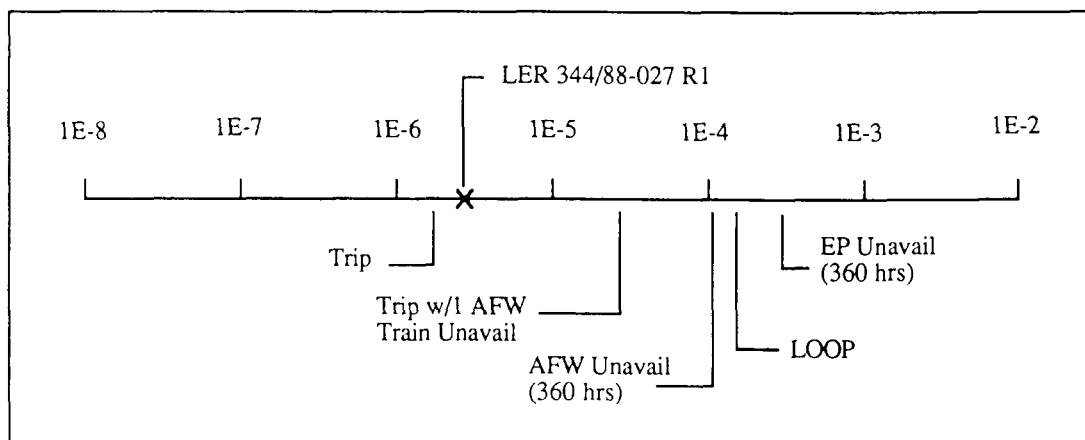


Accident Sequence Precursor Program Event Analysis

LER No: 344/88-027 R1
 Event Description: Loss of volume control tank isolation capability results in potential for charging pump inoperability
 Date of Event: September 15, 1988
 Plant: Trojan

Summary

The ability to isolate the volume control tank from the charging pump suction was lost for approximately 2.33 h because of failure of control power to one isolation valve and maintenance activities on the series valve. The conditional probability of core damage associated with the event is estimated to be 2.8×10^{-6} . Relative significance compared with other potential events at Trojan is shown below.



Event Description

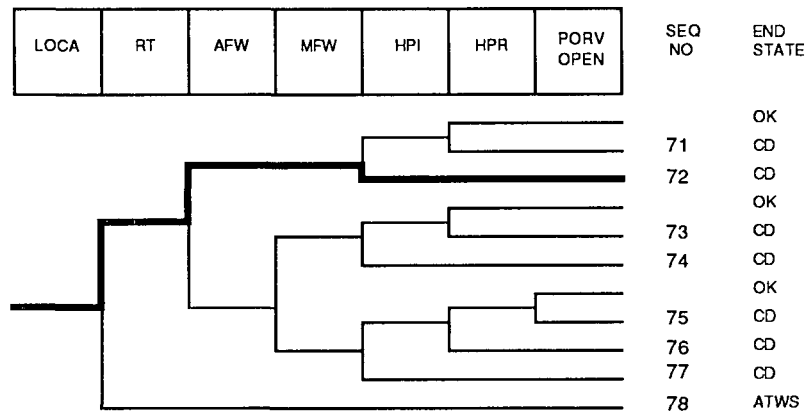
The train B suction valve (MO-122C) for the centrifugal charging pumps from the volume control tank (VCT) was open and incapable of automatic closure due to performance of a design change. It was discovered that control power had been lost to the train A suction valve (MO-112B) for the centrifugal charging pumps. This combination of valve unavailabilities resulted in the inability to isolate the centrifugal charging pump suction line from the VCT on a safety-injection signal. In the event of a safety-injection signal and realignment of the charging pump suction to the RWST, hydrogen gas in the VCT would be drawn into the pumps, failing the pumps. It was estimated that the capability to isolate the VCT was lost for approximately 2 h and 19 min.

ASP Modeling Assumptions and Approach

This event was modeled as an unavailability of high-pressure injection and of feed and bleed capabilities because the inability to isolate the volume control tank from the charging pumps could render both of these functions inoperative. These functions were inoperable for approximately 2.33 h.

Analysis Results

The conditional probability of severe core damage estimated for this event is 2.8×10^{-6} . The dominant core damage sequence (highlighted on the following event tree) involves a postulated small-break LOCA during the vulnerability period ($p = 2.4 \times 10^{-6}$), with unavailability of HPI.



Dominant Core Damage Sequence for LER 344/88-027 R1

CONDITIONAL CORE DAMAGE PROBABILITY CALCULATIONS

Event Identifier: 344/88-027
 Event Description: Loss of volume control tank isolation capability
 Event Date: 09/15/88
 Plant: Trojan

UNAVAILABILITY, DURATION= 2.33

NON-RECOVERABLE INITIATING EVENT PROBABILITIES

TRANS	1.3E-03
LOOP	1.4E-05
LOCA	2.4E-06

SEQUENCE CONDITIONAL PROBABILITY SUMS

End State/Initiator	Probability
CD	
TRANS	3.8E-07
LOOP	1.4E-08
LOCA	2.4E-06
Total	2.8E-06
ATWS	
TRANS	0.0E+00
LOOP	0.0E+00
LOCA	0.0E+00
Total	0.0E+00

SEQUENCE CONDITIONAL PROBABILITIES (PROBABILITY ORDER)

	Sequence	End State	Prob	N Rec**
72	loca -rt -afw HPI	CD	2.4E-06	4.3E-01
17	trans -rt afw mfw HPI(F/B)	CD	3.8E-07	1.2E-01

** non-recovery credit for edited case

SEQUENCE CONDITIONAL PROBABILITIES (SEQUENCE ORDER)

	Sequence	End State	Prob	N Rec**
17	trans -rt afw mfw HPI(F/B)	CD	3.8E-07	1.2E-01
72	loca -rt -afw HPI	CD	2.4E-06	4.3E-01

** non-recovery credit for edited case

Note: For unavailabilities, conditional probability values are differential values which reflect the added risk due to failures associated with an event. Parenthetical values indicate a reduction in risk compared to a similar period without the existing failures.

SEQUENCE MODEL: c:\asp\sealmod\pwrseal.cmp
 BRANCH MODEL: c:\asp\sealmod\trojan.sll
 PROBABILITY FILE: c:\asp\sealmod\pwr_bsll.pro

No Recovery Limit

BRANCH FREQUENCIES/PROBABILITIES

Branch	System	Non-Recov	Opr Fail
trans	5.6E-04	1.0E+00	
loop	1.6E-05	3.6E-01	
loca	2.4E-06	4.3E-01	

Event Identifier: 344/88-027

rt	2.8E-04	1.2E-01	
rt/loop	0.0E+00	1.0E+00	
emerg.power	2.9E-03	8.0E-01	
afw	2.5E-03	3.4E-01	
afw/emerg.power	2.5E-03	3.4E-01	
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	
seal.loca	2.3E-01	1.0E+00	
ep.rec(sl)	5.9E-01	1.0E+00	
ep.rec	6.1E-02	1.0E+00	
HPI	1.0E-03 > 1.0E+00	8.4E-01 > 1.0E+00	
Branch Model: 1.OF.2			
Train 1 Cond Prob:	1.0E-02 > Failed		
Train 2 Cond Prob:	1.0E-01 > Failed		
HPI(F/B)	1.0E-03 > 1.0E+00	8.4E-01 > 1.0E+00	1.0E-02
Branch Model: 1.OF.2+opr			
Train 1 Cond Prob:	1.0E-02 > Failed		
Train 2 Cond Prob:	1.0E-01 > Failed		
hpr/-hpi	1.5E-04	1.0E+00	1.0E-03
porv.open	1.0E-02	1.0E+00	4.0E-04
* branch model file			
** forced			

Minarick
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