



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

February 14, 1996

Mr. James E. Quinn, Projects Manager  
LMP and SBWR Programs  
GE Nuclear Energy  
175 Curtner Avenue, M/C 165  
San Jose, California 95125

32-004

SUBJECT: VACUUM BREAKER TEST PROGRAM

Dear Mr. Quinn:

In your letter dated November 7, 1995, you requested that the staff provide you with feedback on the Simplified Boiling Water Reactor (SBWR) vacuum breaker test results. Specifically, you requested that the staff conclude that the test results, submitted by letter dated December 15, 1994, are "valid and acceptable for use in licensing, and meet the defined testing program objectives".

During your testing program, the Nuclear Regulatory Commission (NRC) staff members witnessed a portion of the seismic testing, the conclusion of the 3000-cycle reliability testing, the post-test inspection, and leakage-testing in the presence of debris and with various size pieces of wire placed under the soft seat. These tests were performed by competent and experienced personnel and, with the exception of concerns that arose during the leakage test and discussed below, the test program appeared to be thorough. This, together with a review of the test program results, leads the staff to believe that the test results are valid and acceptable for use in licensing. However, a number of concerns prevent the staff from concluding that the testing program meets its objectives.

In request for additional information (RAI) 900.176, the staff questioned GE's determination that a sealant, such as room temperature vulcanizing (RTV), was required on the back side of the EPDM soft seal to prevent excessive leakage around the back of the seal. This sealant was not subjected to the radiation and thermal aging to which the EPDM seal was subjected. Therefore, it will be necessary to qualify the RTV sealant following similar aging treatment. Alternatively, GE could demonstrate that the leakage is acceptable without the RTV sealant in place, or, if RTV is to be used in the SBWR vacuum breaker, periodic leak testing could be performed with regulatory oversight.

During the reliability testing, a loss of sealing was caused when the soft seal groove was spanned by a piece of wire whose diameter was small enough to pass through the intake screen. This loss of sealing and its potential impact on PCC performance will have to be analyzed, possibly referencing the results of the containment by-pass experiment run in the PANDA facility and other relevant tests. (This issue was also raised in RAI 900.176.)

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Also, GE has not demonstrated that the following four specific test objectives were met by the test program, as described below:

- 1. "The vacuum breaker flow capacity could be made equivalent to 1.04 square feet."

During the tests that the staff witnessed, the valve stroke was insufficient to meet this flow requirement; while the disc damper had been removed, the valve stroke had not been increased to take credit for this change. GE must provide the data from tests with the increased valve stroke.

- 2. "The main seal is air bubble tight as installed and has an equivalent leakage flow area of <0.02 square centimeters to steam in the fully degraded condition under design basis accident conditions."

GE must explain how 'design basis accident conditions' were achieved.

- 3. "The dynamic loads which result in lift of the disk were acceptable."

GE must submit an analysis of the test data to demonstrate that the loads and seismic response spectra to which the valve was subjected during the testing are valid and acceptable.

- 4. "The opening and closing reliability are maintained after subjecting the fully aged valve to grit ingestion."

Although the vacuum breaker operated reliably and failure free during the 3,000-cycle test, GE must provide an analysis to support the relevant reliability numbers used in the SBWR PRA.

In summary, the staff cannot reach a conclusion on the acceptability of the test results or conclude that the objectives of the testing program have been met until GE has submitted its analyses of the test results and demonstrated that they support these conclusions.

If you have any questions regarding this matter, contact James H. Wilson at (301) 415-1108 or Son Q. Ninh at (301) 415-1125.

Sincerely,  
original signed by:  
Theodore R. Quay, Director  
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Office of Nuclear Reactor Regulation

Docket No. 50-004

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Docket No. 52-004

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