

## PRECURSOR DESCRIPTION SHEET

LER No.: 389/84-011  
Event Description: Trip and One AFW Train Fails  
Date of Event: November 21, 1984  
Plant: St. Lucie 2

### EVENT DESCRIPTION

#### Sequence

At 0927 h on November 21, 1984, the reactor was automatically tripped from 68% power due to loss of load. The loss of load was due to a generator exciter field failure. All automatic functions performed as designed with the exception of the "C" auxiliary feed pump that received its start signal, attempted to start, and tripped on overspeed as a result of steam leakage, causing the pump to spin. The "B" auxiliary feed pump functioned properly and provided the needed feed flow to the SGs. The cause of the overspeed trip was the pump spinning as a result of steam leakage. The leakage was corrected, and the pump spinning stopped.

The cause of the loss of field excitation was determined to be failure of the exciter bearing, which allowed the rotor to drop slightly and rub the permanent magnet generator.

#### Corrective Action

The bearing and the permanent magnet generator were replaced. Alignment and other checks were performed. No cause for the failure of the bearing was able to be determined. The AFW leakage was repaired.

#### Plant/Event Data

Systems Involved:  
AFW

Components and Failure Modes Involved:  
One AFW pump — failed on demand

Component Unavailability Duration: NA  
Plant Operating Mode: 1 (68% power)  
Discovery Method: Operational event  
Reactor Age: 1.4 years  
Plant Type: PWR

#### Comments

None

Event Identifier: 389/84-011

MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

Transient	1.0	Nonrecoverable
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Branches Impacted and Branch Nonrecovery Estimate

MFW	0.34	Assumed failed
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AFW	0.27	Degraded; one train failed
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Plant Models Utilized

PWR plant Class G

Event Identifier: 389/84-011

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
CV	
TRANS	3.5E-04
Total	3.5E-04
CD	
TRANS	2.0E-04
Total	2.0E-04
ATWS	
TRANS	3.0E-05
Total	3.0E-05

DOMINANT SEQUENCES

End State: CV Conditional Probability: 3.3E-04  
 112 TRANS -RT AFW MFW -HPI(F/B) -HPR/-HPI PORV.OPEN -SS.DEPRESS -COND/MFW  
 End State: CD Conditional Probability: 1.7E-04  
 113 TRANS -RT AFW MFW -HPI(F/B) -HPR/-HPI PORV.OPEN -SS.DEPRESS COND/MFW  
 End State: ATWS Conditional Probability: 3.0E-05

Event Identifier: 389/84-011

121 TRANS RT

SEQUENCE CONDITIONAL PROBABILITIES

	Sequence	End State	Prob	N Rec**
112	TRANS -RT AFW MFW -HPI(F/B) -HPR/-HPI PORV.OPEN -SS.DEPRESS -COND/MFW	CV	3.3E-04 *	6.1E-02
113	TRANS -RT AFW MFW -HPI(F/B) -HPR/-HPI PORV.OPEN -SS.DEPRESS COND/MFW	CD	1.7E-04 *	3.1E-02
114	TRANS -RT AFW MFW -HPI(F/B) -HPR/-HPI PORV.OPEN SS.DEPRESS	CD	1.9E-05	9.2E-02
118	TRANS -RT AFW MFW HPI(F/B) -SS.DEPRESS -COND/MFW	CV	1.4E-05	3.2E-02
119	TRANS -RT AFW MFW HPI(F/B) -SS.DEPRESS COND/MFW	CD	7.1E-06	1.6E-02
121	TRANS RT	ATWS	3.0E-05 *	1.2E-01

\* dominant sequence for end state

\*\* non-recovery credit for edited case

MODEL: b:\pwrgtree.cmp

DATA: b:\luciepro.cmp

No Recovery Limit

BRANCH FREQUENCIES/PROBABILITIES

Branch	System	Non-Recov	Opr Fail
TRANS	1.0E-03	1.0E+00	
LOOP	2.3E-05	3.4E-01	
LOCA	2.6E-02	3.4E-01	
RT	2.5E-04	1.2E-01	
RT/LOOP	0.0E+00	1.0E+00	
EMERG.POWER	2.9E-03	5.1E-01	
AFW	1.0E-03 > 5.9E-03	2.7E-01	
Branch Model: 1.0F.3+ser			
Train 1 Cond Prob:	2.0E-02 > Failed		
Train 2 Cond Prob:	1.0E-01		
Train 3 Cond Prob:	5.0E-02		
Serial Component Prob:	9.2E-04		
AFW/EMERG.POWER	5.0E-02	3.4E-01	
MFW	1.9E-01 > 1.0E+00	3.4E-01	
Branch Model: 1.0F.1			
Train 1 Cond Prob:	1.9E-01 > Failed		
PORV.DR.SRV.CHALL	2.0E-02	1.0E+00	
PORV.DR.SRV.RESEAT	1.0E-02	1.2E-01	
PORV.DR.SRV.RESEAT/EMERG.POWER	1.0E-02	1.2E-01	
SS.RELEAS.TERM	1.5E-02	3.4E-01	
SS.RELEAS.TERM/-MFW	1.5E-02	3.4E-01	
SS.DEPRESS	3.6E-02	1.0E+00	

Event Identifier: 389/84-011

COND/MFW	1.0E+00	3.4E-01	
HPI	3.0E-04	5.2E-01	
HPI(F/B)	3.0E-04	5.2E-01	4.0E-02
PDRV.OPEN	1.0E+00	1.0E+00	
HPR/-HPI	1.0E-03	1.0E+00	
CSR	2.0E-03	3.4E-01	

\*\*\* forced

Minarick  
04-12-1987  
12:39:29

Event Identifier: 389/84-011