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10 CFR 50.55a

GNRO-2021/00014

June 1, 2021

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

Subject: Inservice Testing Program Relief Request VRR-GGNS-2021-1
Pressure Isolation Valve Testing Frequency

Grand Gulf Nuclear Station, Unit 1
NRC Docket No. 50-416
Renewed Facility Operating License No. NPF-29

In accordance with 10 CFR 50.55a(z)(1), Entergy Operations, Inc. (Entergy) proposes an alternative to the requirements of American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code), Section ISTC-3522, "Category C Check Valves," and Subsection ISTC-3630(a) under Section ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves" for 22 pressure isolation valves (PIVs) at Grand Gulf Nuclear Station, Unit 1 (GGNS). Entergy is currently operating GGNS in the fourth 10-year interval of the Inservice Test (IST) Program in compliance with the 2004 Edition of the ASME OM Code through, and including, the 2006 Addenda.

This request is for NRC approval of an alternative to the OM Code PIV testing frequency (i.e., each refueling outage). Entergy proposes to adopt a performance-based testing frequency for the 22 PIVs, similar to that established under 10 CFR 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Option B, "Performance-Based Requirements." Attachment 1 to this letter provides Relief Request VRR-GGNS-2021-1 Revision 0. Attachment 2 provides historical test results for the 22 PIVs, which form the basis for acceptability of the proposed relief request.

Entergy is submitting this 10 CFR 50.55a(z)(1) request for the remainder of the fourth 10-year IST interval for GGNS, which is scheduled to end on November 30, 2027. As described in Attachments 1 and 2, the proposed alternative provides an acceptable level of quality and safety.

There are no regulatory commitments contained in this letter. Entergy requests approval of this alternative by November 30, 2021.

Should you have any questions or require additional information, please contact Jeff Hardy, GGNS Regulatory Assurance Manager at (601) 437-2103 or jhardy@entergy.com.

Respectfully,

Philip Couture

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Date: 2021.06.01 14:13:46 -05'00'

Phil Couture

PC/jls

Attachment 1: Grand Gulf Nuclear Station, Unit 1, Request for Alternative, VRR-GGNS-2021-1, Revision 0

Attachment 2: Grand Gulf Nuclear Station, Unit 1, Leakage History – Pressure Isolation Valves

cc: NRC Region IV Regional Administrator
NRC Senior Resident Inspector - GGNS
NRC Project Manager - GGNS

**GNRO-2021/00014**

**Attachment 1**

**Grand Gulf Nuclear Station, Unit 1**

**Request for Alternative**

**VRR-GGNS-2021-1, Revision 0**

Request for Alternative

VRR-GGNS-2021-1, Revision 0

1. American Society of Mechanical Engineers (ASME) Code Component(s) Affected

| Component Number | Description | System | ASME Code Class | OM Code Category |
|---|---|---|---|---|
| E12F050A | RHR "A" Discharge Header Check Valve | RHR | 2 | A/C |
| E12F053A | RHR "A" Shutdown Cooling Return to Feedwater | RHR | 2 | A |
| E12F050B | RHR "B" Discharge Header Check Valve | RHR | 2 | A/C |
| E12F053B | RHR "B" Shutdown Cooling Return to Feedwater | RHR | 2 | A |
| E51F065 | RCIC Discharge to RHR Check Valve | RCIC | 2 | A/C |
| E51F013 | RCIC Injection Shutoff Valve | RCIC | 2 | A |
| E12F009 | RHR Shutdown Cooling Inboard Suction Valve | RHR | 1 | A |
| E12F008 | RHR Shutdown Cooling Outboard Suction Valve | RHR | 1 | A |
| E12F308 | Shutdown Cooling Suction Stop Valve | RHR | 2 | A/C |
| E51F063 | RCIC Steam Supply Drywell Inboard Isolation | RCIC | 1 | A |
| E51F064 | RCIC Steam Supply Drywell Outboard Isolation | RCIC | 1 | A |
| E51F076 | RCIC Steam Line Warmup Valve | RCIC | 1 | A |
| E12F041A | RHR "A" Testable Check Valve | RHR | 1 | A/C |
| E12F042A | RHR "A" Injection Shutoff Valve | RHR | 1 | A |
| E12F041B | RHR "B" Testable Check Valve | RHR | 1 | A/C |
| E12F042B | RHR "B" Injection Shutoff Valve | RHR | 1 | A |
| E12F041C | RHR "C" Testable Check Valve | RHR | 1 | A/C |
| E12F042C | RHR "C" Injection Shutoff Valve | RHR | 1 | A |
| E22F005 | HPCS Testable Check Valve | HPCS | 1 | A/C |
| E22F004 | HPCS Injection Shutoff Valve | HPCS | 1 | A |
| E21F006 | LPCS Testable Check Valve | LPCS | 1 | A/C |
| E21F005 | LPCS Injection Shutoff Valve | LPCS | 1 | A |

Note: Residual Heat Removal (RHR); Reactor Core Isolation Cooling (RCIC); High Pressure Core Spray (HPCS); Low Pressure Core Spray (LPCS)

2. Applicable ASME Code Edition and Addenda

American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) – 2004 Edition through, and including, the 2006 Addenda.

3. Applicable ASME Code Requirement(s)

ASME OM Code, Subsection ISTC-3522, "Category C Check Valves," states category C check valves shall be exercised as follows:

(a) 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. …

(c) If exercising is not practicable during operation at power and cold shutdowns, it shall be performed during refueling outages.

ASME OM Code, Subsection ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves," states, in part:

> 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.

ASME OM Code Subsection ISTC-3630(a), "Frequency," states, "Tests shall be conducted at least once every two years".

4. Reason for Request

In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), "Alternatives to codes and standards requirements," Entergy Operations, Inc. (Entergy) proposes an alternative to the requirements of ASME OM Code Section ISTC-3522, "Category C Check Valves," and Subsection ISTC-3630(a) under Section ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves," for the subject pressure isolation valves (PIVs). Approval of this alternative will allow PIV testing to be performed at the Grand Gulf Nuclear Station (GGNS) on a performance-based frequency. The proposed 10 CFR 50.55a(z)(1) alternative provides for more efficient plant operation and lower cumulative radiation exposure (CRE), while maintaining an acceptable level of quality and safety.

Since PIVs may or may not be containment isolation valves, they are not necessarily included in scope for performance-based testing, as provided in 10 CFR 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Option B, "Performance-Based Requirements." The concept behind the 10 CFR 50, Appendix J, Option B alternative for containment isolation valve testing is that licensees should be allowed to adopt cost-effective methods, including the setting of test intervals, for complying with regulatory requirements. Nuclear Energy Institute (NEI) 94-01, "Industry Guideline for Implementing Performance Based Option of 10 CFR 50, Appendix J," Revision 3-A (Reference 1), describes a risk-informed basis for extending containment isolation valves test intervals under Option B. That justification shows that for containment isolation valves which have demonstrated good performance by successful completion of two consecutive leakage rate tests over two consecutive cycles, licensees may increase their test frequencies. Additionally, 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 are negligible (i.e., less than 0.1 percent of total risk)."

The valves identified in this request for a 10 CFR 50.55a alternative are all in water applications with the exception of the RCIC Steam Supply system Inboard Isolation valve, Outboard Isolation valve, and the Warmup valve. Testing is currently performed utilizing high- and low-pressure water, as applicable.

NRC approval of the proposed performance-based scheduling of PIV tests at GGNS will enable Entergy to implement a reduction in the resources required for testing, as well as a reduction in refueling outage duration.

NUREG-0933, "Resolution of Generic Safety Issues," Issue 105, "Interfacing Systems LOCA at LWRs," (Reference 2) discusses the need for PIV leak-rate testing based primarily on three pre-1985 historical failures of applicable valves industrywide. 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. For check valves, 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. 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 two year PIV leak rate testing does not contribute any additional assurance of functional capability; Rather, it only determines the seat tightness of the closed valves.

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

In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), "Alternatives to codes and standards requirements," Entergy proposes the following alternative to the ASME OM Code requirements. The specific test interval for each PIV would be a function of its historical performance and would be established in a manner consistent with the containment isolation valve testing process under 10 CFR 50, Appendix J, Option B. Performance-based scheduling of PIV testing will be controlled in a manner similar to the methods described in NEI 94-01, Revision 3-A. PIV test performances would occur at a nominal frequency ranging from every refueling outage to every third refueling outage, subject to acceptable valve performance. Valves that have demonstrated good performance for two consecutive cycles may have their test interval extended up to 75-months, with a permissible extension (for non-routine emergent conditions) of nine months (84 months total).

A conservative control will be established such that if any valve fails the PIV test, the test interval will be reduced consistent with Appendix J, Option B, requirements. PIV test failure is defined as the low-pressure and high-pressure tests exceeding the Required Action Limit. Any PIV leakage test failure would require the component be returned to the initial ASME OM Code interval until good performance can again be established.

The primary basis for this proposed alternative is the historically good performance of the PIVs. Attachment 2, "Grand Gulf Nuclear Station Unit 1 Leakage History – Pressure Isolation Valves," provides the leakage history for the 22 subject PIVs for five consecutive refueling outage test performances with two exceptions. Attachment 2 provides the historical test performance for the 22 PIVs, including a discussion of the two test performance exceptions.

The functional capability of the check valves is demonstrated by the open and close exercise test. The open testing is separate and distinct from the PIV testing and is currently performed at a cold shutdown or refueling outage frequency, in accordance with ASME OM Code Section ISTC-3522, "Category 2 Check Valves." The closed testing will take 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 exhibit good historical performance (i.e., only one check valve test result has exceeded the Required Action Limit) shows that the Category C check valves are exhibiting the required obturator movement to close and remain closed.

Note that NEI 94-01, Revision 3-A, is not the sole basis for this relief request, given that NEI 94-01, Revision 3-A, does not address seat leakage testing with water. The NEI document is being cited as an approach similar to the requested alternative method. If the proposed alternative is authorized and the valves exhibit good performance, the PIV test frequency will be controlled similar to the method described in NEI 94-01, Revision 3-A, so that testing of these PIVs would not be required each refueling outage.

The extension of test frequencies proposed is consistent with the guidance provided in 10 CFR 50, Appendix J, Type C leak rate tests as detailed in NEI 94-01, Revision 3-A, 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 should be determined by a licensee in accordance with Section 11.0.

Additional justification for NRC approval of this proposed alternative are:

- Separate functional testing of motor-operated valve (MOV) PIVs is performed in accordance with the ASME OM Code.

- Relief valves in the low pressure (LP) piping relief valves may not provide Intersystem Loss of Coolant Accident (ISLOCA) mitigation for inadvertent PIV mispositioning, but their relief capacity can accommodate conservative PIV seat leakage rates.

- Operators are highly trained to recognize symptoms of the presence of an ISLOCA (i.e., alarms that identify high pressure (HP) to LP leakage), and to take appropriate actions.

Following NRC approval of this alternative, leakage test intervals will be established based on performance. The leakage test intervals remain consistent with the process established under 10 CFR 50 Appendix J, Option B.

6. Duration of the Proposed Alternative

This relief is requested for the fourth ten-year IST interval, which began December 1, 2017 and is scheduled to end on November 30, 2027 for GGNS.

7. Precedent

Several recently approved alternatives to allow PIV testing under a performance-based testing approach similar to that established under 10 CFR 50, Appendix J, Option B are listed below:

1. LaSalle County Station, Units 1 and 2, September 2019 (Reference 4)

2. Limerick Generating Station, Units 1 and 2, October 2019 (Reference 5)

3. Peach Bottom Atomic Power Station, Units 2 and 3, May 2018 (Reference 6)

4. Dresden Nuclear Power Station, Units 2 and 3, October 2015 (Reference 7)

8. References

1. Nuclear Energy Institute (NEI) 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," Revision 3-A, dated July 2012

2. U.S. Nuclear Regulatory Commission (NRC) NUREG-0933, "Resolution of Generic Safety Issues, Issue 105, Interfacing Systems LOCA at LWRs (Rev. 4) (NUREG-0933, Main Report with Supplements 1-34)"

3. NRC NUREG/CR-5928, "ISLOCA Research Program Final Report," dated July 1993 (ML072430731) (not-publicly available)

4. NRC letter to Exelon Generation Company, LLC (Exelon), "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)," (ML19217A306), dated September 10, 2019

5. NRC letter to Exelon, "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), (ML19228A195), dated October 28, 2019

6. NRC letter to Exelon, "Peach Bottom Atomic Power Station, Units 2 and 3 – Safety Evaluation of Relief Request GVRR-2 Regarding the Fifth 10-year Interval of the Inservice Testing Program (EPID No. L-2017-LLR-0094)," (ML18141A600), dated May 30, 2018

7. NRC letter to Exelon, "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. MF5809 and MF5090)," (ML15174A303), dated October 27, 2015

**GNRO-2021/00014**

**Attachment 2**

**Grand Gulf Nuclear Station, Unit 1**

**Leakage History – Pressure Isolation Valves**

As stated in Attachment 1, the primary basis for this proposed alternative is the historically good leakage test performance of the Grand Gulf Nuclear Station, Unit 1 (GGNS) Pressure Isolation Valves (PIVs). The table below provides the leakage test history for the 22 subject PIVs for five consecutive refueling outage test performances. With two exceptions, the historical test performance for the 22 PIVs demonstrate successful leakage test results. The two test performance exceptions are noted in the table and described below.

| Valve | Date of test | Measured Value gallons per minute (gpm) | Required Action Limit (gpm) | Comments |
|---|---|---|---|---|
| RHR "A" Discharge Header Check Valve | | | | |
| E12F050A | 2/21/20 | 0.0 | >1.0 | |
| | 4/6/18 | 0.0 | | |
| | 2/18/16 | 0.0 | | |
| | 2/7/14 | 0.0 | | |
| | 2/17/12 | 0.0 | | |
| RHR "A" Shutdown Cooling Return to Feedwater | | | | |
| E12F053A | 2/21/20 | 0.0 | >1.0 | |
| | 4/6/18 | 0.0 | | |
| | 2/18/16 | 0.0 | | |
| | 2/7/14 | 0.0 | | |
| | 2/17/12 | 0.0 | | |
| RHR "B" Discharge Header Check Valve | | | | |
| E12F050B | 2/21/20 | 0.321 | >1.0 | |
| | 4/5/18 | 0.139 | | |
| | 2/19/16 | 0.301 | | |
| | 2/8/14 | 0.177 | | |
| | 2/19/12 | 0.314 | | |
| RHR "B" Shutdown Cooling Return to Feedwater | | | | |
| E12F053B | 2/21/20 | 0.063 | >1.0 | |
| | 4/5/18 | 0.133 | | |
| | 2/19/16 | 0.212 | | |
| | 2/8/14 | 0.288 | | |
| | 2/19/12 | 0.270 | | |
| RCIC Discharge to RHR Check Valve | | | | |
| E51F065 | 2/21/20 | 0.873 | >1.0 | |
| | 4/6/18 | 0.0 | | |
| | 2/18/16 | 0.078 | | |
| | 2/7/14 | 0.070 | | |
| | 2/17/12 | 0.0 | | |
| RCIC Injection Shutoff Valve | | | | |
| E51F013 | 2/21/20 | 0.587 | >1.0 | |
| | 4/6/18 | 0.177 | | |
| | 2/18/16 | 0.146 | | |
| | 2/7/14 | 0.124 | | |
| | 2/17/12 | 0.0 | | |

| Valve | Date of test | Measured Value gallons per minute (gpm) | Required Action Limit (gpm) | Comments |
|---|---|---|---|---|
| RHR Shutdown Cooling Inboard Suction Valve | | | | |
| E12F009 | 2/29/20 | 0.066 | >1.0 | |
| | 4/14/18 | 0.0 | | |
| | 3/3/16 | 0.149 | | |
| | 2/19/14 | 0.130 | | |
| | 3/30/12 | 0.199 | | |
| RHR Shutdown Cooling Outboard Suction Valve | | | | |
| E12F008 | 3/1/20 | 0.050 | >1.0 | |
| | 4/13/18 | 0.0 | | |
| | 3/3/16 | 0.298 | | |
| | 2/17/14 | 0.0 | | |
| | 3/29/12 | 0.0 | | |
| Shutdown Cooling Suction Stop Valve | | | | |
| E12F308 | 2/29/20 | 0.066 | >1.0 | |
| | 4/14/18 | 0.0 | | |
| | 3/3/16 | 0.149 | | |
| | 2/17/14 | 0.130 | | |
| | 3/24/12 | 0.199 | | |
| RCIC Steam Supply Drywell Inboard Isolation | | | | |
| E51F063 | 2/29/20 | 0.0 | >1.0 | |
| | 4/18/18 | 0.008 | | |
| | 2/28/16 | 0.0 | | |
| | 2/20/14 | 0.0 | | |
| | 3/9/12 | 0.0 | | |
| RCIC Steam Supply Drywell Outboard Isolation | | | | |
| E51F064 | 2/29/20 | 0.099 | >1.0 | |
| | 4/18/18 | 0.099 | | |
| | 2/27/16 | 0.333 | | |
| | 2/20/14 | 0.0 | | |
| | 3/9/12 | 0.0 | | |
| RCIC Steam Line Warmup Valve | | | | |
| E51F076 | 2/29/20 | 0.260 | >1.0 | |
| | 4/18/18 | 0.099 | | |
| | 2/27/16 | 0.333 | | |
| | 2/20/14 | 0.0 | | |
| | 3/9/12 | 0.0 | | |
| RHR "A" Testable Check Valve | | | | |
| E12F041A | 3/30/20 | 0.0 | >1.0 | |
| | 5/28/18 | 0.530 | | |
| | 3/15/16 | 0.0 | | |
| | 3/2/14 | 4.941 | | Missed Surveillance |
| | 4/24/12 | 0.273 | | |

| Valve | Date of test | Measured Value gallons per minute (gpm) | Required Action Limit (gpm) | Comments |
|---|---|---|---|---|
| RHR "A" Injection Shutoff Valve | | | | |
| E12F042A | 4/6/20 | 0.249 | >1.0 | |
| | 5/28/18 | 0.075 | | |
| | 3/16/16 | 0.086 | | |
| | 3/3/14 | 0.0 | | |
| | 4/24/12 | 0.274 | | |
| RHR "B" Testable Check Valve | | | | |
| E12F041B | 3/1/20 | 0.0 | >1.0 | |
| | 4/22/18 | 0.0 | | |
| | 3/7/16 | 0.0 | | |
| | 2/23/14 | 0.0 | | |
| | 3/30/12 | 0.0 | | |
| RHR "B" Injection Shutoff Valve | | | | |
| E12F042B | 3/2/20 | 0.0 | >1.0 | |
| | 4/22/18 | 0.0 | | |
| | 3/7/16 | 0.0 | | |
| | 2/23/14 | 0.0 | | |
| | 3/29/12 | 0.0 | | |
| RHR "C" Testable Check Valve | | | | |
| E12F041C | 3/8/20 | 0.0 | >1.0 | |
| | 4/8/18 | 0.0 | | |
| | 2/22/16 | 0.0 | | |
| | 2/11/14 | 0.0 | | |
| | 3/31/12 | 0.0 | | |
| RHR "C" Injection Shutoff Valve | | | | |
| E12F042C | 3/8/20 | 0.0 | >1.0 | |
| | 4/8/18 | 0.0 | | |
| | 3/9/16 | 0.0 | | |
| | 2/10/14 | 0.0 | | |
| | 4/1/12 | 0.0 | | |
| HPCS Testable Check Valve | | | | |
| E22F005 | 4/3/20 | 0.0 | >1.0 | |
| | 6/25/18 | 0.0 | | |
| | 3/14/16 | 0.0 | | |
| | 2/27/14 | 0.0 | | |
| | 3/5/12 | 0.0 | | |

| Valve | Date of test | Measured Value gallons per minute (gpm) | Required Action Limit (gpm) | Comments |
|---|---|---|---|---|
| HPCS Injection Shutoff Valve | | | | |
| E22F004 | 4/3/20 | 0.0 | >1.0 | |
| | 6/2618 | 0.0 | | |
| | 3/14/16 | 0.011 | | |
| | 3/3/14 | 0.0 | | Retest |
| | 2/21/14 | 9.380 | | Failure. Adjusted closed limit switch to maximize thrust. |
| | 3/5/12 | 0 | | |
| LPCS Testable Check Valve | | | | |
| E21F006 | 3/29/20 | 0.017 | >1.0 | |
| | 4/28/18 | 0.0 | | |
| | 3/12/16 | 0.0 | | |
| | 3/1/14 | 0.0 | | |
| | 4/18/12 | 0.0 | | |
| LPCS Injection Shutoff Valve | | | | |
| E21F005 | 3/29/20 | 0.017 | >1.0 | |
| | 4/28/18 | 0.0 | | |
| | 3/12/16 | 0.0 | | |
| | 3/1/14 | 0.0 | | |
| | 4/18/12 | 0.0 | | |

Note: Residual Heat Removal (RHR); Reactor Core Isolation Cooling (RCIC); High Pressure Core Spray (HPCS); Low Pressure Core Spray (LPCS)

**PIV Leakage Test Exceptions**

**E12F041A, RHR "A" Testable Check Valve**

During the closeout review of WO 52415089 for PIV Number E12F041A, "RHR Testable Check Valve, A," Entergy Operations, Inc. (Entergy) identified that the high-pressure water test for this valve was missed. During the low-pressure leakage test, the leakage value recorded was the actual leakage instead of a required extrapolated leakage value. As a result, incorrect data was used, the test results were not properly confirmed per the procedure, and the high-pressure water test was not performed. Therefore, the current data was inadequate and the high-pressure water test was declared missed.

Upon identification of the missed high-pressure water test, Entergy evaluated the impact of the missed surveillance on the operability of PIV E12F041A. The purpose of the Leak Rate Test - High Pressure Water and Leak Rate Test - Low Pressure Water with respect to the E12F041A is to demonstrate operability of each Reactor Coolant System Pressure Isolation Valve (RCS-PIV).

The last 10 years of test data for the E12F041A is provided below.

- WO 50337114, 3/13/2004 Passed with 0.682 gpm
- WO 51034611, 4/1/2007 Passed with 0.207 gpm
- WO 51514645, 10/4/2008 Passed with 0.917 gpm
- WO 182307 5/13/2010 Passed with 0.710 gpm
- WO 52284024 4/26/2012 Passed with 0.273 gpm
- WO 52415089 3/8/2014 Incomplete with 4.941 gpm recorded

Based on review of leakage test data over the past 10 years, there was no degrading trend in valve leakage; This included three successful tests subsequent to the 2014 missed surveillance (i.e., in 2016, 2018, and 2020). As such, a jump in leakage of this magnitude would be unexpected. Water leakage data typically provides a degrading trend in valve seating, prior to failure. This is particularly true for normally out-of-service check valves that are infrequently cycled. E12F041A is a normally out-of-service check valve and is only in-service for a limited time for shutdown cooling during refueling outages. Additionally, the B loop of shutdown cooling is normally used in this lineup.

Incorrect data was used in the performance of Leak Rate Test - Low Pressure Water resulting in the surveillance data being inadequate and Leak Rate Test High Pressure Water testing being missed. Because it was not identified that the valve did not actually meet the leakage acceptance criteria; no troubleshooting was performed to determine if the indicated leakage was actual leakage through the check valve or test boundary leakage through isolation valves. When performing low-pressure water testing it is typical to validate boundaries and isolations if the leakage data is grossly out of specification. For RCS-PIV valves in particular there is an additional surveillance, Leak Rate Test High Pressure Water, to check the valve at high pressure, where it is designed to check and determine leakage. These additional actions were not taken to perform the test at higher pressure as required by the test procedure to troubleshoot the boundary. These considerations invalidate the documented test data since appropriate rigor required by the test procedure was not applied in validating the data.

Based on this data, Entergy subsequently concluded that if the high pressure water test was performed with proper troubleshooting per the procedure, the test would have meet the required surveillance criteria of less than 1 gpm. As a result, Entergy concluded that the E12F041A was fully operable to perform its design function, but was not fully tested in accordance with procedure. If the operators performing the test had recognized that the initial data was not accurate, steps would have been taken to check for boundary leakage and perform a higher-pressure test, as required. This would also include observing leakage through the vent path of the test boundary to confirm if leakage was past the tested valve.

**E22F004, HPCS Injection Shutoff Valve**

During the performance of low-pressure water testing of E22F004, the valve failed with a leakage rate of 9.380 gpm. The performance failure was due to the valve thrust being inadequate, as identified by diagnostic testing. The closed limit switch was adjusted to maximize thrust (i.e., increasing the valve thrust to the previous value where the water leakage test was successful). The post maintenance water leakage test was satisfactory.