PRECURSOR DESCRIPTION SHEET

LER No.: 250/86-039
Event Description: Trip occurs with stuck-open PORV
Date of Event: December 27, 1986
Plant: Turkey Point 3

EVENT DESCRIPTION

Sequence

Unit 3 was tripped manually following a loss of turbine governor oil system pressure and a subsequent rapid electrical load decrease from 730 to 0 MW(e). No automatic control rod insertion occurred. The reactor control operator, noting that the coolant temperature was increasing above the reference temperature, placed the rods under manual control, and initiated rod insertion. Concurrently, a second reactor control operator attempted to raise the oil pressure, unsuccessfully. At this time (~24 s into the transient) it became clear that the unit could not be recovered, and the unit was tripped manually. During the transient, a PORV opened but then would not fully close, necessitating closure of the associated block valve. The unit was stabilized in <5 min. The most probable cause of the drop in oil pressure was the clearing of blockage of the governor impeller orifice, resulting in the auxiliary governor dumping control oil. The control rods failed to insert automatically because of two cold solder joints in the final variable gain summator of the power mismatch circuit. The cause of the PORV failure to close was under investigation. The PORV, turbine governor impeller, and associated components were inspected; and no problems were found. The cold solder joints were repaired. The control, lube, and seal oil piping were to be cleaned.

Corrective Action

The PORV block valve was closed.

Plant/Event Data

Systems Involved:
Pressurizer relief

Components and Failure Modes Involved:
PORV — failed to open in operation

Component Unavailability Duration: NA
Plant Operating Mode: 1 (100% power)
Discovery Method: operational event
Reactor Age: 14.1 years
Plant Type: PWR

Event Identifier: 250/86-039

Comments

Manual control rod insertion occurred before any trip signal actuations.

MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

Transient	1.0	No recovery

Branches Impacted and Branch Nonrecovery Estimate

PORV/SRV reseat	Base case	Recoverable from the control room by closing the block valve

Plant Models Utilized

Plant Class E

Event Identifier: 250/86-039

CONDITIONAL CORE DAMAGE PROBABILITY CALCULATIONS

Event Identifier: 250/86-039
Event Description: Trip and Stuck Open PORV
Event Date: 12/27/86
Plant: Turkey Point 3

INITIATING EVENT

NON-RECOVERABLE INITIATING EVENT PROBABILITIES

TRANS	1.0E+00

SEQUENCE CONDITIONAL PROBABILITY SUMS

End State/Initiator	Probability
CV	
TRANS	6.5E-04
Total	6.5E-04
CD	
TRANS	1.4E-03
Total	1.4E-03
ATWS	
TRANS	3.4E-05
Total	3.4E-05

DOMINANT SEQUENCES

End State: CV Conditional Probability: 6.4E-04

102 TRANS -RT -AFW PORV.OR.SRV.CHALL PORV.OR.SRV.RESEAT -HPI HPR/-HPI -SS.DEPRESS -LPR/-HP I.HPR

End State: CD Conditional Probability: 1.3E-03

103 TRANS -RT -AFW PORV.OR.SRV.CHALL PORV.OR.SRV.RESEAT -HPI HPR/-HPI -SS.DEPRESS LPR/-HP I.HPR

Event Identifier: 250/86-039

End State: ATWS Conditional Probability: 3.4E-05

128 TRANS RT

SEQUENCE CONDITIONAL PROBABILITIES

	Sequence	End State	Prob	N Rec**
102	TRANS -RT -AFW PORV.OR.SRV.CHALL PORV.OR.SRV.RESEAT -HPI HP R/-HPI -SS.DEPRESS -LPR/-HPI.HPR	CV	6.4E-04 *	5.0E-02
103	TRANS -RT -AFW PORV.OR.SRV.CHALL PORV.OR.SRV.RESEAT -HPI HP R/-HPI -SS.DEPRESS LPR/-HPI.HPR	CD	1.3E-03 *	5.0E-02
104	TRANS -RT -AFW PORV.OR.SRV.CHALL PORV.OR.SRV.RESEAT -HPI HP R/-HPI SS.DEPRESS	CD	7.2E-05	5.0E-02
128	TRANS RT	ATWS	3.4E-05 *	1.2E-01

* dominant sequence for end state
** non-recovery credit for edited case

SEQUENCE MODEL: c:\asp\newmodel\pwrbtree.cmp
BRANCH MODEL: c:\asp\newmodel\turkey.txt
PROBABILITY FILE: c:\asp\newmodel\pwr_b.pro

No Recovery Limit

BRANCH FREQUENCIES/PROBABILITIES

Branch	System	Non-Recov	Opr Fail
TRANS	4.8E-04	1.0E+00	
LOOP	4.6E-06	3.9E-01	
LOCA	2.4E-06	4.3E-01	
RT	2.8E-04	1.2E-01	
RT/LOOP	0.0E+00	1.0E+00	
EMERG.POWER	2.9E-03	8.0E-01	
AFW	1.5E-03	2.7E-01	
AFW/EMERG.POWER	1.5E-03	2.7E-01	
MFW	1.9E-01	3.4E-01	
PORV.OR.SRV.CHALL	4.0E-02 > 1.0E+00 **	1.0E+00	
Branch Model: 1.OF.1			
Train 1 Cond Prob:	4.0E-02		
PORV.OR.SRV.RESEAT	2.0E-02 > 1.0E+00	5.0E-02	
Branch Model: 1.OF.1			
Train 1 Cond Prob:	2.0E-02 > Failed		
PORV.OR.SRV.RESEAT/EMERG.POWER	2.0E-02	1.0E+00	
SS.RELEAS.TERM	1.5E-02	3.4E-01	
SS.RELEAS.TERM/-MFW	1.5E-02	3.4E-01	
HPI	3.0E-04	8.4E-01	
HPI(F/B)	3.0E-04	8.4E-01	4.0E-02

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HPR/-HPI	1.5E-04	1.0E+00	4.0E-02
PORV.OPEN	1.0E-02	1.0E+00	
SS.DEPRESS	3.6E-02	1.0E+00	
COND/MFW	1.0E+00	3.4E-01	
LPI/HPI	1.5E-04	3.4E-01	
LPR/-HPI.HPR	6.7E-01	1.0E+00	
LPR/HPI	1.5E-04	1.0E+00	

* branch model file
** forced

Austin
09-11-1987
11:16:50

Event Identifier: 250/86-039