

## PRECURSOR DESCRIPTION SHEET

LER No.: 344/87-037  
 Event Description: Reactor trip and one AFW pump fails to start  
 Date of Event: 12/6/87  
 Plant: Trojan

## EVENT DESCRIPTION

Sequence

At 1010 h, a microswitch in a load decrease button in the electro-hydraulic control system failed due to normal aging. A turbine runback occurred. The reactor was manually tripped. Main feedwater was run back but remained available. The TD AFW pump failed to auto-start due to a loose electrical connection in the auto-start circuitry in control panel C-05. The TD AFW pump was successfully started manually from the control room. The loose connection was a result of prior, unspecified, maintenance activities in 1985. The pump had started in all subsequent tests until this time.

Corrective Action

The loose connection was tightened.

Plant/Event Data

Systems Involved:  
 Auxiliary feedwater

## Components and Failure Modes Involved:

Turbine EHC system - microswitch failure  
 AFW pump fails on demand

Component Unavailability Duration: N/A  
 Plant Operating Mode: 1 (100%)  
 Discovery Method: Operational event  
 Reactor Age: 12.0 y  
 Plant Type: PWR

Comments

None.

## MODELING CONSIDERATION AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

Transient Base case nonrecovery

Branches Impacted and Branch Nonrecovery Estimate

AFW Base case One of two trains fails to start

Plant Models Utilized

PWR plant Class C

Event Identifier: 344/87-037

## 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	4.8E-05
Total	4.8E-05
CV	
TRANS	8.5E-05
Total	8.5E-05
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	2.1E-05	3.3E-02
120	trans -rt AFW mfw -hpi(f/b) -hpr/-hpi porv.open -ss.depress cond/mfw	CD	2.0E-05	3.9E-02
127	trans -rt AFW mfw hpi(f/b) ss.depress	CD	2.3E-06	9.7E-02
121	trans -rt AFW mfw -hpi(f/b) -hpr/-hpi porv.open ss.depress	CD	2.2E-06	1.2E-01
123	trans -rt AFW mfw -hpi(f/b) hpr/-hpi -ss.depress cond/mfw	CD	2.2E-06	3.9E-02
125	trans -rt AFW mfw hpi(f/b) -ss.depress -cond/mfw	CV	3.9E-05	6.4E-02
119	trans -rt AFW mfw -hpi(f/b) -hpr/-hpi porv.open -ss.depress -cond/mfw	CV	3.7E-05	7.6E-02
122	trans -rt AFW mfw -hpi(f/b) hpr/-hpi -ss.depress -cond/mfw	CV	4.1E-06	7.6E-02
109	trans -rt -AFW -porv.or.srv.chall ss.releas.term hpi	CV	4.0E-06	2.8E-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**
109	trans -rt -AFW -porv.or.srv.chall ss.releas.term hpi	CV	4.0E-06	2.8E-01
119	trans -rt AFW mfw -hpi(f/b) -hpr/-hpi porv.open -ss.depress -cond/mfw	CV	3.7E-05	7.6E-02
120	trans -rt AFW mfw -hpi(f/b) -hpr/-hpi porv.open -ss.depress cond/mfw	CD	2.0E-05	3.9E-02
121	trans -rt AFW mfw -hpi(f/b) -hpr/-hpi porv.open ss.depress	CD	2.2E-06	1.2E-01
122	trans -rt AFW mfw -hpi(f/b) hpr/-hpi -ss.depress -cond/mfw	CV	4.1E-06	7.6E-02
123	trans -rt AFW mfw -hpi(f/b) hpr/-hpi -ss.depress cond/mfw	CD	2.2E-06	3.9E-02
125	trans -rt AFW mfw hpi(f/b) -ss.depress -cond/mfw	CV	3.9E-05	6.4E-02
126	trans -rt AFW mfw hpi(f/b) -ss.depress cond/mfw	CD	2.1E-05	3.3E-02
127	trans -rt AFW mfw hpi(f/b) ss.depress	CD	2.3E-06	9.7E-02

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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\trojan.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	2.5E-03 > 5.0E-02	3.4E-01	
Branch Model: 1.OF.2			
Train 1 Cond Prob:	5.0E-02		
Train 2 Cond Prob:	5.0E-02 > Failed		
AFW/EMERG.POWER	2.5E-03 > 5.0E-02	3.4E-01	
Branch Model: 1.OF.2			
Train 1 Cond Prob:	5.0E-02		
Train 2 Cond Prob:	5.0E-02 > Failed		
mfw	1.0E+00	3.4E-01	
porv.or.srv.chall	4.0E-02	1.0E+00	
porv.or.srv.reseat	2.0E-02	1.1E-02	
porv.or.srv.reseat/emerg.power	2.0E-02	1.0E+00	
ss.releas.term	1.5E-02	3.4E-01	
hpi	1.0E-03	8.4E-01	
hpi(f/b)	1.0E-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

Minarick  
 05-16-1989  
 06:55:04