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RC-04-0018



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

Attention: Ms. K. R. Cotton

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS)
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
STATUS REGARDING RESPONSE TO GENERIC LETTER 96-06
(TAC NO. M96872)

In April of 2003, South Carolina Electric & Gas Company (SCE&G) informed the NRC that a preliminary piping analysis had been completed for the Reactor Building Cooling Unit (RBCU) water hammer condition associated with NRC Generic Letter 96-06. The results of this analysis indicated that the as-built piping system was acceptable for the loads associated with this water hammer. It was noted that this analysis was unverified and was for "A" train piping only, a configuration, which was considered to bound the "B" train piping in regards to these water hammer loads. The NRC was also informed of the SCE&G schedule to complete and verify this water hammer analysis of both train A and train B piping by the end of the year 2003.

This preliminary (unverified) analysis of "A" train considered the water hammer loads from the collapse of one vacuum bubble that was expected to form during the events described in Generic Letter 96-06. During the verification of this preliminary analysis, it was concluded that a second vacuum bubble would form during these events. The collapse of this second bubble would create more severe loads than the collapse of the first bubble. This created the need for additional analysis which turned out to be much more involved and difficult than was anticipated during the development of the schedule in April. In addition, the verification of the preliminary analysis, and the consequential identification of the second bubble, was not performed until just recently in October. The time delay between analysis and verification resulted from a decision to perform Generic Letter 96-06 evaluations in series with a service water (SW) system water hammer event not associated with Generic Letter 96-06. It was determined that this course of action would minimize hanger and piping qualification evaluations by identifying limiting loads such that only one bounding evaluation would have to be performed. This course of action was undertaken based on a high confidence in the results of the unverified analysis. This confidence was determined to be unfounded during verification as discussed above.

Currently, a preliminary analysis of the water hammer condition associated with the collapse of the second bubble in "A" train piping has been completed. The results indicate that the as-built piping configuration is acceptable as long as the first vacuum bubble is filled with air by venting. As a result of this analysis, VCSNS has taken action in accordance with the station's Nonconformance Program to ensure that the piping remains vented.

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During this evaluation period reactor building cooling has been assured through satisfactory surveillance performance of the RBCUs and the availability of the Reactor Building Spray System.

Previously, SCE&G had stated that the methodology developed by EPRI would be used for the determination of water hammer loads on piping due to the events described in Generic Letter 96-06. However, the use of the EPRI Rigid Body Model (RBM) methodology provided in EPRI Report 1006456 does not apply when significant quantities of air are introduced into the void. The EPRI methods are based on small amounts of air that may preexist in the water and come out of solution due to drain down or steam void generation post LOCA. The information provided in the EPRI report demonstrates that even very small amounts of air can reduce the effective closure velocity for water hammer load generation (typically water hammer loads are not a consideration for this type of transient since for all practical purposes the water column closure is prevented by pressurization of the air).

The RELAP5 code application for a problem such as this is well understood and documented. RELAP5 was used successfully in the qualification of pressurizer safety relief valve discharge (SRV) piping (see EPRI NP-2479, Dec. 1982) which is a much more hydraulically severe transient than the GL 96-06 scenario for the RBCU header. The VCSNS RELAP5 model predicts higher dynamic forces than the EPRI methodology for single column collapse scenarios where both methods have been applied. Therefore, the loads for the water hammer transient described in Generic Letter 96-06 will be generated within the RELAP5 analysis using the methods provided in the VCSNS SRV discharge transients and EPRI-TR-106438 recognizing the differences in modeling techniques for a high pressure subcooled valve discharge and the SW air compression transient.

A revised schedule has been established for the completion (origination and verification) of the analysis of "A" train and "B" train piping for the water hammer condition associated with NRC Generic Letter 96-06. This schedule projects a completion date for both trains by July 1, 2004.

Should you have questions, please call Mr. Ronald B. Clary at (803) 345-4757.

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

1-20-04

Executed on

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