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SCE&G®
A SCANA COMPANY

October 8, 2018
RC-18-0067

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
LICENSE AMENDMENT REQUEST - LAR-16-00644
LICENSE AMENDMENT REQUEST - REVISE REACTOR COOLANT SYSTEM OPERATIONAL LEAKAGE TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENT 4.4.6.2.2

Pursuant to 10 CFR 50.90, South Carolina Electric & Gas Company (SCE&G), acting for itself and as an agent for South Carolina Public Service authority, hereby requests a license amendment to change Technical Specifications (TS) 4.4.6.2.2 (a). The surveillance frequency will be revised to change the frequency from "each refueling outage" to allow it to be extended to a performance-based frequency not to exceed three refueling outages or 60 months following two consecutive satisfactory tests.

The Enclosure contains a description of the proposed changes. Attachment 1 contains a list of regulatory commitments. Attachment 2 contains existing TS pages marked to show the proposed changes. Attachment 3 contains the reprinted version of the affected TS pages. Attachment 4 contains existing TS Bases pages marked to show the proposed changes.

This amendment request was evaluated and found to have no significant hazards for consideration, as determined per 10 CFR 50.92. Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of this amendment.

Approval of the proposed amendment is requested by October 5, 2019, to support RF-25. Once approved, the amendment shall be implemented within 60 days.

The VCSNS Plant Safety Review Committee and the Nuclear Safety Review Committee have reviewed and approved the proposed change. SCE&G is notifying the State of South Carolina of this LAR by transmitting a copy of this letter and enclosure to the designated State Official in accordance with 10 CFR 50.91(b).

If there are any questions or if additional information is needed, please contact Michael S. Moore at (803) 345-4752

I declare under penalty of perjury that the foregoing is true and correct.

10/8/18
Executed on

George A. Lippard

BAB/GAL/rp

Enclosure: Description and Assessment of the Proposed Changes
Attachment 1: List of Regulatory Commitments
Attachment 2: Existing TS Pages Marked to Show the Proposed Changes
Attachment 3: Revised (Clean) TS Pages
Attachment 4: Existing TS Bases Pages Marked to Show the Proposed Changes

c: Without Enclosure/Attachments unless noted
J. E. Addison
W. K. Kissam
J. B. Archie
J. H. Hamilton
G. J. Lindamood
W. M. Cherry
C. Haney
S. A. Williams (with Enclosure/Attachments)
NRC Resident Inspector
K. M. Sutton
S. E. Jenkins
P. Ledbetter
NSRC
RTS (CR-16-00644)
File (813.20)
PRSF (RC-18-0067) (with Enclosure/Attachments)

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

Enclosure

Description and Assessment of the Proposed Changes

Subject: License Amendment Request - Revise Reactor Coolant System Operational Leakage Technical Specification Surveillance Requirement 4.4.6.2.2

1.0 SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90, South Carolina Electric and Gas Company (SCE&G) hereby requests an amendment to the Virgil C. Summer Nuclear Station (VCSNS), Unit 1, Reactor Coolant System (RCS) Operational Leakage Technical Specifications (TS) Surveillance Requirement (SR) 4.4.6.2.2.

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 Pressure Isolation Valves (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 SI piping.

The existing TS 4.4.6.2.2 requires that each RCS PIV specified in TS Table 3.4-1, Reactor Coolant System Pressure Isolation Valves, shall be demonstrated OPERABLE by verifying leakage to be within its TS allowable leakage limit during start up, following each refueling outage (RFO). For VCSNS, this translates to a scheduled 18-month testing interval. This license amendment request (LAR) proposes to change the VCSNS TS SR 4.4.6.2.2 and associated bases as follows:

- Revise the TS leakage verification requirement to allow it to be extended to a performance-based frequency not to exceed three refueling outages or 60 months following two consecutive satisfactory tests.

- Revise the TS bases to clarify the manner in which leakage verification requirements are accomplished for the PIVs listed in TS Table 3.4-1.

2.0 DETAILED DESCRIPTION

The existing TS SR 4.4.6.2.2 states:

"Each Reactor Coolant System Pressure Isolation Valve specified in Table 3.4-1 shall be demonstrated OPERABLE by verifying leakage to be within its limit.

a. During startup following each refueling outage.

b. Prior to returning the valve to service following maintenance repair or replacement work on the valve.

c. Prior to entering MODE 2 following valve actuation due to automatic or manual action or flow through the valve for valves denoted on Table 3.4-1 by an asterisk*.

d. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4."

This LAR proposes changes to TS 4.4.6.2.2, item a., which will read as follows:

"Each Reactor Coolant System Pressure Isolation Valve specified in Table 3.4-1 shall be demonstrated OPERABLE by verifying leakage to be within its limit.

a. During startup following each refueling outage, which may be extended to a performance-based frequency not to exceed three refueling outages or 60 months following two consecutive satisfactory tests."

This LAR also proposes changes to TS 4.4.6.2.2 Bases, which will read as follows:

"PIV testing is being conducted on a performance-based testing interval. Performance-based is defined as a PIV which demonstrates good performance for two consecutive outages and may have its test interval extended to every third refueling outage, not to exceed 60 months. A PIV, which has demonstrated leakage less than its TS allowable leakage limit for two consecutive outages is classified as a good performer. In the event of a PIV leakage test failure, PIV testing would require the component to return to the initial interval of every refueling outage until good performance is re-established.

Those PIVs listed in TS Table 3.4-1 will be demonstrated OPERABLE by verifying their leakage rates are within TS allowable leakage limits via testing performed at a frequency based on their "good" performance, ranging from every RFO to every third RFO, not to exceed 60 months."

Attachment 1 provides the VCSNS regulatory commitment list. A markup of TS 4.4.6.2.2.a is provided in Attachment 2. Attachment 3 contains the "clean" re-typed TS 4.4.6.2.2 page. In addition, the TS 4.4.6.2.2 Bases changes mark-ups are provided in Attachment 4 for information purposes only and will be implemented in accordance with the VCSNS TS Bases Control Program.

3.0 TECHNICAL EVALUATION

RCS PIVs are defined as two normally closed valves in series with the reactor coolant pressure boundary (RCPB), which separate the high-pressure RCS from an attached lower pressure system. Excessive PIV leakage could lead to overpressure of the low-pressure piping or components, potentially resulting in a loss of coolant accident (LOCA) outside of containment.

The TS surveillance requirement (SR) for RCS PIVs provides added assurance of valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA (ISLOCA). The RCS PIV TS allowable leakage limit applies to each individual valve. Leakage through both series PIVs in a line must be included as part of the IDENTIFIED LEAKAGE governed by VCSNS TS 3.4.6.2, "Reactor Coolant System Operational Leakage." This is true during operation only when the loss of RCS mass through two series valves is determined by water inventory balance (SR 4.4.6.2.1.d).

VCSNS proposes to perform PIV testing on performance-based intervals ranging from every RFO to every third RFO, not to exceed 60 months. 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* (Reference 1). The significant differences between these approaches is that the PIVs will be tested using water as a test medium, not air, and will utilize TS allowable leakage limits, not administrative limits. These TS PIVs have been historically tested at the required interval schedule, which is currently every RFO, or two years, as specified in the American Society of Mechanical Engineers (ASME) Operations and Maintenance (OM) Code Subsection ISTC, *Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants*,

paragraph ISTC-3630, Leakage Rate for Other Than Containment Isolation Valves, subparagraph (a) *Frequency*.

Following implementation of this LAR, valves that have demonstrated good performance for two consecutive outages may have their test interval extended to every third RFO, not to exceed 60 months. A PIV, which has demonstrated leakage less than its TS allowable leakage limit for two consecutive outages is classified as a good performer. Any PIV leakage test failure would require the component to return to the initial interval of every RFO until good performance is re-established.

The PIVs identified in TS 3.4-1, which are subject to the proposed changes in this LAR, 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 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. The purpose of the test is to perform Category A, seat leakage testing of the PIVs. 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 TS allowable leakage limit provides a means of assessing if the PIVs between the RCS and the connecting system are degraded or degrading. Excessive PIV leakage could lead to overpressure of the low-pressure piping or components, potentially resulting in a LOCA outside of containment. This proposed change does not revise any TS PIV allowable leakage limits.

Tables 3-1 and 3-2 are provided to depict past component performance for the Residual Heat Removal and Safety Injection Check Valve PIVs, respectively.

Table 3-1: Historical Leak Rate Test Performance for Residual Heat Removal PIVs

Inservice Testing (IST) Program Valve ID	Date of Test	Measured Value gallons per minute (gpm)	Allowable Leakage Limit (gpm)*
XVG08701A-RH	12/5/2012	0.242	5
XVG08701A-RH	5/29/2014	0.23	
XVG08701A-RH	11/30/2015	0.16	
XVG08701A-RH	5/31/2017	0.16	
XVG08701B-RH	12/5/2012	0.62	5
XVG08701B-RH	5/29/2014	0.29	
XVG08701B-RH	11/30/2015	0.77	
XVG08701B-RH	5/31/2017	0.21	
XVG08702A-RH	12/5/2012	0.715	5
XVG08702A-RH	5/29/2014	0.32	
XVG08702A-RH	11/30/2015	0.00	
XVG08702A-RH	5/31/2017	0.04	
XVG08702B-RH	12/5/2012	1.14	5
XVG08702B-RH	5/29/2014	0.32	
XVG08702B-RH	11/30/2015	0.93	
XVG08702B-RH	5/31/2017	0.76	

Table 3-2: Historical Leak Rate Test Performance for SI Check Valve PIVs

IST Program Valve ID	Date of Test	Measured Value (gpm)	Allowable Leakage Limit (gpm)**
XVC08948A-SI	12/5/2012	0.32	5
XVC08948A-SI	5/29/2014	0.50	
XVC08948A-SI	11/30/2015	0.00	
XVC08948A-SI	5/31/2017	0.30	
XVC08948B-SI	12/5/2012	0.17	5
XVC08948B-SI	5/29/2014	3.30	
XVC08948B-SI	11/30/2015	0.11	
XVC08948B-SI	5/31/2017	0.35	
XVC08948C-SI	12/5/2012	0.20	5
XVC08948C-SI	5/29/2014	2.40	
XVC08948C-SI	11/30/2015	0.15	
XVC08948C-SI	5/31/2017	0.15	
XVC08956A-SI	12/5/2012	0.13	5
XVC08956A-SI	5/29/2014	0.10	
XVC08956A-SI	11/30/2015	0.00	
XVC08956A-SI	5/31/2017	0.13	
XVC08956B-SI	12/5/2012	0.13	5
XVC08956B-SI	5/29/2014	0.10	
XVC08956B-SI	11/30/2015	0.13	
XVC08956B-SI	5/31/2017	0.10	
XVC08956C-SI	12/5/2012	0.12	5
XVC08956C-SI	5/29/2014	0.50	
XVC08956C-SI	11/30/2015	0.11	
XVC08956C-SI	5/31/2017	0.12	

Table 3-2: Historical Leak Rate Test Performance for SI Check Valve PIVs

IST Program Valve ID	Date of Test	Measured Value (gpm)	Allowable Leakage Limit (gpm)**
XVC08973A-SI	12/5/2012	0.40	3
XVC08973A-SI	5/29/2014	0.42	
XVC08973A-SI	11/30/2015	0.34	
XVC08973A-SI	5/31/2017	0.17	
XVC08973B-SI	12/5/2012	0.82	3
XVC08973B-SI	5/29/2014	0.44	
XVC08973B-SI	11/30/2015	0.38	
XVC08973B-SI	5/31/2017	0.30	
XVC08973C-SI	12/5/2012	0.20	3
XVC08973C-SI	5/29/2014	0.37	
XVC08973C-SI	11/30/2015	0.40	
XVC08973C-SI	5/31/2017	0.23	
XVC08974A-SI	12/5/2012	0.38	5
XVC08974A-SI	5/29/2014	0.24	
XVC08974A-SI	11/30/2015	0.17	
XVC08974A-SI	5/31/2017	0.00	
XVC08974B-SI	12/5/2012	0.61	5
XVC08974B-SI	5/29/2014	0.23	
XVC08974B-SI	11/30/2015	0.16	
XVC08974B-SI	5/31/2017	0.00	
XVC08988A-SI	12/5/2012	0.21	3
XVC08988A-SI	5/29/2014	0.93	
XVC08988A-SI	11/30/2015	0.96	
XVC08988A-SI	5/31/2017	0.00	
XVC08988B-SI	12/5/2012	0.21	3
XVC08988B-SI	5/29/2014	0.93	
XVC08988B-SI	11/30/2015	0.96	
XVC08988B-SI	5/31/2017	0.00	

Table 3-2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	Allowable Leakage Limit (gpm)**
XVC08990A-SI	12/5/2012	0.21	1
XVC08990A-SI	5/29/2014	0.93	
XVC08990A-SI	11/30/2015	0.10	
XVC08990A-SI	5/31/2017	0.00	
XVC08990B-SI	12/5/2012	0.21	1
XVC08990B-SI	5/29/2014	0.93	
XVC08990B-SI	11/30/2015	0.10	
XVC08990B-SI	5/31/2017	0.00	
XVC08990C-SI	12/5/2012	0.21	1
XVC08990C-SI	5/29/2014	0.93	
XVC08990C-SI	11/30/2015	0.10	
XVC08990C-SI	5/31/2017	0.00	
XVC08992A-SI	12/5/2012	0.21	1
XVC08992A-SI	5/29/2014	0.86	
XVC08992A-SI	11/30/2015	0.38	
XVC08992A -SI	5/31/2017	0.00	
XVC08992B-SI	12/5/2012	0.21	1
XVC08992B-SI	5/29/2014	0.41	
XVC08992B-SI	11/30/2015	0.38	
XVC08992B-SI	5/31/2017	0.00	
XVC08992C-SI	12/5/2012	0.21	1
XVC08992C-SI	5/29/2014	0.86	
XVC08992C-SI	11/30/2015	0.38	
XVC08992C-SI	5/31/2017	0.00	
XVC08993A-SI	12/5/2012	0.97	3
XVC08993A-SI	5/29/2014	0.41	
XVC08993A-SI	11/30/2015	0.90	
XVC08993A-SI	5/31/2017	0.86	

Table 3-2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	Allowable Leakage Limit (gpm)**
XVC08993B-SI	12/5/2012	0.97	1
XVC08993B-SI	5/29/2014	0.41	
XVC08993B-SI	11/30/2015	0.90	
XVC08993B-SI	5/31/2017	0.86	
XVC08993C-SI	12/5/2012	0.97	1
XVC08993C-SI	5/29/2014	0.41	
XVC08993C-SI	11/30/2015	0.90	
XVC08993C-SI	5/31/2017	0.86	
XVC08995A-SI	12/5/2012	0.72	1
XVC08995A-SI	5/29/2014	0.45	
XVC08995A-SI	11/30/2015	0.16	
XVC08995A-SI	5/31/2017	0.42	
XVC08995B-SI	12/5/2012	0.72	1
XVC08995B-SI	5/29/2014	0.45	
XVC08995B-SI	11/30/2015	0.16	
XVC08995B-SI	5/31/2017	0.42	
XVC08995C-SI	12/5/2012	0.72	1
XVC08995C-SI	5/29/2014	0.45	
XVC08995C-SI	11/30/2015	0.16	
XVC08995C-SI	5/31/2017	0.42	
XVC08997A-SI	12/5/2012	0.72	1
XVC08997A-SI	5/29/2014	0.45	
XVC08997A-SI	11/30/2015	0.16	
XVC08997A-SI	5/31/2017	0.42	
XVC08997B-SI	12/5/2012	0.72	3
XVC08997B-SI	5/29/2014	0.45	
XVC08997B-SI	11/30/2015	0.16	
XVC08997B-SI	5/31/2017	0.42	

Table 3-2: Historical Leak Rate Test Performance for SI Check Valve PIVs (cont.)

IST Program Valve ID	Date of Test	Measured Value (gpm)	Allowable Leakage Limit (gpm)**
XVC08997C-SI	12/5/2012	0.72	1
XVC08997C-SI	5/29/2014	0.45	
XVC08997C-SI	11/30/2015	0.16	
XVC08997C-SI	5/31/2017	0.42	
XVC08998A-SI	12/5/2012	1.00	1
XVC08998A-SI	5/29/2014	0.29	
XVC08998A-SI	11/30/2015	0.88	
XVC08998A-SI	5/31/2017	0.96	
XVC08998B-SI	12/5/2012	1.34	1
XVC08998B-SI	5/29/2014	0.90	
XVC08998B-SI	11/30/2015	0.91	
XVC08998B-SI	5/31/2017	0.20	
XVC08998C-SI	12/5/2012	0.58	1
XVC08998C-SI	5/29/2014	0.32	
XVC08998C-SI	11/30/2015	0.41	
XVC08998C-SI	5/31/2017	0.41	

The primary reason for performance-based PIV test intervals is to eliminate unnecessary thermal cycles. The VCSNS program for monitoring fatigue due to operational cycles and transients consists of review, evaluation, and documentation of RCS operational transients/cycles based on recorded plant operating parameters (i.e., temperature, pressure, flow) for compliance with TS Sections 3.5.2, 3.5.3, and 5.7.1.

As part of a plant cycle counting software upgrade and baseline evaluation for the number of plant safety injections, a periodic transient was identified after every post-refuel heat-up, since approximately 1999, in the RCS Cold Leg Safety Injection (SI) piping downstream of the inlet check valves (XVC08998A-SI, XVC08998B-SI, and XVC08998C-SI) as correlated following every test of the RCS PIVs. The periodic transient occurs when the test fluid supplied from the Charging System, which is at a higher pressure than the RCS, 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 SI piping. The thermal transients, identified by the plant thermal cycle counting software, are counted as fatigue usage 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 fatigue were performed during the subsequent RFO (RF-21 in April 2014) with acceptable exam results. The proposed extended test intervals would reduce the impact of the ECCS injecting water into the RCS during testing.

An additional reason for requesting performance-based PIV test intervals is dose reduction to conform with NRC and industry As Low As Reasonably Achievable (ALARA) radiation dose principles. The nominal fuel cycle lengths at VCSNS, Unit 1, are 18 months. However, since 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 each RFO results in a total personnel dose of approximately 300 milli-Roentgen Equivalent Man (mREM), assuming all of the PIVs remain classified as good performers. The proposed extended test intervals would provide for a savings of approximately 600 mREM over an approximate 60-month period (three RFOs).

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The proposed change has been evaluated to determine whether the applicable regulations and requirements continue to be met. Title 10 of the Code of Federal Regulations (10 CFR), Section 50.36(c)(3), "Surveillance requirements," (Reference 3) states, in part, that TS shall include the "requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met." This TS change proposes revision to the TS SR 4.4.6.2.2.a to reflect a less restrictive testing interval for the RCS PIVs (i.e., reduced number of tests) based on valve performance, not to exceed every third RFO or 60 months. The TS SR will continue to assure verification of the RCS PIV integrity, thereby reducing the probability of gross valve failure and consequent ISLOCA. Therefore, the 10 CFR 50.36(c)(3) surveillance requirement continues to be met based on implementation of a performance-based testing approach which has been accepted for use in a number of applications across the industry (RCS PIV testing, 10 CFR 50, Appendix J, Option B).

4.1.1 Regulations and Regulatory Guidance

10 CFR 50.55a, "Codes and standards," provides the regulatory requirements to perform Inservice Testing of components that fall within the scoping criteria. The RCS PIVs listed in TS Table 3.4-1 will continue to be tested in accordance with the requirements of the VCSNS IST Program and in accordance with 10 CFR 50.55a.

10 CFR 50.55a(f), "Inservice Testing Requirements," (Reference 4) requires, in part, that inservice testing of certain ASME OM Code Class 1, 2, and 3 components must meet the requirements of the ASME OM Code and applicable addenda, incorporated by reference in the regulations. Exceptions are allowed where alternatives have been authorized or relief has been granted by the NRC pursuant to 10 CFR 50.55a(z)(1) or 10 CFR 50.55a(z)(2).

10 CFR 50.55a(z)(1), "Acceptable level of quality and safety," (Reference 5) allows a proposed alternative to the regulatory requirements while providing an acceptable level of quality and safety. VCSNS has submitted a proposed alternative to the testing requirements of ASME ISTC-3630(a) via relief request RR-4-14 for prior approval by the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(z)(1) via Reference 6. This alternative, if approved, would result in a modified PIV test interval not to exceed 60 months.

NUREG-0933, *Resolution of Generic Safety Issues*, Section 3, Issue 105, *Interfacing Systems LOCA at LWRs,* (Reference 7) 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. For check valves, functional testing is accomplished in accordance with the 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. The number of and specific PIVs listed in the TS Table along with the testing methodology remain unchanged by this request. The VCSNS PIVs will continue to provide their leak-tight integrity function.

Generic Letter 87-06 (Reference 9), *Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves,* required verification of the methods, if any, the licensee performed to assure the leak-tight integrity of all PIVs as independent barriers against abnormal leakage, rapidly propagating failure, and gross rupture of the reactor coolant pressure boundary. If current plant TS already required leak rate testing of all the PIVs in the plant, no further actions were required. VCSNS Technical Specification 4.4.6.2.2.a requires testing of PIVs listed in TS Table 3.4-1. The number of and specific PIVs listed in the TS Table along with the testing methodology remain unchanged by this request. The VCSNS PIVs will continue to provide their leak-tight integrity function.

NRC Information Bulletin 88-08 (Reference 2), *Thermal Stresses in Piping Connected to Reactor Coolant Systems,* required licensees to review their reactor coolant systems to identify any connected, unisolable piping that could be subjected to temperature distributions which would result in unacceptable thermal stresses and take action, where such piping is identified, to ensure that the

piping will not be subjected to unacceptable thermal stresses. At VCSNS, plant cycle counting software is used to identify and maintain the cumulative count of thermal transients on affected piping systems. This change will reduce the number of thermal transients and minimize the potential for unacceptable thermal stresses.

4.1.2 Conclusion

The proposed change revises SR 4.4.6.2.2.a and associated TS Bases to reflect the extension of the surveillance testing interval of the RCS PIVs, listed in TS Table 3.4-1, based on PIV performance. The specific RCS PIV leakage testing acceptance criteria and TS allowable leakage limits do not change, and PIV testing continues to meet the requirements of the VCSNS IST Program.

4.2 Precedent

No precedent was identified for this proposed TS change.

4.3 No Significant Hazards Consideration

A change is proposed to the VCSNS, Unit 1, TS to revise the wording of TS 4.4.6.2.2.a and its associated TS Bases to reflect a performance-based surveillance testing interval extension for leakage testing of RCS PIVs. This change will impose a leakage testing interval not to exceed 60 months in lieu of the prescriptive (each RFO) testing interval.

South Carolina Electric & Gas (SCE&G) has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as described below:

1. **Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: **No**.

The proposed change involves revising the VCSNS Unit 1, TS wording to reflect a performance-based surveillance testing interval for leakage testing of the RCS PIVs. Specifically, the proposed change revises TS surveillance requirement (SR) 4.4.6.2.2.a to test the RCS PIVs at a frequency from each RFO to a maximum of every third RFO or 60 months by verifying that each of the PIVs tested in the associated RFO based on performance are within the TS allowable leakage limits. The RCS PIVs are defined as two normally closed valves in series with the reactor coolant pressure boundary (RCPB), which separate the high-pressure RCS from an attached lower pressure system. Excessive PIV leakage could lead to overpressure of the low-pressure piping or components, potentially resulting in a LOCA outside of containment.

TS SR 4.4.6.2.2.a for RCS PIVs provides added assurance of valve integrity thereby reducing the probability of gross valve failure and consequent ISLOCA. The RCS PIV allowable leakage limit applies to each individual valve. This proposed change does not revise any of the TS RCS PIV allowable leakage limits. In addition, the RCS PIVs will continue to be tested per the VCSNS Inservice Testing Program in accordance with Title 10, Code of Federal Regulations (CFR), Section

50.55a, "Codes and standards." The activity does not involve a physical change to the plant or a change in the manner in which the plant is operated or controlled. By transitioning to a performance-based leakage testing interval, these valves will continue to be demonstrated operationally ready and reliable. In the event of a PIV leakage test failure, PIV testing would require the component to return to the initial interval of every RFO until good performance is re-established. Therefore, there is no impact on the assurance that the RCS PIVs will be able to perform their safety function(s).

Therefore, the proposed TS change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The proposed change involves revising the VCSNS TS wording to reflect a performance-based surveillance testing interval for leakage testing of the RCS PIVs from each RFO to a maximum of every third RFO or 60 months based on valve performance. The technical testing methodology and associated acceptance criteria remain unchanged. The change in the testing frequency is a performance-based approach, which has been demonstrated acceptable in numerous applications across the industry (RCS PIV testing, 10 CFR 50, Appendix J, Option B).

The testing requirements involved to periodically demonstrate the integrity of the RCS PIVs exist to ensure the plant's ability to mitigate the consequences of an accident. There are not any accident initiators or precursors affected by this change. The proposed TS change does not involve a physical change to the plant or the manner in which the plant is operated or controlled.

Therefore, the proposed TS change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **Does the proposed change involve a significant reduction in a margin of safety?**

Response: No.

The proposed change involves revising the TS SR 4.4.6.2.2.a and associated TS Bases to reflect a performance-based surveillance testing frequency of the RCS PIVs from each RFO to a maximum of every third RFO or 60 months. The technical testing methodology and associated TS allowable leakage limits/acceptance criteria remain unchanged. The testing frequency uses a performance-based approach, which has been demonstrated acceptable in numerous applications across the industry (RCS PIV testing, 10 CFR 50, Appendix J, Option B). Thus, this amendment request does not alter the manner in which safety limits, limiting safety system set points, or limiting conditions for operation are determined. The RCS PIVs will continue to be tested per the VCSNS Inservice Testing Program in accordance with 10 CFR 50.55a.

The primary reason for performance-based PIV test intervals is to eliminate unnecessary thermal cycles. The VCSNS program for monitoring fatigue due to operational cycles and transients consists of review, evaluation, and documentation of RCS operational transients/cycles based on

recorded plant operating parameters (i.e., temperature, pressure, flow) for compliance with Technical Specification Sections 3.5.2, 3.5.3, and 5.7.1.

An additional reason for requesting performance-based PIV test intervals is dose reduction to conform with NRC and industry As Low As Reasonably Achievable (ALARA) radiation dose principles. The nominal fuel cycle lengths at VCSNS, Unit 1, are 18 months. However, since 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 each RFO results in a total personnel dose of approximately 300 millirem (milli-Roentgen Equivalent Man, or mrem). Assuming all of the PIVs remain classified as good performers, the proposed extended test intervals would provide for a savings of approximately 600 mrem over an approximate 60-month period (three RFOs).

The proposed surveillance interval extension for the RCS PIVs is based on the performance of the PIVs. The proposed TS change does not involve a physical change to the plant or a change in the manner in which the plant is operated or controlled. The design, operation, testing methods, and acceptance criteria for the RCS PIV testing specified in applicable codes and standards will continue to be met.

Therefore, the proposed TS change does not involve a significant reduction in a margin of safety.

Based on the above, SCE&G concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATIONS

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix J, Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors

2. NRC Information Bulletin 88-08, Thermal Stresses in Piping Connected to Reactor Coolant Systems, dated June 22, 1988 (ML031220144)

3. Title 10, Code of Federal Regulations, Section 50.36, Technical Specifications, Paragraph (c)(3), "Surveillance requirements"

4. Title 10, Code of Federal Regulations, Section 50.55a, Codes and standards, Paragraph (f), "Inservice testing requirements"

5. Title 10, Code of Federal Regulations, Section 50.55a, Codes and standards, Paragraph (z)(1), "Acceptable level of quality and safety"

6. Letter from South Carolina Electric & Gas to NRC, "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," dated October 5, 2018

7. 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

8. ASME Operation and Maintenance of Nuclear Power Plants Code, 2004 Edition through OMb-2006 Addenda

9. Generic Letter 87-06, Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves, dated March 13, 1987 (ML031150379)

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1

ATTACHMENT 1

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by the Virgil C. Summer Nuclear Station (VCSNS) in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to Mr. Michael S. Moore at (803) 345-4752

Commitment(s)	Due Date
VCSNS is to revise GTP-302 to reflect the updated performance-based PIV testing.	Within 60 days of NRC Issuance of License Amendment.
VCSNS is to revise Surveillance Test Procedure, STP-215.008, SI and RH System Valve Leakage Test to reflect the updated performance-based PIV testing.	Within 60 days of NRC Issuance of License Amendment.

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1

ATTACHMENT 2

EXISTING TS PAGES MARKED TO SHOW THE PROPOSED CHANGES

Page	Affected Section	Description of Change
3/4 4-20	4.4.6.2.2 (a)	Allows the RCS PIV leakage tests to be extended to a performance-based frequency not to exceed 3 refueling outages or 60 months following two consecutive satisfactory tests.

SURVEILLANCE REQUIREMENTS (Continued)

b. Monitoring the reactor building sump inventory at least once per 12 hours.

c. Measurement of the CONTROLLED LEAKAGE to the reactor coolant pump seals when the Reactor Coolant System pressure is 2235 ± 20 psig at least once per 31 days with the modulating valve fully open. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4.

d. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours.(1) This requirement is not applicable to primary-to-secondary leakage.

e. Monitoring the reactor head flange leakoff system at least once per 24 hours.

4.4.6.2.2 Each Reactor Coolant System Pressure Isolation Valve specified in Table 3.4-1 shall be demonstrated OPERABLE by verifying leakage to be within its limit.

a. During startup following each refueling outage, which may be extended to a performance-based frequency not to exceed 3 refueling outages or 60 months following two consecutive satisfactory tests.

b. Prior to returning the valve to service following maintenance repair or replacement work on the valve.

c. Prior to entering MODE 2 following valve actuation due to automatic or manual action or flow through the valve for valves denoted on Table 3.4-1 by an asterisk*.

d. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4.

4.4.6.2.3 Primary-to-secondary leakage shall be verified ≤ 150 gallons per day through any one steam generator at least once per 72 hours.(1)

(1) Not required to be performed/completed until 12 hours after establishment of steady state operation.

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1

ATTACHMENT 3

REVISED (CLEAN) TS PAGES

Replace the following pages of the Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages	Insert Pages
3/4 4-20	3/4 4-20

SURVEILLANCE REQUIREMENTS (Continued)

b. Monitoring the reactor building sump inventory at least once per 12 hours.

c. Measurement of the CONTROLLED LEAKAGE to the reactor coolant pump seals when the Reactor Coolant System pressure is 2235 ± 20 psig at least once per 31 days with the modulating valve fully open. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4.

d. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours.(1) This requirement is not applicable to primary-to-secondary leakage.

e. Monitoring the reactor head flange leakoff system at least once per 24 hours.

4.4.6.2.2 Each Reactor Coolant System Pressure Isolation Valve specified in Table 3.4-1 shall be demonstrated OPERABLE by verifying leakage to be within its limit.

a. During startup following each refueling outage, which may be extended to a performance-based frequency not to exceed 3 refueling outages or 60 months following two consecutive satisfactory tests.

b. Prior to returning the valve to service following maintenance repair or replacement work on the valve.

c. Prior to entering MODE 2 following valve actuation due to automatic or manual action or flow through the valve for valves denoted on Table 3.4-1 by an asterisk*.

d. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4.

4.4.6.2.3 Primary-to-secondary leakage shall be verified ≤ 150 gallons per day through any one steam generator at least once per 72 hours.(1)

(1) Not required to be performed/completed until 12 hours after establishment of steady state operation.

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1

ATTACHMENT 4

EXISTING TS BASES PAGES MARKED TO SHOW THE PROPOSED CHANGES

OPERATIONAL LEAKAGE (Continued)

An early warning of PRESSURE BOUNDARY LEAKAGE or UNIDENTIFIED LEAKAGE is provided by the automatic systems that monitor containment atmosphere radioactivity and containment sump level. It should be noted that leakage past seals and gaskets is not PRESSURE BOUNDARY LEAKAGE. These leakage detection systems are specified in LCO 3.4.6.1, "Reactor Coolant System, Leakage Detection Systems."

Part (d) notes that this SR is not applicable to primary-to-secondary leakage because leakage of 150 gallons per day cannot be measured accurately by an RCS water inventory balance.

The 72-hour frequency is a reasonable interval to trend leakage and recognizes the importance of early leakage detection in the prevention of accidents.

4.4.6.2.2 This Surveillance Requirement verifies RCS Pressure Isolation Valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA.

4.4.6.2.3 This Surveillance Requirement verifies that primary-to-secondary leakage is less than or equal to 150 gpd through any one steam generator. Satisfying the primary-to-secondary leakage limit ensures that the operational leakage performance criterion in the Steam Generator Program is met. If this Surveillance Requirement is not met, compliance with LCO 3.4.5 should be evaluated. The 150-gpd limit is measured at room temperature as described in Reference 2. The operational leakage rate limit applies to leakage through any one steam generator. If it is not practical to assign the leakage to an individual steam generator, all the primary-to-secondary leakage should be conservatively assumed to be from one steam generator.

The Surveillance Requirement is modified by a note, which states that the Surveillance is not required to be performed until 12 hours after establishment of steady state operation. For Reactor Coolant System primary-to-secondary leakage determination, steady state is defined as stable Reactor Coolant System pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and reactor coolant pump seal injection and return flows.

The frequency of 72 hours is a reasonable interval to trend primary-to-secondary leakage and recognizes the importance of early leakage detection in the prevention of accidents. The primary-to-secondary leakage is determined using continuous process radiation monitors or radiochemical grab sampling in accordance with the EPRI guidelines (Reference 2).

References

1. NEI 97-06, "Steam Generator Program Guidelines"

2. EPRI TR-104788, "Pressurized Water Reactor Primary-to-Secondary Leak Guidelines"

Pressure Isolation Valve (PIV) testing is being conducted on a performance-based testing interval. Performance-based is defined as a PIV which demonstrates good performance for two consecutive outages and may have its test interval extended to every third refueling outage, not to exceed 60 months. A PIV, which has demonstrated leakage less than its TS allowable leakage limit for two consecutive outages is classified as a good performer. In the event of a PIV leakage test failure, PIV testing would require the component to return to the initial interval of every refueling outage, or two years until good performance is re-established.

Those PIVs listed in TS Table 3.4-1 will be demonstrated OPERABLE by verifying their leakage rates are within TS allowable leakage limits via testing performed at a frequency based on their "good" performance, ranging from every refueling outage to every third refueling outage, not to exceed 60 months.