LER 277/83-028

Event Description: Trip with Two HPSW Pumps Inoperable

Date of Event: December 23, 1983

Plant: Peach Bottom 2

Summary

During normal operation on December 23, 1983, while surveillance testing was being performed, high-pressure service water (HPSW) pump 2B was declared inoperable due to low flow caused by a stuck-open discharge check valve on the 2D HPSW pump. The HPSW 2A pump was removed from service on July 20, 1983 for an overhaul. The HPSW 2D discharge check valve was inspected and the cause of the check valve failure was determined to be internal wear to the valve disk pin and arm. These parts were replaced and pump 2B was returned to service on December 30th. The HPSW system provides cooling to the residual heat removal (RHR) system heat exchangers. Without HPSW cooling water flow to the RHR heat exchangers, RHR cannot adequately remove decay heat. There was a plant trip on December 25 before the HPSW pump 2B was returned to service (NUREG-0020).

This event was modeled as a transient with degraded RHR and low-pressure coolant injection (LPCI). HPSW pump 2B would continue to work with the failed 2D check valve as long as pump 2D was working, but if pump 2D failed, pump 2B would also fail. The probability that the remaining HPSW pumps would fail was estimated to be 0.01 × 0.1, or 0.001. The conditional core damage probability estimated for this event is 7.7×10^{-6}. The dominant sequence involves a successful reactor shutdown, failure of the power conversion system, failure of one safety relief valve (SRV) to close, successful main feedwater, and failure of RHR.