

PRECURSOR DESCRIPTION AND ANALYSIS

LER No.: 251/85-011
Event Description: Loss of Offsite Power
Date of Event: May 17, 1985
Plant: Turkey Point 4

EVENT DESCRIPTION

Sequence

A reactor trip occurred when offsite power was lost because of multiple faults on the high-voltage power system. The LOOP deenergized the Unit 3C transformer that feeds power to the Unit 4C 4160-V bus, thus deenergizing the 4C bus also. The deenergizing of the 4C bus tripped the 4B SG feedwater pump, initiating a turbine governor runback. The reactor trip occurred when the reactor protection logic of SG low level coincident with steam flow greater than feed flow on the 4C SG occurred because of the reduction in feedwater flow.

The emergency diesel generators started and sequenced onto the safety-related buses as designed. The AFW pumps started automatically upon loss of voltage on one 4160-V bus and began to recover SG levels.

Corrective Action

1. Natural circulation cooling was established, verified, and maintained in accordance with applicable off-normal operating procedures.
2. Upon restoration of offsite power, forced circulation cooling was initiated on Unit 4 by starting the 4B reactor coolant pump, and the unit was stabilized at hot shutdown conditions.
3. Posttrip review and resolution of any discrepancies were identified.

Plant/Event Data

Systems Involved:

500-kV grid transmission, emergency diesel generators, and AFW demanded

Components and Failure Modes Involved:

Three transmission lines - shorted out by brush fires
MFW - made unavailable by LOOP

Event Identifier: 251/85-011

Component Unavailability Duration: NA
Plant Operating Mode: 1 (100% power)
Discovery Method: Operational event
Reactor Age: 12.1 years
Plant Type: PWR

Comments

None

MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

LOOP	1.0	Offsite power could not be restored until at least 1 h following the LOOP
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Branches Impacted and Branch Nonrecovery

None

Plant Models Utilized

PWR plant Class B

Event Identifier: 251/85-011

CONDITIONAL CORE DAMAGE CALCULATIONS

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INITIATING EVENT

NON-RECOVERABLE INITIATING EVENT PROBABILITIES

LOOP 1.000E+00

SEQUENCE CONDITIONAL PROBABILITY SUMS

End State/Initiator	Probability
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CV

LOOP	7.973E-06
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Total	7.973E-06
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CD

LOOP	3.789E-05
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Total	3.789E-05
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ATWS

LOOP	0.000E+00
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Total	0.000E+00
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DOMINANT SEQUENCES

End State: CV	Conditional Probability: 7.113E-06
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217 LOOP -RT/LOOP EMERG.POWER -AFW/EMERG.POWER -PORV.OR.SRV.CHALL SS.RELEAS.TERM

End State: CD	Conditional Probability: 1.624E-05
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214 LOOP -RT/LOOP -EMERG.POWER AFW HPI(F/B)

SEQUENCE CONDITIONAL PROBABILITIES

Event Identifier: 251/85-011

	Sequence	End State	Seq. Prob	Non-Recov**
203	LOOP -RT/LOOP -EMERG.POWER -AFW PORV.OR.SRV.CHALL PORV.OR.SR V.RESEAT -HPI HPR/-HPI -SS.DEPRESS -LPR/-HPI.HPR	CV	5.284E-07	2.964E-03
204	LOOP -RT/LOOP -EMERG.POWER -AFW PORV.OR.SRV.CHALL PORV.OR.SR V.RESEAT -HPI HPR/-HPI -SS.DEPRESS LPR/-HPI.HPR	CD	1.073E-06	2.964E-03
212	LOOP -RT/LOOP -EMERG.POWER AFW -HPI(F/B) -HPR/-HPI PORV.OPEN	CD	3.720E-06	2.486E-01
213	LOOP -RT/LOOP -EMERG.POWER AFW -HPI(F/B) HPR/-HPI	CD	1.615E-05	1.537E-02
214	LOOP -RT/LOOP -EMERG.POWER AFW HPI(F/B)	CD	1.624E-05 *	1.126E-02
215	LOOP -RT/LOOP EMERG.POWER -AFW/EMERG.POWER PORV.OR.SRV.CHALL -PORV.OR.SRV.RESEAT/EMERG.POWER SS.RELEAS.TERM	CV	2.961E-07	1.732E-01
217	LOOP -RT/LOOP EMERG.POWER -AFW/EMERG.POWER -PORV.OR.SRV.CHALL SS.RELEAS.TERM	CV	7.113E-06 *	1.734E-01
218	LOOP -RT/LOOP EMERG.POWER AFW/EMERG.POWER	CD	5.887E-07	1.377E-01

* dominant sequence for end state
** non-recovery credit for edited case

Note:

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.

MODEL: b:pwrmtree.cmp
DATA: b:turkprob.cmp

No Recovery Limit

BRANCH FREQUENCIES/PROBABILITIES

Branch	System	Non-Recov	Opr Fail
TRANS	1.030E-03	1.000E+00	
LOOP	2.280E-05 > 2.280E-05	3.400E-01 > 1.000E+00	
Branch Model: INITOR			
Initiator Freq:			
LOCA	4.170E-06	3.400E-01	
RT	2.500E-04	1.200E-01	
RT/LOOP	0.000E+00	1.000E+00	
EMERG.POWER	2.850E-03	5.100E-01	
AFW	1.500E-03	2.700E-01	
AFW/EMERG.POWER	1.500E-03	2.700E-01	
MFW	1.900E-01	3.400E-01	
PORV.OR.SRV.CHALL	4.000E-02	1.000E+00	
PORV.OR.SRV.RESEAT	2.000E-02	5.000E-02	
PORV.OR.SRV.RESEAT/EMERG.POWER	2.000E-02	5.000E-02	
SS.RELEAS.TERM	1.500E-02	3.400E-01	
SS.RELEAS.TERM/-MFW	1.500E-02	3.400E-01	
HPI	3.000E-04	5.200E-01	
HPI(F/B)	3.000E-04	5.200E-01	4.000E-02
HPR/-HPI	3.000E-03	5.600E-01	4.000E-02

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PORV.OPEN	1.000E-02	1.000E+00
SS.DEPRESS	3.600E-02	1.000E+00
COND/MFW	1.000E+00	3.400E-01
LPI/HPI	1.000E-03	3.400E-01
LPR/-HPI.HPR	6.700E-01	1.000E+00
LPR/HPI	1.000E-03	1.000E+00

*** forced

Austin
08-11-1986
17:23:25