New Hampshire
Yankee

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United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-86, Docket No. 50-443

Subject: Response to "Solicitation of Public Comments on Generic Issue 23, Reactor Coolant Pump Seal Failure"

Gentlemen:

New Hampshire Yankee (NHY) is pleased to have the opportunity to comment on the proposed resolution of Generic Issue 23, "Reactor Coolant Pump Seal Failure." While we agree that the RCP seals are important components of the primary loop and that seal failures may be important contributors to severe accident risk, we offer the following insights for consideration:

- RCP seal maintenance and operation has significantly improved since the early 1980s as a result of licensees' own efforts to improve safety and reduce downtime due to seal problems. Although Seabrook has only operated for one year, we have instituted significant enhancements (described below) as a result of our review of industry experience and vendor recommendations.

- the utility-generated improvements in seal maintenance and operation are the most cost effective in assuring high reliability. Additional NRC requirements would provide only marginal improvements but would impose significant paperwork burdens in control and reporting.

- plant specific design differences make reasonable generic solutions difficult. For example, the Seabrook seal cooling system includes a separate closed cooling loop that cools each RCP thermal barrier and that is, in turn, cooled by both trains of PCCW. This added system improves the reliability of the seal cooling for normal operation.

- the severe accident risk is subject to significant uncertainty in the areas of seal performance (leak size, time to initiation, effect of depressurization) and time to recover failed equipment (electric power and component cooling water pumps). In both of these areas, the uncertainty is due to the lack of data on seal performance with hot fluid and long-term (greater than 4 hour) recoverability. While the focus of this issue is on the seal, assumptions about recoverability can significantly affect risk and change the relative importance of fixes to seal leakage.

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- while it may be possible to show that a seal LOCA fix is cost beneficial, it does not follow that it is the most cost-effective risk reduction measure for each individual plant. This demonstrates the difficulty of trying to address severe accident issues one at a time. Generic Letter 88-20, Individual Plant Examination, was set up by the Commission to systematically examine plants for severe accident vulnerabilities and identify cost-effective changes to design and operation to reduce the vulnerabilities.

The following comments are in response to specific areas requested in the notice and numbered accordingly:

1. Seal Experience

Because of our limited operating experience, Seabrook has not had problems that forced changes in seal maintenance/operation. Instead, as a result of industry experience and vendor recommendations and prior to operation, NHY instituted an extensive RCP Seal Reliability program, that includes the following:

- An interdisciplinary task force was set up, consisting of members from maintenance, operations, technical support, engineering, health physics, and training. This group meets to review seal operation, trends, and options to deal with any degradation.

- A "RCP Seal Reliability Analysis" study was completed in January 1989. This study evaluated industry experience with seal failures in order to identify the potential failure modes and what could be done to prevent or detect them. This identified such areas as the need for clean room conditions when handling the seal - in storage, rebuild, or replacement; the importance of seal injection filter replacement to assure that the seals are not contaminated during the switchover; and a trending program to allow for early identification of potential seal degradation.

- A monitoring program is conducted by the Technical Support Group which periodically issues a trend report to the task force members. As a result of this monitoring, degraded seal flow was detected in mid-1990 on the "C" RCP #1 seal leakoff - flow trending low. Data was available over a sufficient length of time to allow the identification of this slow trend. Several recovery options were tried as directed by the pump vendor, including small changes in VCT temperature and seal injection flow. None of these options was successful and in late 1990, when the plant was shutdown, the pump seal was inspected. This revealed wear on the # 1 insert and a small amount of crud. Also, the #1 insert was made of stainless steel. The replacement insert is Chrome Carbide coated to give longer service life, as recommended by the vendor. Subsequently, the decision was made to inspect the other three pumps at the next refueling. In the future, the plan is to inspect two pump seals per refueling outage, including changing out the cartridge seal package.

- A full scale mockup is used in training for maintenance, health physics technicians, and support engineers. This hands-on training was also used to optimize the procedures used to remove, rebuild, and replace a seal cartridge. The training also included classroom training for operations, maintenance, and Technical Support personnel on the theory of seal operation and the ways the seal can possibly fail.

NHY believes the above initiatives will ensure reliable seal performance and early identification of potential seal degradation.

2. Experience in Degraded Cooling

None at Seabrook.

3. Procedures and Instrumentation

3.1 The Abnormal and Emergency Operating Procedures at Seabrook Station are consistent with vendor guidance which includes responding to a seal leak, i.e. shutting down the RCP on abnormal seal indications and closing the seal leakoff line on high flow.

3.2 The RCP seal instrumentation is fully in compliance with the vendor recommendations.

3.3 Vendor information is used as the basis for procedures and maintenance practices. Configuration control assures that vendor updates are reviewed by the appropriate groups.

3.4 Per vendor recommendations, the abnormal procedure (OS1201.01 "RCP Malfunction") calls for RCP trip and plant shutdown for any of the following:

- #1 seal leakoff flow abnormal - high or low
- high RCP vibration
- high RCP motor temperature
- loss of thermal barrier cooling and seal injection

In the case of a degradation of the first stage, such as the low seal leakage experienced earlier at Seabrook, or loss of the second stage flow, the task force and pump vendor are consulted for recommendations.

4. PRA Seal Models

NHY has no additional information regarding seal leakage models beyond what is available in the literature. From a PRA standpoint, the NUREG-1150 model seems to be the best in that it attempts to account for the range of expert opinion.

The NUREG-1150 seal LOCA probability model has been used in the current Seabrook PRA analyses. Sensitivity studies have been done to investigate the value in adding the new high temperature seal O-rings. The new O-rings resulted in a decrease in the best estimate seal leakage rate from about 250 gpm per pump to about 25 gpm per pump. However, this order-of-magnitude change in leak rate did not significantly affect the core damage frequency for seal LOCA due to two factors: (1) the small credit given to recovery of electric power in the long term (greater than 4 hours) and (2) no credit given for recovery of PCCW. Thus, core damage sequence durations are longer but are not significantly changed in frequency. In this case, the long term electric power recovery and the potential for PCCW recovery need to be investigated to account for conservatism inherent in PRAs.

5. Testing

It is not clear that enough is known about the seal performance to set up a test or series of tests that would resolve this issue. Tests would probably be inconclusive until the parameters that affect seal performance are better understood.

6. NRC Action

The information presented above demonstrates the extent of the care that is taken, with no regulatory action, to maintain the seals. The additional requirements covered by proposed Regulatory Guide DG-1008, "Reactor Coolant Pump Seals", would not substantially improve seal performance, and would likely only result in resources spent to document and justify activities presently occurring.

New Hampshire Yankee believes that the assurance that NRC is looking for could be achieved without the burden to the utilities of additional requirements and that generic rulemaking is not necessary. If you have any questions on this, please contact Mr. Larry Rau, Reliability and Safety Engineering Manager, at (603) 474-9521, extension 4305.

Very truly yours,

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