

LICENSEE EVENT REPORT (LER)

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TITLE (4)
Failure of RHR Inboard Injection Valves to Close During Surveillance Testing

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		
0	4	0	8	8	8	0	0	8	0 5 0 0 0		
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OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §. (Check one or more of the following) (11)			
POWER LEVEL (10) 0 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.36(c)(2)	X 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 365A)
	20.405(a)(1)(iii)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	50.73(a)(2)(iii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)	
NAME Donald L. Reeves, Jr.	TELEPHONE NUMBER 4 0 2 8 2 5 - 3 8 1 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO					

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On April 6, 1988, during performance of a surveillance test for the Residual Heat Removal (RHR) Injection Valve trip logic, the valve closure control logic relays failed to actuate. The logic circuit is designed to initiate closure of RHR Injection Valves RHR-MOV-MO25A and B, if opened (and prevent opening, if closed) when a Group 2 Isolation signal (High Drywell Pressure or Low Reactor Vessel Water Level) is actuated and RHR is in the Shutdown Cooling mode; i.e., Shutdown Cooling Suction Valves, RHR-MOV-MO17 and 18, are open. When this problem was discovered, the reactor was in a Cold Shutdown condition (Primary Containment Integrity not required) and the 1988 Refueling Outage was in progress.

As specified in Revision 0, a complete investigation of the test deviation could not be completed due to plant conditions. Subsequently, the surveillance test was re-performed as a means to initiate troubleshooting. This test of the logic circuit was completed satisfactorily without implementation of any corrective action. Nevertheless, further investigation revealed that the cause of the problem was due to inconsistent actuation of the limit switches associated with the motor operator for RHR-MOV-MO17, RHR Shutdown Cooling Outboard Suction Valve, which were used in the trip logic circuits for the RHR Inboard Injection Valves.

Corrective action taken included selection of alternate limit switches for use in the trip logic circuits that would normally be closed when RHR-MOV-MO17 was not fully closed. Limit switch actuation was set in accordance with existing procedures, and the surveillance test was performed satisfactorily.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

A. Event Description

On April 6, 1988, during performance of a surveillance test for the Residual Heat Removal (RHR) Injection Valve trip logic, the valve closure control logic relays, 10A-K63A and 10A-K63B, failed to actuate. The logic circuit is designed to initiate closure of RHR Injection Valves RHR-MOV-MO25A and B, if opened (and prevent opening, if closed) when a Group 2 Isolation signal (High Drywell Pressure or Low Reactor Vessel Water Level) is actuated and RHR is in the Shutdown Cooling mode; i.e., Shutdown Cooling Suction Valves, RHR-MOV-MO17 and 18, are open. During performance of Surveillance Procedure 6.2.2.5.16A, RHR Loops A & B Shutdown Cooling PCIS Isolation Functional Test, the individual isolation control relays (10A-K63A and B) did not energize when a simulated Group 2 Isolation signal was inserted. Consequently, neither valve was automatically actuated to the CLOSE position.

B. Plant Conditions

Shutdown for the 1988 Refueling Outage which commenced March 5, 1988.

C. Basis for Report

An event where a single cause resulted in failure of two independent RHR Injection Valves to automatically close when required, reportable in accordance with 10CFR50.73 (a)(2)(vii).

D. Cause

As specified in Revision 0, a complete investigation of the test deviation had not been completed due to plant conditions. Subsequently, with the establishment of appropriate conditions, the surveillance test was re-performed as a means to initiate troubleshooting. This test of the logic circuit was completed satisfactorily without implementing any corrective action. Further investigations were then conducted in an effort to determine the apparent intermittent (non-repeatable) operation of the logic circuit. It was determined that the limit switches used in the logic circuits were being driven by one of the two auxiliary rotors in the Limitorque operator for RHR-MOV-MO17, and were set up to close when the valve reached the full OPEN position. While this conclusion could not be verified during the course of the investigation, based upon visual observation and subsequent discussions, it is believed that operation of the auxiliary rotor was not precisely synchronized with the Limitorque operator rotors containing the limit switches that control the operation of the valve. Consequently, the observed intermittent operation of the logic circuit was believed to be a result of this slight difference in rotor positioning, hence resulting in intermittent limit switch operation.

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E. Safety Significance

When this apparent deficiency was identified, the 1988 Refueling Outage was in progress with the reactor vessel head removed, the Refueling cavity flooded, RHR in operation in the Shutdown Cooling mode, and Primary Containment integrity not required.

The logic circuit is intended to be in effect when reactor pressure is ≤ 75 psig (the upper pressure limit for placing the RHR System in the Shutdown Cooling mode) and when Shutdown Cooling Suction Valves RHR-MOV-MO17 & 18 are not fully closed; i.e., when they are open and RHR is in the Shutdown Cooling mode of operation. With the plant in this latter condition, had a Group 2 Isolation signal (Drywell High Pressure or Reactor Low Water Level) been actuated, RHR-MOV-MO17 & 18 would have closed as designed. (Their actuation under these conditions is not effected by this trip logic circuit). However, as a result of the apparent intermittent operation of the logic circuit RHR-MOV-MO25A & B might have remained open. If a low Reactor Vessel Water Level condition (a Group 2 Isolation signal) had occurred due to a break in the RHR System, closure of the RHR System Shutdown Cooling Suction valves would have been sufficient to isolate the break since check valves downstream of RHR Injection Valves, RHR-MOV-MO25A & B, would have seated, preventing reverse flow in the discharge line. If, however, the check valves had failed to seat, a leak path through one or both of the RHR Sub-Systems could have existed. Operator actions to close RHR-MOV-MO25A and B would then have been reasonably expected, either when it was noted that the valves had not closed automatically or upon indications of water leakage.

During normal operation, the trip logic is not required (nor is it capable of being actuated) since reactor pressure is greater than 75 psig and the Shutdown Cooling Suction Valves are closed. Under these conditions, the logic circuit is, essentially, disarmed.

F. Corrective Action

The valve operation logic circuit for RHR-MOV-MO17 (as well as for RHR-MOV-MO18) is designed such that upon actuation of the valve to the OPEN position, the valve will travel to the full open position, due to a seal-in feature of the logic circuit. Therefore, a simple adjustment to the limit switch auxiliary rotor so that the limit switches would close when the valves reached the fully open position would set up the logic circuit so that it would function correctly should a Group 2 Isolation occur. However, to ensure resolution and prevent reoccurrence, in lieu of adjusting operation of the auxiliary rotor to achieve the desired actuation of the associated limit switches, alternate limit switches were selected. The limit switches selected are associated with separate rotors and are those that will operate to the CLOSE position as soon as the valve begins to stroke open. Therefore, logic circuit actuation will

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no longer be dependent on such a precise limit switch adjustment as the valve reaches its full OPEN position, the prior condition. The limit switches for both RHR-MOV-MO17 and 18 were then checked and adjusted as specified in Maintenance Procedure 7.3.36, Limit and Torque Switch Checkout and Adjustment for Rising Stem Limitorque Motor Operated Valves. Surveillance testing was then performed in accordance with Surveillance Procedure 6.2.2.5.16A and logic circuit operation was determined to be satisfactory.

G. Past Similar Events

A similar surveillance test failure occurred in December 1986 while shutdown for the 1986 Refueling Outage but, during subsequent troubleshooting, could not be repeated. This failure was not reported at that time, since it was believed that maintenance activities completed during the outage associated with RHR-MOV-MO17 prior to performance of surveillance testing were most likely the cause of the problem. Since that time two (2) successful surveillance tests have been performed (May and October, 1987).