Docket File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

March 12, 1991

Docket Nos. 50-528, 50-529
and 50-530

Mr. William F. Conway
Executive Vice President, Nuclear
Arizona Public Service Company
P. O. Box 53999
Phoenix, Arizona 85072-3999

Dear Mr. Conway:

SUBJECT: REACTOR COOLANT PUMP HIGH PRESSURE SEAL COOLER (TAC NOS. 79490, 79491, AND 79492)

We have completed an initial review of your letter of January 18, 1991, and related LER 91-001 dated February 11, 1991, in which you describe a potential small break loss-of-coolant accident due to a postulated tube rupture in the reactor coolant pump seal cooler. You identified a scenario in which this could result in reactor coolant by-passing containment and being discharged onto the auxiliary building roof. Our review has resulted in several comments, as discussed below.

1. The justification for continued operation contained in your letter of January 18, 1991, relied, in part, on leak-before-break analysis of the seal cooler tubing. Because this methodology is based only on pipes 4-inches and larger in diameter, the application of this method to the smaller diameter tube in the seal cooler (1¼-inch diameter) has not been validated and should not be applied. More details concerning this are contained in Enclosure 1, "Evaluation of Leak-Before-Break". Your justification for continued operation should be revised by deleting any reliance on this leak-before-break methodology.

2. As you state on page seven of your January 18, 1991 letter, a postulated catastrophic high pressure cooler tube rupture may simultaneously initiate degradation of the RCP seals of the affected pump because cooling and lubricating flow would be diverted to the break. If this should occur, the maximum break size of 0.0042 ft^2 may not be correct, since seal flow would need to be considered. Confirm that your small break LOCA break size of 0.02 ft^2 is still bounding and that your conclusion that no fuel failures occur remains valid. Seal failure would also appear to impact the probabilistic risk assessment and your safety evaluation of the adequacy of the capacity of the refueling water tank. Please discuss this aspect.

3. Please provide the basis for your conclusion that a rupture of the tubing in a RCP throttle cooler would not result in overpressure in the NC system.

4. Our radiological safety evaluation is contained in enclosure 2. You are

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requested to respond to each of the points raised in its conclusion regarding actions that can be taken to assure that the radiological consequences of a high pressure seal cooler failure are within regulatory acceptance criteria, such as: reduced iodine levels, sampling, revised operating practices, reporting, and your proposed longer-term permanent corrective action.

In order that we may conclude our review of this matter promptly, you are request to provide a response to this request within thirty days of your receipt of this letter. Please contact us should you have any questions regarding this matter.

Sincerely,

Original Signed By:

Charles M. Trammell, Senior Project Manager
Project Directorate V
Division of Reactor Projects III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:
1. Evaluation of Leak-before-break
2. Radiological Assessment

cc w/enclosures:
See next page

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Arizona Public Service Company

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ENCLOSURE 1

EVALUATION OF LEAK-BEFORE-BREAK

REACTOR COOLANT PUMP HIGH PRESSURE SEAL COOLER

PALO VERDE NUCLEAR GENERATING STATION

By letter dated January 18, 1991 Arizona Public Service Company submitted a Justification for Continued Operation (JCO) based on its review of NRC Information Notice No. 89-54, "Potential Overpressurization of the Component Cooling Water System." The licensee identified a scenario in which a postulated tube rupture in reactor coolant pump seal coolers (HPSC) could result in reactor coolant being discharged onto the auxiliary building roof. The JCO was based on leak-before-break (LBB) evaluation of the tube, radiological consequence evaluation, probabilistic risk assessment of the event, and structural evaluation of the cooler.

The Materials and Chemical Engineering Branch has reviewed the LBB evaluation of the HPSC tube. The HPSC tube is made of seamless stainless steel Type 347 with an outside diameter of 1.25 inch schedule 80. In the teleconference on February 8, 1991, the licensee indicated that the tube is made of piping material. The licensee applied the NRC LBB criteria (NUREG-1061) and methodology (NUREG/CR-4572) to calculate a leakage rate of 0.08 gpm.

The fracture mechanics of the NRC LBB methodology is based on test data of pipes 4 inch in diameter or larger. The test data of smaller diameter pipes either are unavailable or are not credible to be used in the fracture mechanics analysis. The application of the criteria and methodology to smaller diameter piping may not be valid in terms of elastic-plastic fracture mechanics. We also have a concern about the capability of the leakage detection system for small leaks. The licensee indicated that the radiation monitoring system for tube leakage can detect a leakage of 0.08 gpm. The experiences of steam generators have shown that the radiation monitoring/detection system may not be accurate during transients. Based on these considerations, we have not approved the LBB technology for pipes that are less than 6-inch in diameter.

We conclude that the LBB methodology is not applicable to the HPSC tube rupture. However, the licensee can use other analytical approaches (e.g. stress analysis) to show the structural integrity of the HPSC tube.

Principal Contributor: John Tsao