

PRECURSOR DESCRIPTION SHEET

LER No.: 265/84-010
Event Description: Trip with RCIC Failure
Date of Event: October 25, 1984
Plant: Quad-Cities 2

EVENT DESCRIPTION

Sequence

On October 25, 1984, Unit 2 was proceeding to hot standby. At 0546 h, the procedure was partially completed, and all outboard MSIVs were closed. Once the outboard MSIVs were closed, reactor pressure started to increase. In an attempt to control pressure, additional control rods were inserted into the core. Because the reactor was already subcritical, the insertion of additional rods had no effect on the increasing pressure. A second attempt was made to control pressure by starting the RCIC system. RCIC tripped on overspeed and had to be manually and locally reset at the turbine. Concurrently, the HPCI system was started by another operator, but the reactor scrambled from a high pressure of 1044 psig at 0641 h.

When the reactor scrambled, rod K-13 remained at position 48. Control rod K-13 was successfully inserted from the individual rod scram back-panel at 0712 h.

An inspection of the hydraulic control unit 38-51, which drives control rod K-13, revealed that the scram discharge riser valve EP 305-112 was closed, preventing the drive from venting properly when the scram took place. A thorough investigation to determine the root cause of the manual valve 112 being closed was conducted by reexamining Work Requests, Out-of-Service requests subsequent to the refueling outage, the September 18 hot scram timing surveillance tests, accumulator alarms logged in the unit operator's log book subsequent to the September 18 hot scram surveillance tests, and work performed on CRD modules in the vicinity of that for the K-13 hydraulic control unit (on both units). Despite all of the above measures, the reason for valve EP 305-112 being in the improper position could not be determined.

Corrective Action

The LER stated that the procedure for placing the plant in hot standby from full power would be revised. The hydraulic control unit valve positions were checked. The RCIC problem was being investigated at the time of the report.

Event Identifier: 265/84-010

Plant/Event Data

Systems Involved:
RCIC

Components and Failure Modes Involved:
RCIC — tripped on demand

Component Unavailability Duration: NA
Plant Operating Mode: 3 (0% power)
Discovery Method: Operational event
Reactor Age: 12.5 years
Plant Type: BWR

Comments

None

MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

Transient	1.0	No recovery
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Branches Impacted and Branch Nonrecovery Estimate

RCIC	0.34	Recoverable locally at pump
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Plant Models Utilized

BWR plant Class C

Event Identifier: 265/84-010

CONDITIONAL CORE DAMAGE PROBABILITY CALCULATIONS

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 Plant: Quad Cities 2

INITIATING EVENT

NON-RECOVERABLE INITIATING EVENT PROBABILITIES

TRANS 1.0E+00

SEQUENCE CONDITIONAL PROBABILITY SUMS

End State/Initiator	Probability
CV	
TRANS	1.2E-07
Total	1.2E-07
CD	
TRANS	8.9E-06
Total	8.9E-06
ATWS	
TRANS	2.0E-05
Total	2.0E-05

DOMINANT SEQUENCES

End State: CV Conditional Probability: 7.8E-08

134 TRANS SCRAM -SLC.OR.RODS PCS/TRANS -SRV.CLOSE FW/PCS.TRANS HPCI RCIC/TRANS.OR.LOOP -SRV.ADS
 -COND/FW.PCS -RHR(SDC)

End State: CD Conditional Probability: 7.1E-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)

Event Identifier: 265/84-010

End State: ATWS

Conditional Probability: 2.0E-05

173 TRANS SCRAM SLC.OR.RODS

SEQUENCE CONDITIONAL PROBABILITIES

	Sequence	End State	Prob	N Rec**
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	7.1E-06 *	1.1E-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	7.3E-07	3.8E-02
110	TRANS -SCRAM PCS/TRANS SRV.CHALL/TRANS.-SCRAM -SRV.CLOSE FW /PCS.TRANS HPCI RCIC/TRANS.OR.LOOP CRD SRV.ADS	CD	7.4E-07	6.6E-02
134	TRANS SCRAM -SLC.OR.RODS PCS/TRANS -SRV.CLOSE FW/PCS.TRANS HPCI RCIC/TRANS.OR.LOOP -SRV.ADS -COND/FW.PCS -RHR(SDC)	CV	7.8E-08 *	4.3E-02
138	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)	CV	4.0E-08	2.2E-02
173	TRANS SCRAM SLC.OR.RODS	ATWS	2.0E-05 *	1.0E+00

* dominant sequence for end state

** non-recovery credit for edited case

MODEL: b:\bwrctree.cmp

DATA: b:\qcprob.cmp

No Recovery Limit

BRANCH FREQUENCIES/PROBABILITIES

Branch	System	Non-Recov	Opr Fail
TRANS	1.1E-03	1.0E+00	
LOOP	1.3E-05	3.4E-01	
LOCA	3.3E-06	3.4E-01	
SCRAM	4.1E-04	1.0E+00	
SLC.OR.RODS	1.0E-02	1.0E+00	4.0E-02
PCS/TRANS	1.7E-01	1.0E+00	
PCS/LOCA	1.0E+00	1.0E+00	
SRV.CHALL/TRANS.-SCRAM	1.0E+00	1.0E+00	
SRV.CHALL/TRANS.SCRAM	1.0E+00	1.0E+00	
SRV.CHALL/LOOP.-SCRAM	1.0E+00	1.0E+00	
SRV.CHALL/LOOP.SCRAM	1.0E+00	1.0E+00	
SRV.CLOSE	1.6E-02	1.0E+00	
EMERG.POWER	2.9E-03	5.1E-01	
FW/PCS.TRANS	2.9E-01	3.4E-01	

Event Identifier: 265/84-010

FW/PCS.LOCA	4.0E-02	3.4E-01	
HPCI	1.0E-01	5.7E-01	
RCIC/TRANS.OR.LOOP	6.7E-02 > 1.0E+00	5.7E-01 > 3.4E-01	
Branch Model: 1.0F.1			
Train 1 Cond Prob:	6.7E-02 > Failed		
RCIC/LOCA	1.0E+00	1.0E+00	
CRD	1.0E-02	1.0E+00	4.0E-02
SRV.ADS	6.7E-03	1.0E+00	4.0E-02
COND/FW.PCS	1.0E+00	3.4E-01	
LPCS	3.0E-03	3.4E-01	
LPCI (RHR)/LPCS	4.0E-04	3.4E-01	
RHRSW/LPCS.LPCI.TRANS	5.0E-01	1.0E+00	4.0E-02
RHRSW/LPCS.LPCI.LOOP	5.0E-01	1.0E+00	4.0E-02
RHRSW/LPCS.LPCI.LOCA	5.0E-01	1.0E+00	4.0E-02
RHR(SDC)	2.0E-02	3.4E-01	
RHR(SDC)/-LPCI	2.0E-02	3.4E-01	
RHR(SDC)/LPCI	1.0E+00	1.0E+00	
RHR(SPCOOL)/-LPCI.RHR(SDC)	2.0E-02	1.0E+00	
RHR(SPCOOL)/LPCI.RHR(SDC)	5.2E-01	1.0E+00	
C.I.AND.V/RHR(SDC).RHR(SPCOOL)	1.0E+00	3.4E-01	

*** forced

Minarick
04-11-1987
14:15:07

Event Identifier: 265/84-010