

Waterford 3 Event Description

Safety Injection Sump Outlet Header B Isolation Valve SI-602B is a normally closed valve. The valve is required to close on a Safety Injection Actuation Signal (SIAS) and required to open on a Recirculation Actuation Signal (RAS) to provide a flow path from the Safety Injection Sump to the Emergency Core Cooling System (ECCS) and Containment Spray (CS) pumps.

On September 9, 2004, while performing Surveillance Test OP-903-110, "RAB Fluid Systems Leak Test," on the Safety Injection (SI) piping between valves SI-602B and SI-604B, the piping could not be pressurized. Subsequent troubleshooting efforts identified that Valve SI-602B was not fully seated. The licensee identified that this was due to inadequate valve setup following T-Ring replacement during Refueling Outage 12.

The licensee identified that under certain accident conditions with a large break or medium break Loss-of-Coolant-Accident (LOCA) present, containment pressure would force air through Valve SI-602B into the safety injection sump suction piping. This would create a back pressure on Refueling Water Storage Pool (RWSP) Suction Check Valve, SI-107B. Under certain conditions, the void pressure could isolate flow from the RWSP to the CS and ECCS pumps before the RWSP level reached the RAS actuation setpoint. Based on this, the SI system was considered to be unavailable between November 11, 2003, when Refuel 12 ended, and September 9, 2004, when the valve leakage was identified and corrected.

NRC's Understanding of the Licensee's Position

The licensee contends that the root cause of this event was a design deficiency in that valves SI-602A and SI-602B had been incorrectly classified as category B valves under the IST program (which do not require leak testing), when the valves should have been classified as category A (which do require leak testing). As a result, no routine testing had been performed that would quantify any leakage past the valve. Thus no surveillance tests were available to guarantee the leak-tightness of these valves and prevent the back pressure that could cause the inoperability of the ECCS and CS system. In addition, because the condition existed since the original design and licensing basis and was a condition of long duration, the licensee believes that they meet the criteria set forth in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 2, Page 33, Line 17:

NRC's Interpretation of the Issue

The NRC's position is that the licensee should include in the SSU High Pressure Injection System PI the time from when SI-602B had its T-ring replaced (November 11, 2003) to when the valve failure was identified (September 9, 2004). The unavailability was the result of inadequate test controls whereby the lack of post maintenance testing resulted in the failure by the licensee to identify the maintenance errors.

The staff believes that the root cause of the failure of SI-602B was the maintenance errors that occurred during the T-ring installation effort and the failure to perform a post maintenance test as required per 10 CFR 50, Appendix B, Criterion XI. The licensee had many opportunities between 1984 and 2004 to identify both the voiding and back-pressure condition as well as the valve mis-classification.