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SCE&G®
A SCANA COMPANY

October 8, 2018
RC-18-0070

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
RELIEF REQUEST RR-4-14, USE OF A PERFORMANCE BASED TESTING FREQUENCY FOR PRESSURE ISOLATION VALVES AS AN ALTERNATIVE TO THE REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE FOR OPERATION AND MAINTENANCE OF NUCLEAR POWER PLANTS

In accordance with the provisions of 10 CFR 50.55a(z)(1), South Carolina Electric & Gas Company (SCE&G), acting for itself and as an agent for South Carolina Public Service Authority (Santee Cooper) hereby submits the attached request for using an alternative to the inservice testing requirements of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance (O&M) of Nuclear Power Plants. SCE&G has determined that the proposed alternative would provide an acceptable level of quality and safety.

A detailed description of the proposed alternative, including basis for relief, is enclosed with this letter SCE&G requests NRC review and approval of this request by October 5, 2019 to support planning for refueling outage (RF-25), which is scheduled to start in the Spring of 2020.

SCE&G is submitting the attached relief request in accordance with 10CFR50.55a(z)(1).

Should you have any questions, please call Michael S. Moore at 803-345-4752.

Very truly yours,

George A. Lippard

BAB/GAL/rp

Enclosure: Relief Request RR-4-14

cc: Without Enclosure unless noted

J.E. Addison	W. M. Cherry	NSRC
W.K. Kissam	C. Haney	RTS (CR-13-02110)
J. B. Archie	S. A. Williams (with enclosure)	File (810.19-2)
J. H. Hamilton	NRC Resident Inspector	PRSF (RC-18-0070) (with enclosure)
G.J. Lindamood	K.M. Sutton	

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

ENCLOSURE

Relief Request RR-4-14

1. ASME Code Component(s) Affected

Inservice Test (IST) Program Valve ID	IST Program Description*	Code Class	Code Category
XVG08701A-RH	RH Header A Isolation Valve (IRC)	1	A
XVG08701B-RH	RH Header B Isolation Valve (IRC)	1	A
XVG08702A-RH	RH Inlet Header A Isolation Valve	1	A
XVG08702B-RH	RH Inlet Header B Isolation Valve	1	A
XVC08948A-SI	SI Loop A Outlet Header Check Valve	1	A/C
XVC08948B-SI	SI Loop B Outlet Header Check Valve	1	A/C
XVC08948C-SI	SI Loop C Outlet Header Check Valve	1	A/C
XVC08956A-SI	SI Accum A Disch Header Check Valve	1	A/C
XVC08956B-SI	SI Accum B Disch Header Check Valve	1	A/C
XVC08956C-SI	SI Accum C Disch Header Check Valve	1	A/C
XVC08973A-SI	RCS Loop A Cold Leg Inlet Hdr Check Valve	1	A/C
XVC08973B-SI	RCS Loop B Cold Leg Inlet Hdr Check Valve	1	A/C
XVC08973C-SI	RCS Loop C Cold Leg Inlet Hdr Check Valve	1	A/C
XVC08974A-SI	SI Header A Check Valve (IRC)	2	A/C
XVC08974B-SI	SI Header B Check Valve (IRC)	2	A/C
XVC08988A-SI	RHR Supply Header Check Valve	1	A/C
XVC08988B-SI	RHR Supply Header Check Valve	1	A/C
XVC08990A-SI	Loop A Low Head Hot Leg Check Valve	1	A/C
XVC08990B-SI	Loop B Low Head Hot Leg Check Valve	1	A/C
XVC08990C-SI	Loop C Low Head Hot Leg Check Valve	1	A/C
XVC08992A-SI	Loop A High Head Hot Leg Check Valve	1	A/C
XVC08992B-SI	Loop B High Head Hot Leg Check Valve	1	A/C
XVC08992C-SI	Loop C High Head Hot Leg Check Valve	1	A/C
XVC08993A-SI	Loop A High Head Hot Leg Hdr Check Valve	1	A/C
XVC08993B-SI	Loop B High Head Hot Leg Hdr Check Valve	1	A/C
XVC08993C-SI	Loop C High Head Hot Leg Hdr Check Valve	1	A/C
XVC08995A-SI	Loop A High Head Cold Leg Check Valve	1	A/C
XVC08995B-SI	Loop B High Head Cold Leg Check Valve	1	A/C
XVC08995C-SI	Loop C High Head Cold Leg Check Valve	1	A/C
XVC08997A-SI	Loop A Low Head Cold Leg Check Valve	1	A/C
XVC08997B-SI	Loop B Low Head Cold Leg Check Valve	1	A/C
XVC08997C-SI	Loop C Low Head Cold Leg Check Valve	1	A/C
XVC08998A-SI	Loop A Low Head Cold Leg Check Valve	1	A/C
XVC08998B-SI	Loop B Low Head Cold Leg Check Valve	1	A/C
XVC08998C-SI	Loop C Low Head Cold Leg Check Valve	1	A/C

* **Acronym Key**: **SI** – Safety Injection
RHR – Residual Heat Removal

2. Applicable Code Edition and Addenda

American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) 2004 Edition through OMb-2006 Addenda.

3. Applicable Code Requirement

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

ASME OM Code Subsection ISTC-3630(a), *Frequency*, states, "Tests shall be conducted at least once every 2 years."

4. Reason for Request

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

ASME OM Code Subsection ISTC-3630 paragraph (a) 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 of 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).

The Virgil C. Summer Nuclear Station (VCSNS), Unit 1, Technical Specification (TS) 6.8.4.g, Containment Leakage Rate Testing Program, currently contains a requirement to establish the containment leakage rate testing program in accordance with the guidelines contained in NEI 94-01, *Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J.*

NEI 94-01, Paragraph 10.2.3.2, *Extended Test Interval*, states (in part):

> "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. Test intervals for

4. <u>Reason for Request (continued)</u>

Type C valves should be determined by a licensee in accordance with Section 11.0."

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. The discussion concludes that CIVs, which have demonstrated good performance by the successful completion of two consecutive leakage rate tests over two consecutive cycles, may increase their test frequencies. 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 request are all in water applications. Testing is performed with water pressurized to slightly below or at the function maximum pressure differential; however, where necessary the observed leakage is adjusted to the function maximum pressure differential value in accordance with ASME OM Code Subsection ISTC-3630, paragraph (b) *Differential Test Pressure*, item (4). Testing of the PIVs is performed during plant startup following a refueling shutdown. The testing is performed by applying test pressure to the Reactor Coolant System (RCS) side of the disk by using the RCS as the pressure source or the Charging System via the Emergency Core Cooling System (ECCS) test header and the associated flow meters. Although the testing of the PIVs includes a limit on allowable PIV leakage rate, the main purpose of this limit is to prevent overpressure failure of the low-pressure portions of connecting systems. The allowable leakage limit provides a standard against which the PIV leakage can be compared to determine if the component is degraded or degrading. Excessive PIV leakage (i.e., greater than the allowable leakage limit) could lead to overpressure of the low-pressure piping or components, potentially resulting in a loss of coolant accident (LOCA) outside of containment.

This proposed alternative is intended to provide for a performance-based scheduling of PIV tests at VCSNS. The primary reason for requesting this alternative is to eliminate unnecessary thermal cycles in the RCS cold leg safety injection piping. A periodic thermal transient was identified in the RCS Cold Leg Safety Injection (SI) piping after every post-refueling heat-up, since approximately 1999. These transients coincide with the testing of the RCS PIVs, which causes the inlet check valves (XVC08998A-SI, XVC08998B-SI, and XVC08998C-SI) to open during this portion of testing, allowing cooler Volume Control Tank (VCT) temperature water into the Safety Injection (SI) piping.

4. Reason for Request (continued)

These thermal transients, identified by the plant thermal cycle counting software, are counted against allowable fatigue usage totals for the affected piping system. For the RCS Cold Leg SI lines, the approximate fatigue usage is at 70% of the allowable. As a result of the high cumulative usage factor, additional ultrasonic inspections of the welds and elbows of the RCS Cold Leg SI lines A, B, and C in areas susceptible to thermal stratification were performed during refueling outage RF-21 in April 2014, with acceptable exam results. The proposed extended test intervals would reduce the frequency and, therefore, the impact of injecting ECCS water into the RCS during testing.

An additional reason for requesting this alternative is dose reduction to conform with Nuclear Regulatory Commission (NRC) and industry As Low As Reasonably Achievable (ALARA) radiation dose principles. The nominal fuel cycle lengths at VCSNS are 18 months. However, since refueling outages (RFOs) may be scheduled slightly beyond 18 months, a 60-month period is used to provide a bounding timeframe to encompass three RFOs. The review of recent historical data identified that PIV testing results in a total personnel dose of approximately 300 milli-Roentgen Equivalent Man (mREM) each RFO.

A PIV, which has demonstrated leakage less than its allowable leakage limit for two consecutive cycles, is classified as a good performer. The proposed extended test intervals would provide for a savings of approximately 600 mrem over an approximate 60-month period (three RFOs), assuming all of the PIVs remain classified as good performers.

NUREG-0933, *Resolution of Generic Safety Issues*, Section 3, Issue 105, *Interfacing Systems LOCA at LWRs,* discussed the need for PIV leak rate testing based primarily on three pre-1985 historical failures of applicable valves industry-wide. These failures all involved human errors in either operations or maintenance. 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 valve's ability to reposition from open to closed.

4. Reason for Request (continued)

For check valves, functional testing is accomplished in accordance with ASME OM Code Mandatory Appendix II, *Check Valve Condition Monitoring Program*. For power-operated valves, full stroke functional testing is accomplished in accordance with the ASME OM Code paragraph ISTC-3521, *Category A and Category B Valves*. Performance of the separate two-year PIV leak rate testing does not contribute any additional assurance of functional capability but rather provides added assurance of valve integrity, thereby reducing the probability of gross valve failure and consequent intersystem LOCA.

5. Proposed Alternative and Basis for Use

SCE&G proposes to perform PIV testing at VCSNS 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 extended test eligibility process guidance under 10 CFR 50, Appendix J, Option B. These valves have been historically tested at the required interval schedule, which is currently every refueling outage, or two years, as specified in ASME OM Code Subsection ISTC-3630 paragraph (a). Leakage rates less than the leakage limits found in TS and VCSNS procedure STP-215.008, "SI and RH System Valve Leakage Test", shall be considered acceptable. Valves that have demonstrated good performance for two consecutive cycles may have their test interval extended to every third refueling outage, not to exceed 60-months. Any PIV leakage test failure would require the component to return to the initial interval of every RFO or two years until good performance is re-established. This direction/requirement will be added to the PIV testing procedure, STP-215.008, SI and RH System Valve Leakage Test, will be a commitment in accordance with the station's Procedure/Commitment Accountability Program (P/CAP), SAP-0630, and will serve to initiate corrective action as warranted.

The functional capability of the motor-operated valves (MOVs) included within this alternative request is demonstrated by the full exercise test and stroke time testing (both the open and close directions) performed at a cold shutdown frequency in accordance with ASME OM Code, paragraph ISTC-3521(c).

5. Proposed Alternative and Basis for Use (continued)

Additionally, the MOVs are position indication tested at a biennial frequency in accordance with ASME OM Code, paragraph ISTC-3700. These tests are separate and distinct from the leakage determining function, which PIV testing demonstrates.

The functional capability of the check valves included within this alternative request is demonstrated by the open and close exercising performed in accordance with ASME OM Code, Appendix II, paragraph II-4000(b), *Optimization of Condition-Monitoring Frequencies*, and satisfying the requirements of 10 CFR 50.55a(b)(3)(iv). The Condition Monitoring Plans for the check valves currently include open verification testing performed at least every third RFO. Additionally, PIV leak testing is currently performed every RFO and credited with confirming closure of the check valve when performed concurrently with open verification testing.

Note that NEI 94-01 does not address seat leakage testing with water. Instead, NEI 94-01 was cited as an approach similar to the requested alternative method and provides reasonable assurance of continued PIV operational readiness.

If this proposed alternative is authorized and the PIVs continue to exhibit good performance, the PIV test frequency could be extended such that testing would not be required each RFO. Instead, testing would be conducted at an interval not to exceed every third refueling outage or 60-months.

Tables 1 and 2 below present historical test data that demonstrates acceptable PIV performance for the Residual Heat Removal and SI systems. Individual testing of PIVs is performed for the purposes of identifying leakage and troubleshooting when required.

5. Proposed Alternative and Basis for Use (continued)

Group testing of PIVs is performed where such capability exists. Group testing is more conservative, in that, the same limit is applied when testing a single valve or group consisting of multiple valves. The comments sections in the tables below delineate the manner of testing performed.

Table 1: Historical Leak Rate Test Performance for Residual Heat Removal PIVs

IST Program Valve ID	Date of Test	Measured Value (gpm)	TS Allowable Leakage Limit (gpm)	Comments
XVG08701A-RH	12/5/2012	0.242	5	Individual Leak Rate
XVG08701A-RH	5/29/2014	0.23	5	
XVG08701A-RH	11/30/2015	0.16	5	
XVG08701A-RH	5/31/2017	0.16	5	
XVG08701B-RH	12/5/2012	0.62	5	Individual Leak Rate
XVG08701B-RH	5/29/2014	0.29	5	
XVG08701B-RH	11/30/2015	0.77	5	
XVG08701B-RH	5/31/2017	0.21	5	
XVG08702A-RH	12/5/2012	0.715	5	Individual Leak Rate
XVG08702A-RH	5/29/2014	0.32	5	
XVG08702A-RH	11/30/2015	0.0	5	
XVG08702A-RH	5/31/2017	0.04	5	
XVG08702B-RH	12/5/2012	1.14	5	Individual Leak Rate
XVG08702B-RH	5/29/2014	0.32	5	
XVG08702B-RH	11/30/2015	0.93	5	
XVG08702B-RH	5/31/2017	0.76	5	

5. Proposed Alternative and Basis for Use (continued)

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

IST Program Valve ID	Date of Test	Measured Value (gpm)	TS Allowable Leakage Limit (gpm)	Comments
XVC08948A-SI	12/5/2012	0.32	5	Individual Leak Rate
XVC08948A-SI	5/29/2014	0.5	5	
XVC08948A-SI	11/30/2015	0.0	5	
XVC08948A-SI	5/31/2017	0.30	5	
XVC08948B-SI	12/5/2012	0.17	5	Individual Leak Rate
XVC08948B-SI	5/29/2014	3.3	5	
XVC08948B-SI	11/30/2015	0.11	5	
XVC08948B-SI	5/31/2017	0.35	5	
XVC08948C-SI	12/5/2012	0.2	5	Individual Leak Rate
XVC08948C-SI	5/29/2014	2.4	5	
XVC08948C-SI	11/30/2015	0.15	5	
XVC08948C-SI	5/31/2017	0.15	5	
XVC08956A-SI	12/5/2012	0.13	5	Individual Leak Rate
XVC08956A-SI	5/29/2014	0.1	5	
XVC08956A-SI	11/30/2015	0.0	5	
XVC08956A-SI	5/31/2017	0.13	5	
XVC08956B-SI	12/5/2012	0.13	5	Individual Leak Rate
XVC08956B-SI	5/29/2014	0.1	5	
XVC08956B-SI	11/30/2015	0.13	5	
XVC08956B-SI	5/31/2017	0.10	5	
XVC08956C-SI	12/5/2012	0.12	5	Individual Leak Rate
XVC08956C-SI	5/29/2014	0.5	5	
XVC08956C-SI	11/30/2015	0.11	5	
XVC08956C-SI	5/31/2017	0.12	5	
XVC08973A-SI	12/5/2012	0.4	3	Individual Leak Rate
XVC08973A-SI	5/29/2014	0.42	3	
XVC08973A-SI	11/30/2015	0.34	3	
XVC08973A-SI	5/31/2017	0.17	3	

5. Proposed Alternative and Basis for Use (continued)

Table 2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	TS Allowable Leakage Limit (gpm)	Comments
XVC08973B-SI	12/5/2012	0.82	3	Individual Leak Rate
XVC08973B-SI	5/29/2014	0.44	3	
XVC08973B-SI	11/30/2015	0.38	3	
XVC08973B-SI	5/31/2017	0.30	3	
XVC08973C-SI	12/5/2012	0.2	3	Individual Leak Rate
XVC08973C-SI	5/29/2014	0.37	3	
XVC08973C-SI	11/30/2015	0.40	3	
XVC08973C-SI	5/31/2017	0.23	3	
XVC08974A-SI	12/5/2012	0.38	5	Individual Leak Rate
XVC08974A-SI	5/29/2014	0.24	5	
XVC08974A-SI	11/30/2015	0.17	5	
XVC08974A-SI	5/31/2017	0.0	5	
XVC08974B-SI	12/5/2012	0.61	5	Individual Leak Rate
XVC08974B-SI	5/29/2014	0.23	5	
XVC08974B-SI	11/30/2015	0.16	5	
XVC08974B-SI	5/31/2017	0.0	5	
XVC08988A-SI	12/5/2012	0.21	3	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08988A-SI	5/29/2014	0.93	3	Group Leak Rate (5 valves: XVC08988A/B-SI; XVC08990A/B/C-SI)
XVC08988A-SI	11/30/2015	0.96	3	Group Leak Rate (2 valves: XVC08988A/B-SI)
XVC08988A-SI	5/31/2017	0.0	3	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)

5. Proposed Alternative and Basis for Use (continued)

Table 2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	TS Allowable Leakage Limit (gpm)	Comments
XVC08988B-SI	12/5/2012	0.21	3	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08988B-SI	5/29/2014	0.93	3	Group Leak Rate (5 valves: XVC08988A/B-SI; XVC08990A/B/C-SI)
XVC08988B-SI	11/30/2015	0.96	3	Group Leak Rate (2 valves: XVC08988A/B-SI)
XVC08988B-SI	5/31/2017	0.0	3	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08990A-SI	12/5/2012	0.21	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08990A-SI	5/29/2014	0.93	1	Group Leak Rate (5 valves: XVC08988A/B-SI; XVC08990A/B/C-SI)
XVC08990A-SI	11/30/2015	0.1	1	Group Leak Rate (3 valves: XVC08990A/B/C-SI)
XVC08990A-SI	5/31/2017	0.0	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08990B-SI	12/5/2012	0.21	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08990B-SI	5/29/2014	0.93	1	Group Leak Rate (5 valves: XVC08988A/B-SI; XVC08990A/B/C-SI)
XVC08990B-SI	11/30/2015	0.1	1	Group Leak Rate (3 valves: XVC08990A/B/C-SI)
XVC08990B-SI	5/31/2017	0.0	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)

5. Proposed Alternative and Basis for Use (continued)

Table 2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	TS Allowable Leakage Limit (gpm)**	Comments
XVC08990C-SI	12/5/2012	0.21	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08990C-SI	5/29/2014	0.93	1	Group Leak Rate (5 valves: XVC08988A/B-SI; XVC08990A/B/C-SI)
XVC08990C-SI	11/30/2015	0.1	1	Group Leak Rate (3 valves: XVC08990A/B/C-SI)
XVC08990C-SI	5/31/2017	0.0	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08992A-SI	12/5/2012	0.21	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08992A-SI	5/29/2014	0.86	1	Group Leak Rate (2 valves: XVC08992A/C-SI)
XVC08992A-SI	11/30/2015	0.38	1	Group Leak Rate (3 valves: XVC08992A/B/C-SI)
XVC08992A-SI	5/31/2017	0.0	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08992B-SI	12/5/2012	0.21	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08992B-SI	5/29/2014	0.41	1	Individual Leak Rate
XVC08992B-SI	11/30/2015	0.38	1	Group Leak Rate (3 valves: XVC08992A/B/C-SI)
XVC08992B-SI	5/31/2017	0.0	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)

5. Proposed Alternative and Basis for Use (continued)

Table 2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	TS Allowable Leakage Limit (gpm)	Comments
XVC08992C-SI	12/5/2012	0.21	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08992C-SI	5/29/2014	0.86	1	Group Leak Rate (2 valves: XVC08992A/C-SI)
XVC08992C-SI	11/30/2015	0.38	1	Group Leak Rate (3 valves: XVC08992A/B/C-SI)
XVC08992C-SI	5/31/2017	0.0	1	Group Leak Rate (8 valves: XVC08988A/B-SI; XVC08990A/B/C-SI; XVC08992A/B/C-SI)
XVC08993A-SI	12/5/2012	0.97	3	Group Leak Rate (3 valves: XVC08993A/B/C-SI)
XVC08993A-SI	5/29/2014	0.41	3	
XVC08993A-SI	11/30/2015	0.90	3	
XVC08993A-SI	5/31/2017	0.86	3	
XVC08993B-SI	12/5/2012	0.97	3	Group Leak Rate (3 valves: XVC08993A/B/C-SI)
XVC08993B-SI	5/29/2014	0.41	3	
XVC08993B-SI	11/30/2015	0.90	3	
XVC08993B-SI	5/31/2017	0.86	3	
XVC08993C-SI	12/5/2012	0.97	3	Group Leak Rate (3 valves: XVC08993A/B/C-SI)
XVC08993C-SI	5/29/2014	0.41	3	
XVC08993C-SI	11/30/2015	0.90	3	
XVC08993C-SI	5/31/2017	0.86	3	
XVC08995A-SI	12/5/2012	0.72	1	Group Leak Rate (6 valves: XVC08995A/B/C-SI; XVC08997A/B/C-SI)
XVC08995A-SI	5/29/2014	0.45	1	
XVC08995A-SI	11/30/2015	0.16	1	
XVC08995A-SI	5/31/2017	0.42	1	
XVC08995B-SI	12/5/2012	0.72	1	Group Leak Rate (6 valves: XVC08995A/B/C-SI; XVC08997A/B/C-SI)
XVC08995B-SI	5/29/2014	0.45	1	
XVC08995B-SI	11/30/2015	0.16	1	
XVC08995B-SI	5/31/2017	0.42	1	

5. Proposed Alternative and Basis for Use (continued)

Table 2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	TS Allowable Leakage Limit (gpm)	Comments
XVC08995C-SI	12/5/2012	0.72	1	Group Leak Rate (6 valves: XVC08995A/B/C-SI; XVC08997A/B/C-SI)
XVC08995C-SI	5/29/2014	0.45	1	
XVC08995C-SI	11/30/2015	0.16	1	
XVC08995C-SI	5/31/2017	0.42	1	
XVC08997A-SI	12/5/2012	0.72	1	Group Leak Rate (6 valves: XVC08995A/B/C-SI; XVC08997A/B/C-SI)
XVC08997A-SI	5/29/2014	0.45	1	
XVC08997A-SI	11/30/2015	0.16	1	
XVC08997A-SI	5/31/2017	0.42	1	
XVC08997B-SI	12/5/2012	0.72	1	Group Leak Rate (6 valves: XVC08995A/B/C-SI; XVC08997A/B/C-SI)
XVC08997B-SI	5/29/2014	0.45	1	
XVC08997B-SI	11/30/2015	0.16	1	
XVC08997B-SI	5/31/2017	0.42	1	
XVC08997C-SI	12/5/2012	0.72	1	Group Leak Rate (6 valves: XVC08995A/B/C-SI; XVC08997A/B/C-SI)
XVC08997C-SI	5/29/2014	0.45	1	
XVC08997C-SI	11/30/2015	0.16	1	
XVC08997C-SI	5/31/2017	0.42	1	
XVC08998A-SI	12/5/2012	1.0	3	Individual Leak Rate
XVC08998A-SI	5/29/2014	0.29	3	
XVC08998A-SI	11/30/2015	0.88	3	
XVC08998A-SI	5/31/2017	0.96	3	
XVC08998B-SI	12/5/2012	1.34	3	Individual Leak Rate
XVC08998B-SI	5/29/2014	0.90	3	
XVC08998B-SI	11/30/2015	0.91	3	
XVC08998B-SI	5/31/2017	0.20	3	
XVC08998C-SI	12/5/2012	0.58	3	Individual Leak Rate
XVC08998C-SI	5/29/2014	0.32	3	
XVC08998C-SI	11/30/2015	0.41	3	
XVC08998C-SI	5/31/2017	0.41	3	

5. Proposed Alternative and Basis for Use (continued)

The specific interval for each valve would be a function of its performance. The proposed approach is analogous to that used when establishing performance-based intervals for containment isolation valves in accordance with 10 CFR 50, Appendix J, *Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors*, Option B, *Performance-Based Requirements*.

Additional bases and considerations for this proposed alternative are provided below:

Separate functional testing of MOV PIVs and check valve PIVs will continue to be conducted per the ASME OM Code.

There is a low likelihood of valve mis-positioning during power operations (e.g., alignment and valve position verification procedures, interlocks).

Relief valves in the low pressure (LP) piping may not provide inter-system LOCA (ISLOCA) mitigation for inadvertent PIV mis-positioning, but their relief capacity can accommodate conservative PIV seat leakage rates.

Alarms are provided that identify high pressure to low pressure leakage. Operators are highly trained to recognize symptoms of a present ISLOCA and to take appropriate actions.

Based on valve performance history, there is continued assurance of valve operational readiness, as required by ASME OM-2004 Code, paragraph ISTC-3630. Therefore, this proposed alternative to extend the testing frequency will continue to provide assurance of the valves' operational readiness and provides an acceptable level of quality and safety pursuant to 10 CFR 50.55a(z)(1).

6. Duration of Proposed Alternative

This request, upon approval, will be applied to the remainder of the station's fourth 10-year interval, which commenced January 1, 2014, and is currently scheduled to end on December 31, 2023.

7. Precedence

The NRC approved similar relief requests for the following boiling water reactors for extending the PIV leakage test intervals based on good performance and low risk factor (which was noted as a logical progression to a performance-based program):

1. GVRR-3 was approved for Nine Mile Point Nuclear Station, for the fourth and third 10-year intervals for Units 1 and 2, respectively, in letter from NRC (J. G. Danna) to Exelon Generation Company, LLC (B. C. Hanson), "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 (ML17136A112).
2. GVRR-2 was approved for Peach Bottom Atomic Power Station, Units 2 and 3, in a letter from NRC (D. A. Broaddus) to Exelon Nuclear (B. C. Hanson), "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 (ML16235A340).
3. RV-03 was approved for Dresden Nuclear Power Station, Units 2 and 3 for the fifth IST interval in a letter from NRC (T. L. Tate) to Exelon Generation Company, LLC (B. C. Hanson), "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 andMF5090)," dated October 27, 2015 (ML15174A303).
4. RV-03 was approved for Quad Cities Nuclear Power Station, Units 1 and 2 in a letter from NRC (J. S. Wiebe) to Exelon Generation Company, LLC (M. J. Pacilio), "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, ... and ME7995)," dated February 14, 2013 (ML13042A348).
5. VRR-013 was approved for Fermi Power Station for the third IST Interval in a letter from NRC (R. J. Pascarelli) to Detroit Edison (J. M. Davis), "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 (ML102360570).

8. References

1. 10 CFR 50.55a, *Codes and Standards,* paragraphs (b)(3)(iv) and (z)(1)
2. ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code), 2004 Edition through OMb-2006 Addenda
3. Letter from NRC (S. Bahadur) to NEI (B. Bradley), *Final Safety Evaluation of Nuclear Energy Institute (NEI) Report, 94-01, Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J" (TAC No. ME2164),* dated June 8, 2012 (ML121030286)
4. NRC Information Bulletin 88-08, *Thermal Stresses in Piping Connected to Reactor Coolant Systems*, dated June 22, 1988
5. NUREG-0933, Resolution of Generic Safety Issues, (Main Report with Supplements 1-34); Section 3, New Generic Issues; Issue 105: Interfacing Systems LOCA at LWRs (Rev. 4); Fard, M. Reisi; U.S. NRC, Division of Risk Analysis; Published December 2011