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SCE&G®
A SCANA COMPANY

December 18, 2014
RC-14-0203

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
REQUEST RELIEF FROM ASME CODE REQUIREMENTS IN VCSNS 4TH TEN YEAR INSERVICE TESTING INTERVAL
RR-4-06 (P) IST PUMP TEST REQUIREMENTS

Pursuant to 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), South Carolina Electric & Gas Company (SCE&G), acting for itself and as an agent for South Carolina Public Service Authority, hereby requests NRC approval of the attached relief request associated with the fourth inservice testing (IST) interval. VCSNS proposes to apply the methodology previously covered under Generic Letter (GL) 89-04, Position 9 for quarterly Group A inservice testing of Charging/Safety Injection Pumps. The basis for the relief request is provided within the Attachment.

This letter contains no new regulatory commitments. If you should have any questions, please contact Mr. Bruce L. Thompson at (803) 931-5042.

Very truly yours,

Thomas D. Gatlin

TS/TDG/wt

Attachment: RR-4-06 (P) IST Pump Tests Requirements

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

ATTACHMENT

RR-4-06 (P) IST PUMP TEST REQUIREMENTS

1. **ASME Code Component Affected**

XPP0043A, B and C, Charging/Safety Injection Pumps (Centrifugal/Group A/Class 2)

2. **Applicable Code Edition and Addenda**

ASME OM Code-2004 Edition, with Addenda through OMb-2006

3. **Applicable Code Requirement**

The Charging/SI Pumps XPP0043A, B, and C are Group A pumps as defined in the ASME OM Code. Group A pumps are those pumps that operate continuously or routinely during normal operation, cold shutdown, and refueling operation. The charging pumps are used for plant operation providing charging and seal injection.

ISTB-3000, "General Testing Requirements," states, in part, the parameters requiring measurement during both preservice and inservice testing of pumps in Light-Water Reactors, as specified in Table ISTB-3000-1.

Table ISTB-3000-1, "Inservice Test Parameters," specifies, in part, that Flow Rate (Q) is required to be measured during Group A pump preservice and inservice testing.

ISTB-3510(a), "Accuracy," states instrument accuracy shall be within the limits of Table ISTB-3510-1. If a parameter is determined by analytical methods instead of measurement, then the determination shall meet the parameter accuracy requirement of Table ISTB-3510-1.

ISTB-3550, "Flow Rate," states when measuring flow rate, a rate or quantity meter shall be installed in the pump test circuit. If a meter does not indicate the flow rate directly, the record shall include the method used to reduce the data. Internal recirculated flow is not required to be measured.

ISTB-5100(a), "Centrifugal Pumps (Except Vertical Line Shaft Centrifugal Pumps)," Part (a), "Duration of Tests," specifies, in part, that during a Group A test after stable conditions are achieved after a minimum of two minutes operation, that the quantities of Table ISTB-3000-1 shall be measured or determined and recorded.

ISTB-5121, "Group A Test Procedure," details requirements for the conduct of pump inservice testing and evaluation/analysis of test results. ISTB-5121(c) requires that where it is not practical to vary system resistance, flow rate and pressure shall be determined and compared to their respective reference values. ISTB-5121(e) requires, in part, that deviations from reference values be compared with their allowable variations as specified in Table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria," and corrective action be taken as specified in ISTB-6200, "Corrective Action."

4. Reason for Request

Pursuant to 10CFR50.55a(z)(1), an alternate to the surveillance testing methodology of the ASME OM Code is required. The basis of this request is that the proposed alternative would provide an acceptable level of quality and safety.

In accordance with 10CFR50.55a(f)(4), "Inservice testing standards requirement for operating plants," VCSNS is required to meet the inservice test requirements set forth in the ASME OM Code and addenda.

ASME OM Code ISTB-3400, "Frequency of Inservice Tests," states an inservice test shall be run on each pump as specified in Table ISTB-3400-1. Group A pumps are to be tested quarterly.

The test circuit used during the quarterly Group A Charging/SI Pump inservice test is described in FSAR (Reference 1) Section 6.3.2.2.4.2, which states, "During normal plant operation, at least one charging pump is continuously in service. The second pump is a non-running pump on the inactive loop and the third, if available, is designated as a spare and its breaker(s) are racked out. The other charging pumps may be tested during power operation via the minimum-flow bypass lines."

ASME OM Code Table ISTB-3510-1, "Required Instrument Accuracy," establishes an accuracy of plus or minus 2 percent for flow rate measurement during inservice testing. This accuracy establishes "repeatability" for component trending.

VCSNS's Charging/Safety Injection (SI) System was constructed without installed flow measurement instrumentation in the Charging/SI System minimum-flow recirculation lines. During the previous two test intervals Charging/SI Pump inservice testing was conducted in accordance with Generic Letter (GL) 89-04 (Reference 4), Position 9.

Efforts were undertaken to measure flow through the recirculation lines using ultrasonic flow meters prior to the new interval. Strap-on ultrasonic flow meters have been used during the first 12 months of the new interval to measure recirculation flow during Charging/SI Pump quarterly Group A testing. The required instrument repeatability established in ASME OM Code Table ISTB-3510-1 could not be achieved. During field use, flow rate variations of up to 6 percent and higher from average were noted. Inaccuracies associated with clamp-on ultrasonic flow measurement devices were the subject of NRC Information Notice (IN) 95-08 (Reference 2), "Inaccurate Data Obtained with Clamp-on Ultrasonic Flow Measurement Instruments."

Relief from the requirement to measure recirculation line flow during Charging/SI Pump Group A testing is requested based on the lack of consistency in data measurement using the ultrasonic meters and lack of installed instrumentation.

5. Proposed Alternative and Basis for Use

Proposed Alternative

VCSNS has historically performed a quarterly surveillance test without measuring the recirculation line flow rate as provided for in GL 89-04, Position 9. VCSNS has attempted to measure flow with ultrasonic flow meters but has not been successful. Through this relief request, VCSNS proposes to use the previous method as identified in GL 89-04 as an alternative method for meeting the surveillance requirement, therefore, maintaining an acceptable level of quality and safety. Performing inservice testing using a non-instrumented recirculation line was previously found acceptable by the NRC in GL 89-04, Position 9, "Pump Testing using Minimum-flow Return Line With or Without Flow Measuring Devices," when an instrumented flow path was available during refueling for measuring flow at a substantial flow rate.

Pump flow is measured during a comprehensive test each refueling outage with the minimum-flow line isolated. Pump performance is then compared to Design Basis Accident analysis requirements.

The Group A pump quarterly test of the Charging/SI Pumps will be performed in accordance with GL 89-04, Position 9, measuring pump differential pressure and vibration. The Charging/SI Pump orifices are large differential pressure orifices, with backpressure having minimal effect on orifice performance (Reference 3).

Using the provisions of this request as an alternative to the requirements of ISTB-3000, Table ISTB-3000-1, ISTB-5100(a), and ISTB-5121 provides a reasonable alternative to the Code requirements based on the determination that the proposed alternative will provide adequate indication of pump performance, permit detection of component degradation, and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10CFR50.55a(z)(1), VCSNS requests approval of this alternative to the specific ISTB requirements identified in this request.

Basis for Use

Based on recirculation flow measurement data repeatability issues, relief is being requested from the requirement of the ASME OM Code to measure Charging/SI Pump recirculation line flow during quarterly Group A testing. This test alternate is endorsed in Position 9 of GL 89-04. This test methodology using Position 9 was used during the previous two test intervals at VCSNS. Relief was not previously requested as NUREG-1482, Revision 0 was used for the third ten-year interval update and did not require licensees to submit relief requests prior to utilizing GL 89-04, Position 9.

GL 89-04, Position 9 acknowledged that earlier (and current) inservice test Codes required pump differential pressure and flow rate to be measured then

evaluated together to determine pump hydraulic performance during testing. The generic letter states that certain safety-related systems are designed such that the minimum-flow return lines are the only flow paths that can be utilized for quarterly pump testing. Furthermore, some of these systems do not have flow path that can be utilized for pump testing during any plant operating mode except the minimum-flow return lines. In these cases, pumping through the path designed for fulfilling the intended system safety function could result in damage to plant equipment. Minimum-flow lines are not designed for pump testing purposes and few have installed flow measuring devices.

In cases where flow can only be established through a non-instrumented minimum-flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the staff has determined that the increased interval is an acceptable alternative to the Code requirements provided that pump differential pressure, flow rate, and bearing measurements are taken during this testing and that quarterly testing also measuring at least pump differential pressure and vibration is continued. Data from both of these test testing frequencies should be trended as required by (the Code).

GL 89-04 also references NRC Bulletin 88-04 (Reference 6) which advised licensees of the potential for pump damage while running pumps in the minimum-flow condition. The generic letter said licensees should ensure that if pumps are tested in the low flow condition, the flow is sufficient to prevent damage to the pump.

The acceptability of operation of VCSNS Charging/SI Pumps in the minimum-flow configuration has been evaluated in Reference 3. While on minimum-flow, each pump will run at greater than 60 gallons per minute, regardless of which combination of pumps are operating. This is because the individual pump minimum-flow orifices govern the operating point for each pump. A stronger pump will have negligible impact on the operating point of the weaker pump since a slight increase in orifice backpressure will have minimal effect on orifice performance. This is true for the charging pump minimum-flow orifices which are large differential pressure orifices. The required minimum-flow of 60 gallons per minute is sufficient to envelop thermal rise and pump vibration considerations.

The large differential pressure orifices establish a fixed operating point for each Charging/SI Pump which allows testing under repeatable conditions, without the need to measure flow, as endorsed in GL 89-04 Position 9. Pump condition will be evaluated by trending pump differential pressure and vibration. Flow rate will be assumed to be fixed and at its reference value similar to the previous inservice testing interval. The Charging/SI Pumps also undergo comprehensive inservice testing during refueling outages. The minimum-flow lines are isolated and total flow is measured at substantial flow conditions as required by the ASME OM Code.

NUREG-1482, Revision 2, "Guidelines for Inservice Testing at Nuclear Power Plants," (Reference 5) states, "The recommendations herein replace the guidance and technical positions in GL 89-04. Note that specific relief is required to implement the guidance derived from GL 89-04. However, relief justification may refer to the positions in the GL with clarifying information to clearly show how it would apply to a licensee's situation."

6. Duration of Proposed Alternative

SCE&G will implement the alternative requirements during the fourth 10-year Inservice Testing interval at VCSNS Unit 1 which began January 1, 2014 and ends December 31, 2023.

7. Precedents

The NRC approved (Reference 7) a similar request for alternative at Beaver Valley Power Station, Unit 1 for Beaver Valley's fourth ten-year inservice testing program in Reference 8.

8. References

1. VCSNS Final Safety Analysis Report (UFSAR) Docket Number 50-395, November 26, 2014
2. NRC Information Notice 95-08, *Inaccurate Data Obtained with Clamp-on Ultrasonic Flow Measurement Instruments,* dated January 30, 1995
3. J. C. Snelson, Westinghouse Letter CGE-87-776 to R. B. Clary (SCE&G), *South Carolina Electric & Gas Company Virgil C. Summer Nuclear Station Charging Pump Miniflow Assessment*, dated November 16, 1987
4. NRC Generic Letter 89-04, *Guidance on Developing Acceptable Inservice Testing Programs (Generic Letter No. 89-04)*, dated April 3, 1989 [ML031150259]
5. NUREG-1482, Revision 2, *Guidelines for Inservice Testing at Nuclear Power Plants* [ML13295A020]
6. NRC Bulletin 88-04, *Potential Safety-Related Pump Loss*, dated May 5, 1988
7. M. G. Kowal, NRC Letter to P. P. Sena (FENOC), *Beaver Valley Power Station, Unit No. 1 - Relief Request Nos. PRR1, PRR2, PRR3, PRR4, PRR5, PRR6, PRR7, PRR8, PRR9, PRR10, PRR11, PRR12, PRR 13, and VRR1 Regarding the Fourth 10-Year Inservice Testing Program Relief Requests (TAC NOS. MD5118 - MD5131)*, dated September 27, 2007 [ML072420376]
8. J. H. Lash, FENOC Beaver Valley Unit 1 Letter, to Document Control Desk (NRC), *Inservice Testing Program Ten-Year Updated*, dated March 28, 2007 [ML070890491]