclear Regulatory Commission) to B. Hanson (Exelon Generation, LLC), "Nine Mile Point Nuclear Station, Units 1 and 2 – Re: Alternative to the Requirements of the American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants (CAC Nos. MF9073 and MF9074)," dated May 30, 2017 (ADAMS Accession No. ML17136A112)

6. Letter from J. G. Danna (U.S. Nuclear Regulatory Commission) to B. Hanson (Exelon Generation, LLC), "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 (ADAMS Accession No. ML17004A063)

7. Letter from L.M. Regner (U.S. Nuclear Regulatory Commission) to B. Hanson (Exelon Generation, LLC), "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)," dated September 10, 2019 (ADAMS Accession No. ML19217A306)

8. Letter from J. G. Danna (U.S. Nuclear Regulatory Commission) to B. Hanson (Exelon Generation, LLC), "Limerick Generating Station, Units 1 and 2 – Safety Evaluation of Relief Requests GVRR-8, 11-PRR-1, 90-PRR-1 and 47-VRR-2 Regarding the Fourth 10-Year Interval of The Inservice Testing Program (EPID L-2018-LLR-0384, EPID L-2018-LLR-0385, EPID L-2018-LLR-0386, and EPID L-2018-LLR-0387)," dated October 28, 2019 (ADAMS Accession No. ML19228A195)

## Attachment 2

## Leakage History of QCNPS Unit 1 and 2 PIVs


The tables below summarize the leakage history for QCNPS Unit 1 and 2 Residual Heat Removal (RHR) and Core Spray (CS) system PIVs for at least three tests.

**RHR Shutdown Cooling Suction PIVs**

| Valve | Date of Test | Measured Value (gpm) | Required Action Limit (gpm) | Comments |
|---|---|---|---|---|
| 1-1001-047-MO | 5/10/2007 | 2 | 5 | |
| 1-1001-047-MO | 5/7/2009 | 0.39 | 5 | |
| 1-1001-047-MO | 5/15/2011 | 0.1216 | 5 | |
| 1-1001-047-MO | 3/5/2015 | 0.143 | 5 | |
| 1-1001-047-MO | 3/20/2019 | 1.674 | 5 | |
| | | | | |
| 1-1001-050-MO | 5/10/2007 | 0.6 | 5 | |
| 1-1001-050-MO | 5/7/2009 | No Measurable Leakage | 5 | |
| 1-1001-050-MO | 5/15/2011 | No Measurable Leakage | 5 | |
| 1-1001-050-MO | 5/27/2011 | No Measurable Leakage | 5 | |
| 1-1001-050-MO | 3/5/2015 | 1.49 | 5 | |
| 1-1001-050-MO | 3/20/2019 | No Measurable Leakage | 5 | |
| | | | | |
| 2-1001-047-MO | 4/1/2006 | 0.0777 | 5 | |
| 2-1001-047-MO | 3/7/2008 | 0.04 | 5 | |
| 2-1001-047-MO | 3/23/2010 | 3.063 | 5 | |
| 2-1001-047-MO | 3/23/2012 | 0.282 | 5 | |
| 2-1001-047-MO | 4/14/2014 | 0.08 | 5 | |
| 2-1001-047-MO | 3/23/2018 | 2.33 | 5 | |
| | | | | |
| 2-1001-050-MO | 4/1/2006 | No Measurable Leakage | 5 | |
| 2-1001-050-MO | 3/7/2008 | No Measurable Leakage | 5 | |
| 2-1001-050-MO | 3/23/2010 | No Measurable Leakage | 5 | |
| 2-1001-050-MO | 3/23/2012 | 0.744 | 5 | |
| 2-1001-050-MO | 4/14/2014 | No Measurable Leakage | 5 | |
| 2-1001-050-MO | 3/23/2018 | No Measurable Leakage | 5 | |

| Core Spray Injection PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 1-1402-025A-MO | 5/12/2007 | No Measurable Leakage | 5 | |
| 1-1402-025A-MO | 5/12/2009 | 0.086 | 5 | |
| 1-1402-025A-MO | 5/15/2011 | 0.22 | 5 | |
| 1-1402-025A-MO | 3/12/2013 | 0.074 | 5 | |
| 1-1402-025A-MO | 3/28/2017 | 0.074 | 5 | |
| | | | | |
| 1-1402-025B-MO | 5/12/2007 | No Measurable Leakage | 5 | |
| 1-1402-025B-MO | 4/28/2009 | 2.18 | 5 | |
| 1-1402-025B-MO | 5/15/2011 | 0.003 | 5 | |
| 1-1402-025B-MO | 3/7/2015 | 0.0025 | 5 | |
| 1-1402-025B-MO | 3/29/2019 | No Measurable Leakage | 5 | |
| | | | | |
| 2-1402-025A-MO | 3/27/2006 | No Measurable Leakage | 5 | |
| 2-1402-025A-MO | 3/5/2008 | No Measurable Leakage | 5 | |
| 2-1402-025A-MO | 4/4/2010 | No Measurable Leakage | 5 | |
| 2-1402-025A-MO | 3/21/2012 | 0.0013 | 5 | |
| 2-1402-025A-MO | 3/26/2016 | 0.004 | 5 | |
| | | | | |
| 2-1402-025B-MO | 4/5/2006 | No Measurable Leakage | 5 | |
| 2-1402-025B-MO | 3/11/2008 | No Measurable Leakage | 5 | |
| 2-1402-025B-MO | 3/21/2010 | No Measurable Leakage | 5 | |
| 2-1402-025B-MO | 3/31/2012 | 0.0011 | 5 | |
| 2-1402-025B-MO | 4/8/2014 | No Measurable Leakage | 5 | |
| 2-1402-025B-MO | 3/21/2018 | No Measurable Leakage | 5 | |

| RHR LPCI Injection PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 1-1001-029A-MO | 5/14/2007 | No Measurable Leakage | 5 | |
| 1-1001-029A-MO | 5/7/2009 | No Measurable Leakage | 5 | |
| 1-1001-029A-MO | 5/21/2011 | 2.89 | 5 | |
| 1-1001-029A-MO | 3/13/2013 | 0.0186 | 5 | |
| 1-1001-029A-MO | 3/29/2017 | No Measurable Leakage | 5 | |
| | | | | |

| RHR LPCI Injection PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 1-1001-029B-MO | 5/13/2007 | No Measurable Leakage | 5 | |
| 1-1001-029B-MO | 4/29/2009 | No Measurable Leakage | 5 | |
| 1-1001-029B-MO | 5/23/2011 | No Measurable Leakage | 5 | |
| 1-1001-029B-MO | 3/5/2014 | 0.04 | 5 | |
| 1-1001-029B-MO | 3/19/2019 | 0.31 | 5 | |
| | | | | |
| 2-1001-029A-MO | 4/3/2006 | 0.2 | 5 | |
| 2-1001-029A-MO | 3/10/2008 | No Measurable Leakage | 5 | |
| 2-1001-029A-MO | 3/29/2010 | 0.097 | 5 | |
| 2-1001-029A-MO | 3/23/2012 | 1.146 | 5 | |
| 2-1001-029A-MO | 3/25/2016 | 0.022 | 5 | |
| | | | | |
| 2-1001-029B-MO | 4/4/2006 | No Measurable Leakage | 5 | |
| 2-1001-029B-MO | 3/13/2008 | No Measurable Leakage | 5 | |
| 2-1001-029B-MO | 3/18/2010 | No Measurable Leakage | 5 | |
| 2-1001-029B-MO | 3/30/2012 | 0.0081 | 5 | |
| 2-1001-029B-MO | 4/9/2014 | 0.007 | 5 | |
| 2-1001-029B-MO | 3/21/2018 | No Measurable Leakage | 5 | |

| Core Spray PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 1-1402-009A | 7/15/1994 | No Measurable Leakage | 1 | |
| 1-1402-009A | 3/30/1996 | No Measurable Leakage | 5 | |
| 1-1402-009A | 11/19/1998 | 0.69 | 5 | |
| 1-1402-009A | 10/18/2000 | 1.2 | 5 | |
| 1-1402-009A | 4/1/2005 | No Measurable Leakage | 5 | |
| 1-1402-009A | 5/12/2007 | 1.1 | 5 | |
| 1-1402-009A | 5/12/2009 | 1.43 | 5 | |
| 1-1402-009A | 5/15/2011 | 0.9226 | 5 | |
| 1-1402-009A | 3/12/2013 | 0.147 | 5 | |
| 1-1402-009A | 3/28/2017 | 0.145 | 5 | |
| | | | | |

## Attachment 2

## Leakage History of QCNPS Unit 1 and 2 PIVs


| Core Spray PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 1-1402-009B | 7/15/1994 | No Measurable Leakage | 1 | |
| 1-1402-009B | 3/13/1996 | 2.86 | 5 | |
| 1-1402-009B | 10/22/2000 | 7.364 | 5 | Valve not seated properly. |
| 1-1402-009B | 10/24/2000 | 4.87 | 5 | Retest |
| 1-1402-009B | 11/5/2002 | 4.8 | 5 | |
| 1-1402-009B | 3/21/2005 | 1.43 | 5 | |
| 1-1402-009B | 5/12/2007 | 3.16 | 5 | |
| 1-1402-009B | 4/28/2009 | 2.18 | 5 | |
| 1-1402-009B | 5/15/2011 | 5.368 | 5 | Valve not seated properly. |
| 1-1402-009B | 5/25/2011 | 4.46 | 5 | Retest |
| 1-1402-009B | 5/27/2011 | No Measurable Leakage | 5 | Retest with high pressure. |
| 1-1402-009B | 3/7/2015 | 0.15 | 5 | |
| 1-1402-009B | 3/23/2019 | No Measurable Leakage | 5 | |
| | | | | |
| 2-1402-009A | 7/2/1995 | 0.25 | 5 | |
| 2-1402-009A | 4/10/1997 | No Measurable Leakage | 5 | |
| 2-1402-009A | 2/21/1999 | No Measurable Leakage | 5 | |
| 2-1402-009A | 1/31/2000 | No Measurable Leakage | 5 | |
| 2-1402-009A | 2/17/2002 | 44.3 | 5 | Valve not seated properly. |
| 2-1402-009A | 2/19/2002 | No Measurable Leakage | 5 | Retest following seating of valve. |
| 2-1402-009A | 3/27/2006 | No Measurable Leakage | 5 | |
| 2-1402-009A | 3/5/2008 | No Measurable Leakage | 5 | |
| 2-1402-009A | 4/4/2010 | No Measurable Leakage | 5 | |
| 2-1402-009A | 3/21/2012 | 0.000461 | 5 | |
| 2-1402-009A | 3/26/2016 | No Measurable Leakage | 5 | |
| | | | | |
| 2-1402-009B | 7/2/1995 | No Measurable Leakage | 5 | |
| 2-1402-009B | 4/10/1997 | 0.125 | 5 | |
| 2-1402-009B | 2/25/1999 | 0.68 | 5 | |
| 2-1402-009B | 1/31/2000 | No Measurable Leakage | 5 | |
| 2-1402-009B | 2/15/2002 | No Measurable Leakage | 5 | |
| 2-1402-009B | 2/17/2002 | No Measurable Leakage | 5 | |
| 2-1402-009B | 2/25/2004 | No Measurable Leakage | 5 | |
| 2-1402-009B | 3/9/2004 | No Measurable Leakage | 5 | |
| 2-1402-009B | 4/5/2006 | 0.19 | 5 | |

## Attachment 2

## Leakage History of QCNPS Unit 1 and 2 PIVs


| Core Spray PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 2-1402-009B | 3/11/2008 | 0.35 | 5 | |
| 2-1402-009B | 3/21/2010 | 0.7 | 5 | |
| 2-1402-009B | 3/31/2012 | No Measurable Leakage | 5 | |
| 2-1402-009B | 4/8/2014 | No Measurable Leakage | 5 | |
| 2-1402-009B | 3/21/2018 | No Measurable Leakage | 5 | |

| RHR PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 1-1001-068A | 7/18/1994 | No Measurable Leakage | 1 | |
| 1-1001-068A | 2/10/1996 | No Measurable Leakage | 5 | |
| 1-1001-068A | 11/20/1998 | No Measurable Leakage | 5 | |
| 1-1001-068A | 4/2/2005 | No Measurable Leakage | 5 | |
| 1-1001-068A | 5/14/2007 | No Measurable Leakage | 5 | |
| 1-1001-068A | 5/7/2009 | No Measurable Leakage | 5 | |
| 1-1001-068A | 5/21/2011 | 0.278 | 5 | |
| 1-1001-068A | 3/13/2013 | No Measurable Leakage | 5 | |
| 1-1001-068A | 3/29/2017 | 0.149 | 5 | |
| | | | | |
| 1-1001-068B | 7/18/1994 | No Measurable Leakage | 1 | |
| 1-1001-068B | 3/31/1996 | No Measurable Leakage | 5 | |
| 1-1001-068B | 4/2/2005 | 1.35 | 5 | |
| 1-1001-068B | 5/13/2007 | 0.33 | 5 | |
| 1-1001-068B | 4/29/2009 | No Measurable Leakage | 5 | |
| 1-1001-068B | 5/23/2011 | 0.346 | 5 | |
| 1-1001-068B | 3/5/2015 | 0.29 | 5 | |
| 1-1001-068B | 3/19/2019 | 0.1 | 5 | |
| | | | | |

## Attachment 2

## Leakage History of QCNPS Unit 1 and 2 PIVs


| RHR PIVs | | | | |
|---|---|---|---|---|
| **Valve** | **Date of Test** | **Measured Value (gpm)** | **Required Action Limit (gpm)** | **Comments** |
| 2-1001-068A | 7/2/1995 | No Measurable Leakage | 5 | |
| 2-1001-068A | 4/17/1997 | No Measurable Leakage | 5 | |
| 2-1001-068A | 2/20/1999 | 1.3 | 5 | |
| 2-1001-068A | 1/26/2000 | No Measurable Leakage | 5 | |
| 2-1001-068A | 2/22/2002 | No Measurable Leakage | 5 | |
| 2-1001-068A | 4/3/2006 | No Measurable Leakage | 5 | |
| 2-1001-068A | 3/10/2008 | No Measurable Leakage | 5 | |
| 2-1001-068A | 3/29/2010 | No Measurable Leakage | 5 | |
| 2-1001-068A | 3/23/2012 | No Measurable Leakage | 5 | |
| 2-1001-068A | 3/25/2016 | No Measurable Leakage | 5 | |
| | | | | |
| 2-1001-068B | 7/2/1995 | No Measurable Leakage | 5 | |
| 2-1001-068B | 4/10/1997 | No Measurable Leakage | 5 | |
| 2-1001-068B | 2/25/1999 | No Measurable Leakage | 5 | |
| 2-1001-068B | 2/1/2000 | No Measurable Leakage | 5 | |
| 2-1001-068B | 2/15/2002 | No Measurable Leakage | 5 | |
| 2-1001-068B | 4/4/2006 | No Measurable Leakage | 5 | |
| 2-1001-068B | 3/13/2008 | 0.33 | 5 | |
| 2-1001-068B | 3/18/2010 | No Measurable Leakage | 5 | |
| 2-1001-068B | 3/30/2012 | 0.29 | 5 | |
| 2-1001-068B | 4/9/2014 | No Measurable Leakage | 5 | |
| 2-1001-068B | 3/21/2018 | No Measurable Leakage | 5 | |