Date: April 13, 1977

FAILURE OF FEEDWATER SAMPLE PROBE

DESCRIPTION OF CIRCUMSTANCES:

Recent events involving failure of sample probes are of concern to the NRC.

During surveillance testing at the Cooper Nuclear Station on January 21, 1977, a High Pressure Coolant Injection (HPCI) system check valve was found to be non-functional. Inspection of the valve revealed a length of feedwater sample probe lodged in the valve. The piece of sample probe prevented the check valve from fully closing which allowed feedwater to flow backward into the HPCI system injection line, however, the blocked check valve would not have prevented the HPCI system from supplying coolant to the feedwater system in the event it was requried at the time.

A similar probe failure occurred at the Brunswick facility on February 17, 1976. This piece of feedwater sample probe was found lodged in the feedwater check valve located just outboard of the primary containment.

These feedwater sample probes are schedule 120 stainless steel, 1-inch OD, about 14-inches in length with 3 holes spaced to serve as the sample entry ports. The sample probes are inserted and welded to the feedwater lines at multiple locations. The Cooper sample probe was located directly opposite and above the "T" connection with the HPCI discharge line.

Due to the non-functioning HPCI check valve at Cooper, the feedwater system pressurized the HPCI system suction piping when HPCI surveillance test was attempted. This pressurization caused the flange gasket to be blown out of the check valve located in the HPCI suction piping from the torus. This would not have prevented the HPCI from supplying emergency cooling water in the event it had been required.

Both the Cooper and Brunswick failed sample probes were examined by metallographic analysis. NRC was orally informed that the probable failure mechanism was intergranular stress corrosion cracking which was probably induced by chlorides. There was no evidence of fatigue failure.

Because there are a number of such sample probes used in light water nuclear power reactors, these failures indicate a need for licensees to verify the integrity of similar components in their facilities. In addition, licensees should review the potential for such failures at their facilities and should assess the potential consequences should such a failure occur. Particular attention should be given to those installations where a failure and subsequent blockage could lead to overpressurization of components of lower system design pressure. Operators should be made aware of these failures and indications of such failures to enable them to respond properly should such an event occur.

No written response to this Circular is required. If you need additional information regarding this matter, contact the Director of the cognizant NRC Regional Office.

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