Nebraska Public Power District

COOPER NUCLEAR STATION
P.O. BOX 98, BROWNVILLE, NEBRASKA 68321
TELEPHONE (402) 825-3811

CNSS790430

August 20, 1979

Mr. K. V. Seyfrit
U.S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region IV
611 Ryan Plaza
Suite 1000
Arlington, Texas 76011

Dear Sir:

This report is submitted in accordance with Section 6.7.2.A.5 of the Technical Specifications for Cooper Nuclear Station and discusses a reportable occurrence that was discovered on August 9, 1979. Our initial notification was telecopied to your office on August 10, 1979. A licensee event report form is also enclosed.

Report No.: 50-298-79-19
Report Date: August 20, 1979
Occurrence Date: August 9, 1979
Facility: Cooper Nuclear Station
Brownville, Nebraska 68321

Identification of Occurrence:

Failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) used to cope with accidents analyzed in the SAR.

Conditions Prior to Occurrence:

Reactor power was at 99% of rated thermal power. This occurrence was initiated subsequent to a reactor scram.

Description of Occurrence:

Upon receipt of an auto start signal, the HPCI (High Pressure Coolant Injection) system did not initially start. However, a short time after the initiation signal, the HPCI system did start and maintained reactor vessel water level.

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Designation of Apparent Cause of Occurrence:

It was found that the failure of the pump to start was caused by the failure of the seal rings on the hydraulic operator for the turbine stop valve. The seal rings were allowing oil to leak by the piston of the operator and insufficient force was available to open the stop valve at full system steam pressure. When disassembled it was found that approximately 1/3 of the seating surface of one ring was missing. The valve actuator is a 12 inch hydraulic cylinder manufactured by Miller Fluid Power Company, Model J-53.

Analysis of Occurrence:

A review of this occurrence indicates that at its lowest point the reactor water level was approximately -70 inches. This is about 35 inches above the top of the active fuel. The RCIC (Reactor Core Isolation Cooling) pump automatically started and supplied water to the reactor vessel and would have restored vessel water level had HPCI not started. HPCI did not start until about 14 minutes after the scram when system pressure was reduced to about 600 psig.

Initially it was believed that the apparent cause of this occurrence as stated in the 24 hour notification was low lube oil pressure to the operating piston on the stop valve actuator. The following sequence of events revealed the apparent cause currently stated in this response. The lube oil pressure was adjusted and the HPCI stop valve was stroked in an acceptable time frame with no steam pressure when the reactor was shutdown. The HPCI was declared operable and was satisfactorily tested in the manual test mode at 150 psig main steam pressure during reactor startup. The reactor was placed in RUN and the turbine generator was synchronized to the bus. HPCI was again started manually satisfactorily. However, during the subsequent automatic quick start test, HPCI did not start due to the stop valve not opening. At this point HPCI was declared inoperable and additional troubleshooting activities commenced. The problem was diagnosed as failed piston rings. During the ensuing two days while the piston rings were being procured from the vendor, the HPCI system could have been manually initiated if required. The HPCI system was in this manual mode for approximately 56 hours and was inoperable for about 16 hours during troubleshooting and replacement of the piston rings.

The HPCI stop valve is a vertically mounted hydraulically operated piston type globe valve with the actuating cyclinder on the bottom and an internal balance chamber on top of the globe valve piston. The purpose of the balance chamber is to insure smooth operation of the valve during the opening cycle. This function is provided by

an internal orificed steam passage which permits approximately 20% of the main steam pressure to accumulate in the balance chamber during valve opening. When the valve is fully open, the internal steam pressure is equalized throughout the stop valve body. During this occurrence, the valve actuator piston did not have sufficient force to overcome the initial main steam pressure in the balance chamber. As the main steam pressure decreased after the reactor scram, the force on the valve actuator piston became sufficient to open the stop valve and start the HPCI pump and aid in restoring reactor water level to its normal range.

The failed piston ring was of a cup type configuration and fabricated from leather. It is believed that the ring failure was accelerated due to the operating temperature of the stop valve. The failed ring had never been replaced and the estimated time in service of the subject ring is six (6) years.

All Low Pressure Coolant Injection systems were operable and could have been used to maintain level had they been required. This occurrence presented no adverse consequences from the standpoint of public health and safety.

Corrective Action:

The leather cup rings in the valve actuator were replaced and a simulated Auto Actuation Test (S.P. 6.3.3.3) was satisfactorily performed at full system pressure to verify pump operability. All applicable surveillance procedures have been changed to insure that during testing the stop valve is opened under conditions approximating those found during an automatic system initiation.

The preventive maintenance program has been revised to include checking the subject valve actuating piston for excess oil leakage and the subject piston rings are scheduled for replacement every five years. The turbine control actuator for the RCIC is of a different design and the mode of failure identified in the occurrence is not applicable to the RCIC.

Sincerely,

L. C. Lessor
Station Superintendent
Cooper Nuclear Station

LCL:cg
Attach.