

PRECURSOR DESCRIPTION SHEET

LER No.: 277/85-003
Event Description: Loss of One RHR and LPCI Train
Date of Event: June 3, 1985
Plant: Peach Bottom 2

EVENT DESCRIPTION

Sequence

On June 1 during a test, the "A" residual heat removal (RHR) system outboard injection valve (154A) failed in mid-position. This failure was not detected.

On June 3, the RHR loop A injection valve failed to open in a test and could not be opened manually at the valve. This failure also affected LPCI system train A operation. The valve's lock nut and yoke nut had been damaged in a May 29 hydro test. A trust bearing was also found damaged.

Corrective Action

The valve was repaired.

Plant/Event Data

Systems Involved:
LPCI and RHR

Components and Failure Modes Involved:
Injection valve — failed in test twice

Component Unavailability Duration: 96 h
Plant Operating Mode: 6 (0% power)
Discovery Method: Testing
Reactor Age: 11.8 years
Plant Type: BWR

Comments

None

Event Identifier: 277/85-003

MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

Transient, LOOP, small LOCA (Postulated event)

Base case

Events are conservatively assumed to occur at power

Branches Impacted and Branch Nonrecovery Estimate

| | | |
|-------------------------------|-----------|------------------|
| LPCI | base case | One train failed |
| RHR (shutdown coding mode) | base case | One train failed |

Plant Models Utilized

BWR plant Class C

Event Identifier: 277/85-003

(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC)

End State: CD Conditional Probability: 3.237E-06

101 TRANS -SCRAM PCS/TRANS SRV.CHALL/TRANS.-SCRAM -SRV.CLOSE -FW/PCS.TRANS RHR(SDC) RHR(SPCOOL)/-LPCI.RHR(SDC) C.I.AND.V/RHR(SDC).RHR(SPCOOL)

SEQUENCE CONDITIONAL PROBABILITIES

| | Sequence | End State | Seq. Prob | Non-Recov** |
|-----|--|-----------|-------------|-------------|
| 101 | TRANS -SCRAM PCS/TRANS SRV.CHALL/TRANS.-SCRAM -SRV.CLOSE -FW/PCS.TRANS RHR(SDC) RHR(SPCOOL)/-LPCI.RHR(SDC) C.I.AND.V/RHR(SDC).RHR(SPCOOL) | CD | 3.237E-06 † | 1.015E-01 |
| 102 | TRANS -SCRAM PCS/TRANS SRV.CHALL/TRANS.-SCRAM -SRV.CLOSE FW/PCS.TRANS -HPCI RHR(SDC) RHR(SPCOOL)/-LPCI.RHR(SDC) C.I.AND.V/RHR(SDC).RHR(SPCOOL) | CD | 5.660E-07 | 3.828E-02 |
| 135 | TRANS SCRAM -SLC.OR.RODS PCS/TRANS -SRV.CLOSE FW/PCS.TRANS HPCI RCIC/TRANS.OR.LOOP -SRV.ADS -COND/FW.PCS RHR(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC) | CV | 4.619E-11 | 2.285E-02 |
| 139 | TRANS SCRAM -SLC.OR.RODS PCS/TRANS -SRV.CLOSE FW/PCS.TRANS HPCI RCIC/TRANS.OR.LOOP -SRV.ADS COND/FW.PCS -LPCS RHR(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC) | CV | 2.377E-11 | 1.177E-02 |
| 156 | TRANS SCRAM -SLC.OR.RODS PCS/TRANS SRV.CLOSE FW/PCS.LOCA HPCI RCIC/LOCA -SRV.ADS -COND/FW.PCS RHR(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC) | CV | 9.905E-11 † | 4.008E-02 |
| 160 | TRANS SCRAM -SLC.OR.RODS PCS/TRANS SRV.CLOSE FW/PCS.LOCA HPCI RCIC/LOCA -SRV.ADS COND/FW.PCS -LPCS RHR(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC) | CV | 5.097E-11 | 2.065E-02 |
| 227 | LOOP -EMERG.POWER SCRAM -SLC.OR.RODS HPCI RCIC/TRANS.OR.LOOP -SRV.ADS -LPCS RHR(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC) | CV | 1.118E-11 | 3.461E-02 |
| 315 | LOCA SCRAM -SLC.OR.RODS PCS/LOCA FW/PCS.LOCA HPCI -SRV.ADS -COND/FW.PCS RHR(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC) | CV | 1.640E-11 | 1.363E-02 |
| 319 | LOCA SCRAM -SLC.OR.RODS PCS/LOCA FW/PCS.LOCA HPCI -SRV.ADS COND/FW.PCS -LPCS RHR(SDC) -RHR(SPCOOL)/-LPCI.RHR(SDC) | CV | 8.438E-12 | 7.020E-03 |

† dominant sequence for end state

** non-recovery credit for edited case

Note:

Conditional probability values are differential values which reflect the added risk due to observed failures. Parenthetical values indicate a reduction in risk compared to a similar period without the existing failures.

MODEL: b:bwrcree.cmp

DATA: b:peachpro.cmp

No Recovery Limit

BRANCH FREQUENCIES/PROBABILITIES

Event Identifier: 277/85-003

| Branch | System | Non-Recov | Opr Fail |
|---|-----------------------|-----------|-----------|
| TRANS | 1.142E-03 | 1.000E+00 | |
| LOOP | 1.305E-05 | 3.400E-01 | |
| LOCA | 3.250E-06 | 3.400E-01 | |
| SCRAM | 4.100E-04 | 1.000E+00 | |
| SLC.OR.RODS | 1.000E-02 | 1.000E+00 | 4.000E-02 |
| PCS/TRANS | 1.700E-01 | 1.000E+00 | |
| PCS/LOCA | 1.000E+00 | 1.000E+00 | |
| SRV.CHALL/TRANS.-SCRAM | 1.000E+00 | 1.000E+00 | |
| SRV.CHALL/TRANS.SCRAM | 1.000E+00 | 1.000E+00 | |
| SRV.CHALL/LOOP.-SCRAM | 1.000E+00 | 1.000E+00 | |
| SRV.CHALL/LOOP.SCRAM | 1.000E+00 | 1.000E+00 | |
| SRV.CLOSE | 3.630E-02 | 1.000E+00 | |
| EMERG.POWER | 2.708E-04 | 5.100E-01 | |
| FW/PCS.TRANS | 4.600E-01 | 3.400E-01 | |
| FW/PCS.LOCA | 1.000E+00 | 3.400E-01 | |
| HPCI | 1.000E-01 | 5.700E-01 | |
| RCIC/TRANS.OR.LOOP | 6.700E-02 | 5.700E-01 | |
| RCIC/LOCA | 1.000E+00 | 1.000E+00 | |
| CRD | 1.000E-02 | 1.000E+00 | 4.000E-02 |
| SRV.ADS | 6.700E-03 | 1.000E+00 | 4.000E-02 |
| COND/FW.PCS | 1.000E+00 | 3.400E-01 | |
| LPCS | 3.000E-03 | 3.400E-01 | |
| LPCI(RHR)/LPCS | 4.000E-04 > 1.000E-01 | 3.400E-01 | |
| Branch Model: 1.OF.2 | | | |
| Train 1 Cond Prob: | 4.000E-03 > Failed | | |
| Train 2 Cond Prob: | 1.000E-01 | | |
| RHR(SDC)/LPCS.LPCI.TRANS | 5.000E-01 | 1.000E+00 | 4.000E-02 |
| RHR(SDC)/LPCS.LPCI.LOOP | 5.000E-01 | 1.000E+00 | 4.000E-02 |
| RHR(SDC)/LPCS.LPCI.LOCA | 5.000E-01 | 1.000E+00 | 4.000E-02 |
| RHR(SDC) | 2.039E-02 > 1.180E-01 | 3.400E-01 | |
| Branch Model: 1.OF.2+ser | | | |
| Train 1 Cond Prob: | 4.000E-03 > Failed | | |
| Train 2 Cond Prob: | 1.000E-01 | | |
| Serial Component Probability: 2.000E-02 | | | |
| RHR(SDC)/-LPCI | 2.000E-02 | 3.400E-01 | |
| RHR(SDC)/LPCI | 1.000E+00 | 1.000E+00 | |
| RHR(SPCOOL)/-LPCI.RHR(SDC) | 2.000E-02 | 1.000E+00 | |
| RHR(SPCOOL)/LPCI.RHR(SDC) | 5.200E-01 | 1.000E+00 | |
| C.I.AND.V/RHR(SDC).RHR(SPCOOL) | 1.000E+00 | 3.400E-01 | |

*** forced

JD HARRIS
10-07-1986
14:54:34

Event Identifier: 277/85-003