UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, DC 20555-0001

June 6, 2002

NRC INFORMATION NOTICE 2002-018: EFFECT OF ADDING GAS INTO WATER STORAGE TANKS ON THE NET POSITIVE SUCTION HEAD FOR PUMPS

Addressees

All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the potential impact of adding gas into water storage tanks on the available net positive suction head (NPSH) for pumps. The NRC anticipates that recipients will review this information for applicability to their facilities and consider taking appropriate actions. However, the suggestions contained in this information notice do not constitute NRC requirements and, therefore, no specific action or written response is required.

Description of Circumstances

The NRC recently performed an inspection at the Union Electric Company's Callaway nuclear power plant in response to the identification of a degraded condensate storage tank (CST) floating diaphragm seal. The degradation resulted in a failure of a motor-driven auxiliary feedwater (AFW) pump. It also had the potential to induce a common-cause failure of multiple AFW pumps. The inspection included a review of several calculations related to the available NPSH for AFW pumps. The NRC inspection report may be found in the NRC Agency Document and Management System (ADAMS) under Accession Number ML 020810177.

Prior to 1988, the Callaway nuclear power plant controlled the amount of dissolved oxygen in the CST water by recirculating water to the main condenser hotwell. However, the licensee determined that this method of removing oxygen from the CST caused water temperatures to exceed the allowable water temperature for the AFW system during the summer months. To prevent high water temperatures, the licensee modified the design to add a nitrogen sparging system to the CST.

The NRC found that the licensee's previous calculations did not appropriately address the effect of the nitrogen-saturated water on the available NPSH for the AFW pumps. The licensee's recent NPSH calculation included the effect of nitrogen addition to the CST. The revised calculation indicated that the available NPSH was reduced by approximately 11 feet for the A-train motor-driven AFW pump.

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DISCUSSION

This example at the Callaway nuclear power plant shows that the available NPSH for the AFW pumps was significantly reduced when nitrogen gas is added to the CST to control dissolved oxygen. Criterion III, "Design Control," in Appendix B to Title 10, Part 50 of the *Code of Federal Regulations* (10 CFR Part 50) requires, in part, that each licensee must implement design control measures to verify or check the adequacy of design through the use of alternate or simplified calculational methods, or by performing a suitable testing program. In general, it is important to consider the effect on available NPSH for pumps when modifying the pumps' suction source (e.g., CST and Refueling Water Storage Tank). Inadequate NPSH can result in significantly degraded pump performance or pump failure.

This information notice does not require any specific action or written response. If you have any questions about the information in this notice, please contact the technical contacts listed below or the appropriate project manager from the NRC's Office of Nuclear Reactor Regulation.

/RA/
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DISCUSSION

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