

PRECURSOR DESCRIPTION SHEET

LER No.: 400/87-035
 Event Description: Reactor trip and one of three AFW pumps fail
 Date of Event: 6/17/87
 Plant: Shearon Harris 1

EVENT DESCRIPTION

Sequence

A reactor coolant pump tripped, which resulted in a reactor trip due to low flow in that reactor coolant loop. During the plant response to the trip, the turbine-driven auxiliary feedwater (AFW) pump started and then tripped on overspeed. The motor-driven AFW pumps started normally. The reactor trip was caused when a worker bumped a bus enclosure while moving a heavy load and power was lost to the reactor coolant pump. The turbine-driven AFW pump tripped on overspeed due to an accumulation of water in the steam supply line. Prior to This event, the moisture was being manually drained every 4 h.

Corrective Action

A program was initiated to check and drain the steam supply lines once per hour. If the lines drain more than 2-3 min, the frequency will be increased. A plant modification is planned that will install drain traps on the steam supply lines to the turbine-driven AFW pump.

Plant/Event Data

Systems Involved:

Auxiliary feedwater system

Components and Failure Modes Involved:

Turbine-driven pump failed to run

Component Unavailability Duration: N/A

Plant Operating Mode: 1 (100% power)

Discovery Method: Operational event

Reactor Age: 0.4 y

Plant Type: PWR

Comments

None.

MODELING CONSIDERATION AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

Transient	1.0	No recovery
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Branches Impacted and Branch Nonrecovery Estimate

AFW

Base case

TD AFWP trips after starting

Plant Models Utilized

PWR plant Class B

CONDITIONAL CORE DAMAGE PROBABILITY CALCULATIONS

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INITIATING EVENT

NON-RECOVERABLE INITIATING EVENT PROBABILITIES

TRANS 1.0E+00

SEQUENCE CONDITIONAL PROBABILITY SUMS

End State/Initiator	Probability
CD	
TRANS	1.7E-06
Total	1.7E-06
CV	
TRANS	9.3E-06
Total	9.3E-06
ATWS	
TRANS	3.4E-05
Total	3.4E-05

SEQUENCE CONDITIONAL PROBABILITIES (PROBABILITY ORDER)

Sequence	End State	Prob	N Rec**
126 trans -rt AFW MFW hpi(f/b) -ss.depress cond/mfw	CD	7.6E-07	2.5E-02
120 trans -rt AFW MFW -hpi(f/b) -hpr/-hpi porv.open -ss.depress cond/mfw	CD	6.9E-07	3.0E-02
127 trans -rt AFW MFW hpi(f/b) ss.depress	CD	8.4E-08	7.4E-02
121 trans -rt AFW MFW -hpi(f/b) -hpr/-hpi porv.open ss.depress	CD	7.6E-08	8.8E-02
123 trans -rt AFW MFW -hpi(f/b) hpr/-hpi -ss.depress cond/mfw	CD	7.6E-08	3.0E-02
109 trans -rt -AFW -porv.or.srv.chall ss.releas.term hpi	CV	6.2E-06	2.9E-01
125 trans -rt AFW MFW hpi(f/b) -ss.depress -cond/mfw	CV	1.4E-06	4.9E-02
119 trans -rt AFW MFW -hpi(f/b) -hpr/-hpi porv.open -ss.depress - cond/mfw	CV	1.3E-06	5.8E-02
101 trans -rt -AFW porv.or.srv.chall -porv.or.srv.reseat ss.releas .term hpi	CV	2.6E-07	2.9E-01
128 trans rt	ATWS	3.4E-05	1.2E-01

** non-recovery credit for edited case

SEQUENCE CONDITIONAL PROBABILITIES (SEQUENCE ORDER)

Sequence	End State	Prob	N Rec**
101 trans -rt -AFW porv.or.srv.chall -porv.or.srv.reseat ss.releas .term hpi	CV	2.6E-07	2.9E-01
109 trans -rt -AFW -porv.or.srv.chall ss.releas.term hpi	CV	6.2E-06	2.9E-01
119 trans -rt AFW MFW -hpi(f/b) -hpr/-hpi porv.open -ss.depress - cond/mfw	CV	1.3E-06	5.8E-02
120 trans -rt AFW MFW -hpi(f/b) -hpr/-hpi porv.open -ss.depress cond/mfw	CD	6.9E-07	3.0E-02
121 trans -rt AFW MFW -hpi(f/b) -hpr/-hpi porv.open ss.depress	CD	7.6E-08	8.8E-02
123 trans -rt AFW MFW -hpi(f/b) hpr/-hpi -ss.depress cond/mfw	CD	7.6E-08	3.0E-02
125 trans -rt AFW MFW hpi(f/b) -ss.depress -cond/mfw	CV	1.4E-06	4.9E-02

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126	trans -rt	AFW MFW hpi(f/b) -ss.depress cond/mfw	CID	7.6E-07	2.5E-02
127	trans -rt	AFW MFW hpi(f/b) ss.depress	CID	8.4E-08	7.4E-02
128	trans rt		ATWS	3.4E-05	1.2E-01

** non-recovery credit for edited case

SEQUENCE MODEL: c:\asp\newmodel\pwr_bnew.cmp
 BRANCH MODEL: c:\asp\newmodel\harris.new
 PROBABILITY FILE: c:\asp\newmodel\pwr_bnew.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	
ep.rec	1.0E+00	1.7E-01	
AFW	3.8E-04 > 2.3E-03	2.6E-01	
Branch Model: 1.OF.3+ser			
Train 1 Cond Prob:	2.0E-02		
Train 2 Cond Prob:	1.0E-01		
Train 3 Cond Prob:	5.0E-02 > Failed		
Serial Component Prob:	2.8E-04		
afw/emerg.power	5.0E-02	3.4E-01	
MFW	2.0E-01 > 1.0E+00	3.4E-01	
Branch Model: 1.OF.1			
Train 1 Cond Prob:	2.0E-01 > Unavailable		
porv.or.srv.chall	4.0E-02	1.0E+00	
porv.or.srv.reseat	3.0E-02	1.1E-02	
porv.or.srv.reseat/emerg.power	3.0E-02	1.0E+00	
ss.releas.term	1.5E-02	3.4E-01	
hpi	1.5E-03	8.4E-01	
hpi(f/b)	1.5E-03	8.4E-01	1.0E-02
hpr/-hpi	1.5E-04	1.0E+00	1.0E-03
porv.open	1.0E-02	1.0E+00	4.0E-04
ss.depress	3.6E-02	1.0E+00	
cond/mfw	1.0E+00	3.4E-01	1.0E-02
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

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