

## **B.37-1**

### **B.37 LER Number 344/83-012**

Event Description: Auxiliary Feedwater Pump Tripped Following Reactor Trip

Date of Event: August 20, 1983

Plant: Trojan

#### **B.37.1 Summary**

After a reactor trip occurred on August 20, 1983, the diesel-driven auxiliary feedwater (AFW) pump auto started but tripped due to overspeed. Several attempts to restart the pump were unsuccessful. The other AFW pumps operated as required. The event was analyzed as an AFW pump failure in conjunction with the reactor trip. The conditional core damage probability (CCDP) estimated for this event is  $3.0 \times 10^{-5}$ .

#### **B.37.2 Event Description**

On August 20, 1983 a reactor trip occurred at 100% power due to a spurious main turbine high vibration signal. The diesel-driven auxiliary feedwater pump auto started but tripped due to overspeed. Several attempts to restart the pump in automatic mode failed. The steam-driven AFW pump and non-ESF motor-driven AFW pump supplied flow as required.

#### **B.37.3 Additional Event-Related Information**

The apparent cause of the diesel AFW pump overspeed was procedural deficiencies for restoration of the pump following annual maintenance combined with human error. Following the failure, the diesel engine controls were adjusted and the engine was tested successfully.

#### **B.37.4 Modeling Assumptions**

The event was modeled as an AFW pump failure in conjunction with a reactor trip. Train 1 of AFW, representing the diesel-driven pump, was failed. The potential for common cause failure exists, even when a component is failed. Therefore, the conditional probability of a common cause failure was included in the analysis for those components that failed as part of the event. Since success of AFW given an anticipated transient without scram (ATWS) requires that both of the auto-start AFW pumps operate, this branch (AFW/ATWS) was assumed to be failed.

#### **B.37.5 Analysis Results**

The conditional core damage probability estimated for this event is  $3.0 \times 10^{-5}$ . The dominant accident sequence, shown in Figure B.37.1, consists of the transient followed by a failure to trip the reactor, successful limiting of reactor coolant system pressure ( $<3200$  psi), and failure of AFW for ATWS mitigation.

# B.37-2

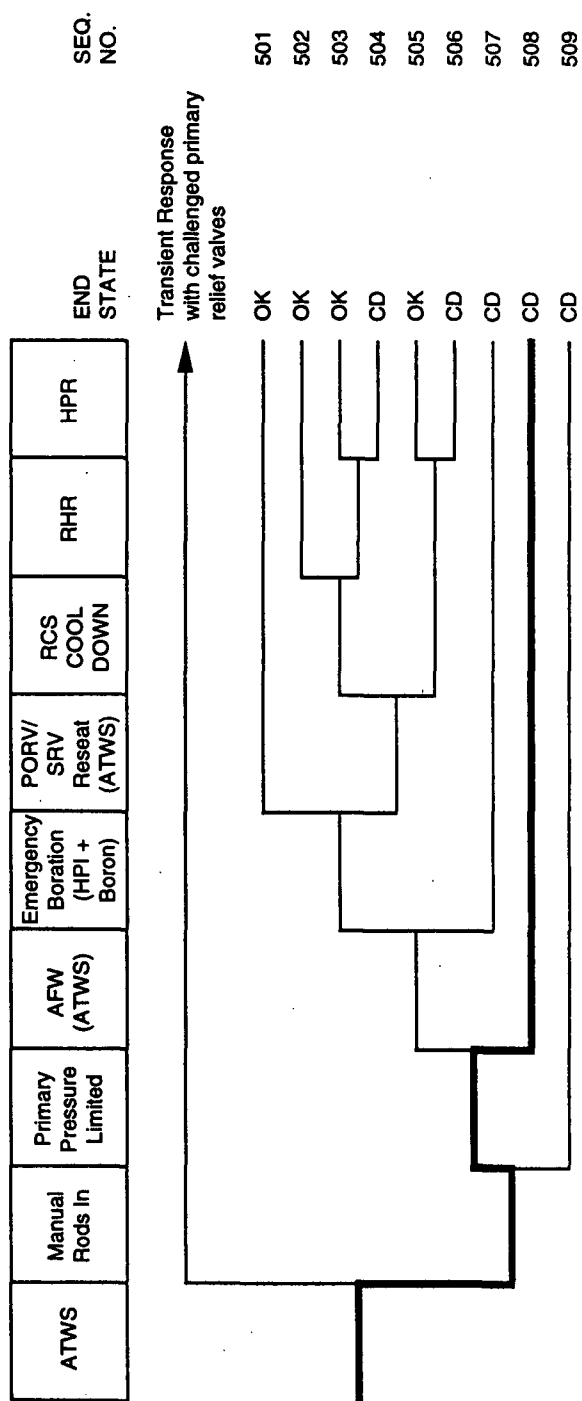


Figure B.37.1 Dominant core damage sequence for LER 344/83-012

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**CONDITIONAL CORE DAMAGE PROBABILITY CALCULATIONS**

Event Identifier: 344/83-012  
Event Description: Diesel AFW pump trip after reactor trip  
Event Date: 8/20/83  
Plant: Trojan

**INITIATING EVENT****NON-RECOVERABLE INITIATING EVENT PROBABILITIES**

TRANS 1.0E+00

**SEQUENCE CONDITIONAL PROBABILITY SUMS**

End State/Initiator	Probability
CD	
TRANS	3.0E-05
Total	3.0E-05

**SEQUENCE CONDITIONAL PROBABILITIES (PROBABILITY ORDER)**

Sequence	End State	Prob	N Rec**
508 trans rt -prim.press.limited AFW/ATWS	CD	2.8E-05	1.0E-01
120 trans -rt AFW mfw feed.bleed	CD	1.2E-06	1.5E-01

\*\* non-recovery credit for edited case

**SEQUENCE CONDITIONAL PROBABILITIES (SEQUENCE ORDER)**

Sequence	End State	Prob	N Rec**
120 trans -rt AFW mfw feed.bleed	CD	1.2E-06	1.5E-01
508 trans rt -prim.press.limited AFW/ATWS	CD	2.8E-05	1.0E-01

\*\* non-recovery credit for edited case

SEQUENCE MODEL: c:\asp\models\pwr8283.cmp  
BRANCH MODEL: c:\asp\models\trojan.82  
PROBABILITY FILE: c:\asp\models\pwr8283.pro

No Recovery Limit

# B.37-4

## BRANCH FREQUENCIES/PROBABILITIES

Branch	System	Non-Recov	Opr Fail
trans	1.6E-03	1.0E+00	
loop	1.6E-05	3.6E-01	
loca	2.4E-06	5.4E-01	
sgtr	1.6E-06	1.0E+00	
rt	2.8E-04	1.0E-01	
rt(loop)	0.0E+00	1.0E+00	
AFW	3.3E-04 > 1.3E-03	4.5E-01	
Branch Model: 1.0F.3+ser			
Train 1 Cond Prob:	5.0E-02 > Unavailable		
Train 2 Cond Prob:	5.0E-02		
Train 3 Cond Prob:	2.0E-02		
Serial Component Prob:	2.8E-04		
AFW/ATWS	1.0E-01 > 1.0E+00	1.0E+00	
Branch Model: 1.0F.1			
Train 1 Cond Prob:	1.0E-01 > Failed		
AFW/EP	2.8E-03 > 5.0E-02	3.4E-01	
Branch Model: 1.0F.2+ser			
Train 1 Cond Prob:	5.0E-02 > Unavailable		
Train 2 Cond Prob:	5.0E-02		
Serial Component Prob:	2.8E-04		
mfw	2.0E-01	3.4E-01	1.0E-03
porv.chall	4.0E-02	1.0E+00	
porv.chall/afw	1.0E+00	1.0E+00	
porv.chall/loop	1.0E-01	1.0E+00	
porv.chall/sbo	1.0E+00	1.0E+00	
porv.reseat	2.0E-02	1.1E-02	
porv.reseat/ep	2.0E-02	1.0E+00	
srv.reseat(atws)	1.0E-01	1.0E+00	
hpi	1.0E-05	8.9E-01	
feed.bleed	2.0E-02	1.0E+00	1.0E-02
emrg.boration	0.0E+00	1.0E+00	1.0E-02
recov.sec.cool	2.0E-01	1.0E+00	
recov.sec.cool/offsite.pwr	3.4E-01	1.0E+00	
rsc.cooldown	3.0E-03	1.0E+00	1.0E-03
rhr	2.2E-02	7.0E-02	1.0E-03
rhr.and.hpr	1.0E-03	1.0E+00	1.0E-03
hpr	4.0E-03	1.0E+00	1.0E-03
ep	2.9E-03	8.9E-01	
seal.loca	2.3E-01	1.0E+00	
offsite.pwr.rec/-ep.and.-afw	2.1E-01	1.0E+00	
offsite.pwr.rec/-ep.and.afw	9.9E-02	1.0E+00	
offsite.pwr.rec/seal.loca	5.9E-01	1.0E+00	
offsite.pwr.rec/-seal.loca	6.1E-02	1.0E+00	

### B.37-5

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sg.iso.and.rcs.cooldown	1.0E-02	1.0E-01	
rsc.cool.below.rhr	3.0E-03	1.0E+00	3.0E-03
prim.press.limited	8.8E-03	1.0E+00	

\* branch model file  
\* forced