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RC-98-0027

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

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS)
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
CHARGING PUMP TESTING RELIEF REQUEST
(NRR 970002)

South Carolina Electric and Gas Company (SCE&G) hereby submits the attached request for relief from performing a "substantial flow" Charging Pump Test at increased frequency per the acceptance criteria of ASME/ANSI OMA-1988, Part 6, Article 6.1. VCSNS charging pumps are tested at "substantial flow" pursuant to Generic Letter 89-04, Position 9 with acceptance limits established through the ASME Code, Section XI program. Vibration levels observed during the last "substantial flow" test placed Charging Pump 'C' in the "Alert" range of the acceptance criteria. Currently, the Code requires increased frequency testing without benefit of evaluation for maintaining normal test frequency.

This relief request is based upon a commitment to perform an alternative monitoring program every six weeks, in lieu of performing full flow testing at the nine month interval which is required by the Code acceptance criteria. This alternative monitoring program would consist of vibration monitoring and frequency spectrum analysis under minimum flow conditions in accordance with the code requirements. Currently, Charging Pump 'C' is also in an alert condition as a result of minimum flow testing and this doubled frequency testing will be performed every six weeks.

This will assure continued confidence in the ability of the C Charging Pump to perform reliably and safely. SCE&G judges that this alternative program is, at minimum, equivalent to the Code requirements. This judgment is based on the increased frequency of monitoring and the fact that the test is performed at flow conditions which would allow pump degradation to be detected. Compliance with all other Code test requirements will continue.

SCE&G is submitting the attached relief request in accordance with 10CFR50.55a(a)(3)(i). This relief request was discussed with NRR in October, 1997. NRC review and approval is requested by June 18, 1998.

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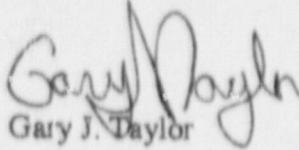


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Should you have any questions, please call Mr. Philip Rose at (803) 345-4052.

Very Truly Yours,


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File (810.19-2)
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**Request for Relief
from
Increased Frequency Testing of Charging/Safety Injection Pumps**

Components: Charging/Safety Injection (SI) Pump C (XPP0043C)

Code Requirement:

ASME/ANSI Oma-1988, Part 6, Article 6.1 requires the following:

"If deviations fall within the alert range of Table 3, the frequency of testing specified in para. 5.1 shall be doubled until the cause of the deviation is determined and the condition corrected."

Alternate Test:

Perform on-line vibration monitoring and analysis at minimum flow conditions at a frequency of every six weeks to verify pump performance and identify any pump degradation. The alternate test flow is the minimum charging pump flow of approximately 60 gallons per minute (gpm). This relief is requested until completion of the 11th Refueling Outage (scheduled for Spring, 1999) when additional pump repairs and full flow testing can be performed. Full flow testing during the next refueling outage will confirm acceptable operation after maintenance or will identify that further action is necessary. The test interval established by Generic Letter 89-04, Position 9 will be resumed when the cause is corrected.

Basis for Relief:

The Charging/SI Pumps are tested in accordance with NRC Generic Letter 89-04, Position 9. This position allows the use of a non-instrumented minimum flow path for quarterly testing with a test performed at substantial flow conditions during cold shutdowns or refueling outages. As the C Charging/SI Pump had also exceeded the code allowable for the alert range during minimum flow testing after the maintenance activity discussed below, the required quarterly frequency has been doubled resulting in a required test every six weeks. Periodic testing on minimum flow in conjunction with testing at substantial flow conditions during refueling outages provides adequate assurance that these pumps are capable of performing their design safety function upon demand.

This position is incorporated into the VCSNS Inservice Testing (IST) Program. Through the IST Program, the acceptance criteria applied to pump performance parameters is established through ASME/ANSI Oma-1988, Part 6. Part 6 is structured to address actions to be taken when performing quarterly tests for components within systems capable of demonstrating their design function performance during power operation.

The actions prescribed for components with parameters in the Alert range do not accommodate components that require testing during cold shutdown plant mode to demonstrate design performance parameters. During the Fall 1997 refueling outage, Charging Pump C indicated one vibration point out of 5 (pump horizontal, outboard) to be in the Alert range for both full flow and minimum flow conditions. It was noted that the test frequency was impacted but that the pump was still recognized as operable to the Code acceptance criteria. VCSNS initiated an evaluation to determine the cause of the deviation and establish corrective actions.

The evaluation included a review of Charging Pump C data collected to determine a viable cause and established corrective actions that could be pursued to improve the vibration condition.

Efforts to determine the cause included:

- Analysis of the vibration data spectrum
- Review of past maintenance history
- Review of trend data (in particular, vibration)

Corrective actions performed to alleviate vibration and confirm cause included:

(this includes activities prior to the start of the outage through the completion of the testing performed after all maintenance conducted during the outage)

- Performed alignment check; discovered that there was no apparent alignment problem, additionally, checks for a 'soft foot' condition were performed on the gearbox and pump casing hold down bolts. 'Soft foot' corrections were made on the gearbox.
- Inspected barrel key block, determined that the key was contacting but was not binding. No corrections were performed for this condition.
- Verified that all the bolts in the outboard bearing area were torqued as required.
- Disassembled pump coupling to insure correct assembly and presence of correct amount of grease.
- The pump outboard bearing housing was torn down, the radial bearing fits were checked. The bearing to housing fit was found to be out of tolerance, this was corrected by installing a gasket with the correct tolerances. The allowed axial float of the shaft was also out of tolerance, this condition was corrected by machining the end cover to correct the outboard thrust shoe position.

Full flow (substantial flow) testing was performed after each phase of major maintenance was concluded on the charging pump when the appropriate test conditions existed (e.g. refill or draindown of the reactor vessel). This test was performed a total of three times during RF-10 while attempting to find and correct the cause of the alert range vibration. The final test results indicate the outboard bearing horizontal vibration amplitude is 0.43 inches per second (ips). This value is above the Oma-6 limit for alert range (0.325 ips) but is still below the action range. The pump manufacturer, Ingersoll Dresser, Pump has provided a letter to SCE&G stating that the current levels of pump vibration are acceptable for continued operation and that for this pump, 0.54 ips should be the alarm limit. Minimum flow testing was performed on this pump after all maintenance had been completed and the full flow test results were analyzed. The final results for this test were 0.38 ips at the same test point, with all other parameters satisfactory.

The increased frequency testing of every six weeks will provide periodic reinforcement that there is not a continuous degradation mechanism involved with this pump. Quarterly vibration measurements for this pump at this test point have shown a consistently high (but below alert) vibration level. These measurements were recorded back through 1994 and range from 0.167 to greater than 0.305 ips. No additional significant degradation is expected to develop for this pump based on this history. Additionally, the full flow vibration measurement for this point has been consistently close to the alert limit of 0.325 ips.

During maintenance on the pump, the vendor was onsite to provide additional guidance. EPRI was also consulted for possible additional actions after final testing was completed. SCE&G has determined, based on evaluation of the data and all available inputs, that the appropriate corrective action is to replace the rotating assembly. Other utilities were contacted to attempt to obtain a spare rotating assembly but none were available. VCSNS has one spare rotating assembly, however this assembly must be rebuilt/balanced by the manufacturer (currently in progress) and this could not be completed prior to restart from the Fall 1997 outage.

A planned shutdown to Mode 6 in order to test this pump to comply with the increased frequency testing requirement will create unnecessary challenges to the plant and operating personnel without a corresponding increase in safety. The C Charging/SI pump is the installed spare and is usually aligned to the operating pump but electrically racked out during all modes of operation.

Full flow (substantial flow) testing of the charging pump would only be feasible during an extended planned shutdown with the Reactor Vessel head removed. VCSNS will conduct this testing prior to the 1999 Refueling outage if system alignment and reactor vessel conditions will support performance of the test. However, should this condition not be corrected prior to the increased test frequency due date, the pump will be declared inoperable and removed from service if relief from increased frequency testing is not received from the NRC (requested by June 18, 1998).

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Summary:

SCE&G has determined that Charging Pump C is operating with an imbalance condition of the pump rotor assembly based on vibration frequency content, amplitude perspective, and historical data. Westinghouse literature confirms that this model pump has the potential to experience more severe conditions such as shaft bending or failure. The proposed alternative on-line monitoring program is considered sufficient to assure that the pump continues to operate satisfactorily. Planned corrective maintenance is scheduled for the next refueling outage (RF-11).