

## PRECURSOR DESCRIPTION SHEET

LER No.: 413/86-031  
Event Description: Small LOCA forces plant trip  
Date of Event: June 13, 1986  
Plant: Catawba 1

### EVENT DESCRIPTION

#### Sequence

The unit was at 48% power with the variable letdown orifice valve INV849 in service to reduce letdown flow to 30 gal/min. A leak (>1 gal/min) had been detected at the CCW/CVCS junction at the letdown heat exchanger. The fixed orifice flow paths were isolated. At 1100 h a leak of >1.5 gal/min was detected. At 1500 h an unusual event was declared. At 1542 h, alarms occurred indicating the loss of motor control center IMXD, which affected control power to valve INV849 and the generator hydrogen-cooler-temperature valve. The former failed open, and the latter failed closed.

Charging flow suddenly increased to 130 gal/min, and pressurizer level began to fall. The letdown line had suffered a guillotine rupture at valve INV849's downstream outlet flange as a result of vibration-induced fatigue. At 1550 h the main-generator hydrogen temperature began to rise. At 1551 h the letdown orifice valve was closed, but pressurizer level continued to decrease. Hydrogen temperature continued to increase. Sump high-level alarms were actuated, and at 1610 h reactor power and turbine load were reduced. Maximum charging was maintaining pressurizer level, and additional letdown isolation valves were closed. The leak was contained by 1641 h. Hot standby was entered at 1700 h. Cold shutdown was entered at 0257 h the next day.

#### Corrective Action

Repairs were made to the letdown line. The MCC failure was due to a name plate that became unglued and caused a short circuit when it fell.

#### Plant/Event Data

##### Systems Involved:

Electrical and chemical volume and control

##### Components and Failure Modes Involved:

Motor control center transformer — failed in operation

CVCS pipe — ruptured in operation

Event Identifier: 413/86-031

Component Unavailability Duration: NA  
Plant Operating Mode: 1 (48% power)  
Discovery Method: Operational event  
Reactor Age: 1.4 years  
Plant Type: PWR

Comments

We are assuming a 130 gpm SBLOCA since CP's were able to maintain pressurizer level with this flowrate

MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

SBLOCA	0.12	Flow isolable via letdown isolation valves
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Branches Impacted and Branch Nonrecovery Estimate

None

Plant Models Utilized

PWR plant Class F

Event Identifier: 413/86-031

# CONDITIONAL CORE DAMAGE PROBABILITY CALCULATIONS

Event Identifier: 413/B6-031  
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## INITIATING EVENT

### NON-RECOVERABLE INITIATING EVENT PROBABILITIES

LOCA	1.2E-01
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### SEQUENCE CONDITIONAL PROBABILITY SUMS

End State/Initiator	Probability
CV	
LOCA	1.6E-03
Total	1.6E-03
CD	
LOCA	3.3E-03
Total	3.3E-03
ATWS	
LOCA	4.0E-06
Total	4.0E-06

### DOMINANT SEQUENCES

End State: CV	Conditional Probability:	1.5E-03
301 LOCA -RT -AFW -HPI HPR/-HPI -SS.DEPRESS -LPR/-HPI.HPR		
End State: CD	Conditional Probability:	3.1E-03
302 LOCA -RT -AFW -HPI HPR/-HPI -SS.DEPRESS LPR/-HPI.HPR		
End State: ATWS	Conditional Probability:	4.0E-06

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326 LOCA RT

# SEQUENCE CONDITIONAL PROBABILITIES

Sequence	End State	Prob	N Rec**
301 LOCA -RT -AFW -HPI HPR/-HPI -SS.DEPRESS -LPR/-HPI.HPR	CV	1.5E-03 *	1.2E-01
302 LOCA -RT -AFW -HPI HPR/-HPI -SS.DEPRESS LPR/-HPI.HPR	CD	3.1E-03 *	1.2E-01
303 LOCA -RT -AFW -HPI HPR/-HPI SS.DEPRESS	CD	1.7E-04	1.2E-01
304 LOCA -RT -AFW HPI -SS.DEPRESS -LPI/HPI -LPR/HPI	CV	9.7E-05	1.0E-01
326 LOCA RT	ATWS	4.0E-06 *	1.4E-02

\* dominant sequence for end state

\*\* non-recovery credit for edited case

SEQUENCE MODEL: c:\asp\newmodel\pwrmtree.cmp  
 BRANCH MODEL: c:\asp\newmodel\catam.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 > 2.4E-06	4.3E-01 > 1.2E-01	
Branch Model: INITOR			
Initiator Freq:			
RT	2.8E-04	1.2E-01	
RT/LOOP	0.0E+00	1.0E+00	
ENERG.POWER	2.9E-03	8.0E-01	
AFW	3.8E-04	2.6E-01	
AFW/ENERG.POWER	5.0E-02	3.4E-01	
MFW	2.0E-01	3.4E-01	
PORV.OR.SRV.CHALL	4.0E-02	1.0E+00	
PORV.OR.SRV.RESEAT	3.0E-02	5.0E-02	
PORV.OR.SRV.RESEAT/ENERG.POWER	3.0E-02	1.0E+00	
SS.RELEAS.TERM	1.5E-02	3.4E-01	
SS.RELEAS.TERM/-MFW	1.5E-02	3.4E-01	
HPI	1.0E-03	8.4E-01	
HPI(F/B)	1.0E-03	8.4E-01	4.0E-02
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	

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LPR/HP1

1.5E-04

1.0E+00

\* branch model file  
\*\* forced

Austin  
09-11-1987  
12:58:13

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