

## PRECURSOR DESCRIPTION AND ANALYSIS

LER No.: 528/85-076  
Event Description: Loss of Offsite Power While Troubleshooting  
Multiplexer  
Date of Event: October 7, 1985  
Plant: Palo Verde 1

### EVENT DESCRIPTION

#### Sequence

At 1958 h, Unit 1 was in Mode 3, with the RCS pressure at ~2250 psia and temperature of ~565°F, when a LOOP caused a reactor trip. The part length and shutdown control element assemblies had been withdrawn in preparation for startup. The RPS sensed a low RCS flow based on SG differential pressure and tripped.

The RCPs speed decreased as a result of the LOOP. The plant protection system sensed low RCS flow, measured by SG differential pressure, and initiated a reactor trip. The LOOP occurred while troubleshooting was being conducted on the plant multiplexer (PMUX). A false signal had been generated. Because of the LOOP, both emergency diesel generators started and loaded, and the Engineered Safety Features system actuated. Offsite power was restored by 2011 h, and one RCP restarted by 2042 h.

#### Corrective Action

To prevent recurrence of the reactor trip, the switchyard breakers that were affected by the apparent PMUX failure have been hardwired, effectively bypassing the PMUX breaker control.

#### Plant/Event Data

##### System Involved:

Switchyard multiplexer and breakers

##### Components and Failure Modes Involved:

Multiplexer — gave false signal in operation

Component Unavailability Duration: NA

Plant Operating Mode: 0% power (startup)

Discovery Method: Operational event

Reactor Age: 0.5 year

Plant Type: PWR

#### Comments

See also LER 528/85-058 on October 3, 1985

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MODELING CONSIDERATIONS AND DECISIONS

Initiators Modeled and Initiator Nonrecovery Estimate

|      |      |  |
|------|------|--|
| LOOP | 0.12 | Nonroutine recovery within required time |
|------|------|--|

Branches Impacted and Branch Nonrecovery Estimate

None

Plant Models Utilized

BWR plant Class G

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|     | Sequence  | End State | Seq. Prob   | Non-Recov** |
|-----|---|-----------|-------------|-------------|
| 204 | LOOP -RT/LOOP -EMERG.POWER -AFW -PORV.DR.SRV.CHALL SS.RELEAS.<br>TERM HPI       | CV        | 9.351E-08   | 2.122E-02   |
| 207 | LOOP -RT/LOOP -EMERG.POWER AFW -HPI(F/B) PORV.OPEN                              | CD        | 3.171E-05 † | 3.110E-02   |
| 208 | LOOP -RT/LOOP -EMERG.POWER AFW HPI(F/B)   | CD        | 1.326E-06   | 1.351E-03   |
| 211 | LOOP -RT/LOOP EMERG.POWER -AFW/EMERG.POWER -PORV.DR.SRV.CHALL<br>SS.RELEAS.TERM | CV        | 1.628E-07 † | 2.057E-02   |

† 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 observed failures. Parenthetical values indicate a reduction in risk compared to a similar period without the existing failures.

MODEL: b:pwrmtree.cmp  
 DATA: b:paloprob.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 > 1.200E-01 |           |
| Branch Model: INITOR           |                       |                       |           |
| Initiator Freq:                |                       |                       |           |
| LOCA                           | 2.560E-02             | 3.400E-01             |           |
| RT                             | 2.500E-04             | 1.200E-01             |           |
| RT/LOOP                        | 0.000E+00             | 1.000E+00             |           |
| EMERG.POWER                    | 5.415E-04             | 5.100E-01             |           |
| AFW                            | 1.020E-03             | 2.700E-01             |           |
| AFW/EMERG.POWER                | 5.000E-02             | 3.400E-01             |           |
| MFW                            | 2.000E-01             | 3.400E-01             |           |
| PORV.DR.SRV.CHALL              | 2.000E-02             | 1.000E+00             |           |
| PORV.DR.SRV.RESEAT             | 1.000E-02             | 1.200E-01             |           |
| PORV.DR.SRV.RESEAT/EMERG.POWER | 1.000E-02             | 1.200E-01             |           |
| SS.RELEAS.TERM                 | 1.500E-02             | 3.400E-01             |           |
| SS.RELEAS.TERM/-MFW            | 1.500E-02             | 3.400E-01             |           |
| SS.DEPRESS                     | 3.600E-02             | 1.000E+00             |           |
| COND/MFW                       | 1.000E+00             | 3.400E-01             |           |
| HPI                            | 3.000E-04             | 5.200E-01             |           |
| HPI(F/B)                       | 3.000E-04             | 5.200E-01             | 4.000E-02 |
| PORV.OPEN                      | 1.000E+00             | 1.000E+00             |           |
| HPR/-HPI                       | 1.000E-03             | 1.000E+00             |           |
| CSR                            | 2.000E-03             | 3.400E-01             |           |

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