

# PRECURSOR DESCRIPTION AND DATA

NSIC Accession Number: 127384

Date: July 25, 1977

Title: Dummy Loads Installed in All Safety Systems at Zion 2

The failure sequence was:

1. With the reactor in hot shutdown, dummy loads were installed on all pressurizer level, pressurizer pressure, reactor coolant loop flow, and steam generator level instrumentation during a periodic reactor protection system logic test. This left the operator with no real indication of these parameters and provided incorrect inputs to the control functions associated with these parameters. These dummy inputs also negated all related inputs for safety injection actuation. (Actuation on high containment pressure and steam generator differential pressure still existed.)
2. The dummy signal for pressurizer level was set 2% higher than the actual pressurizer level at the time of the test, which resulted in a control signal which reduced charging pump flow and subsequently began reducing pressurizer level. (Letdown flow remained constant.)
3. Soon afterwards, the unit operator noticed a reactor coolant pump seal  $\Delta p$  alarm (caused by the decreased charging pump flow) and attempted to restore proper  $\Delta p$  by (cont)  
Corrective action:
  1. The pressurizer heaters were checked for proper current and resistance; all indications were normal.
  2. The test procedure has been changed to eliminate the need for dummy signals. Other protection and safeguards periodic tests were reviewed to minimize and further control the use of dummy signals.

Design purpose of failed system or component:

1. The affected instrumentation provides trip inputs for reactor protection and safety injection actuation and control inputs for reactor auxiliary system operation.

Unavailability of system per WASH 1400:\*  
Safety Injection Control System:  $9.9 \times 10^{-5}/D$  RPS:  $3.6 \times 10^{-5}/D$

Unavailability of component per WASH 1400:\* General operator error:  $3 \times 10^{-3}$

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\*Unavailabilities are in units of per demand  $D^{-1}$ . Failure rates are in units of per hour  $HR^{-1}$ .

The failure sequence was: (cont)

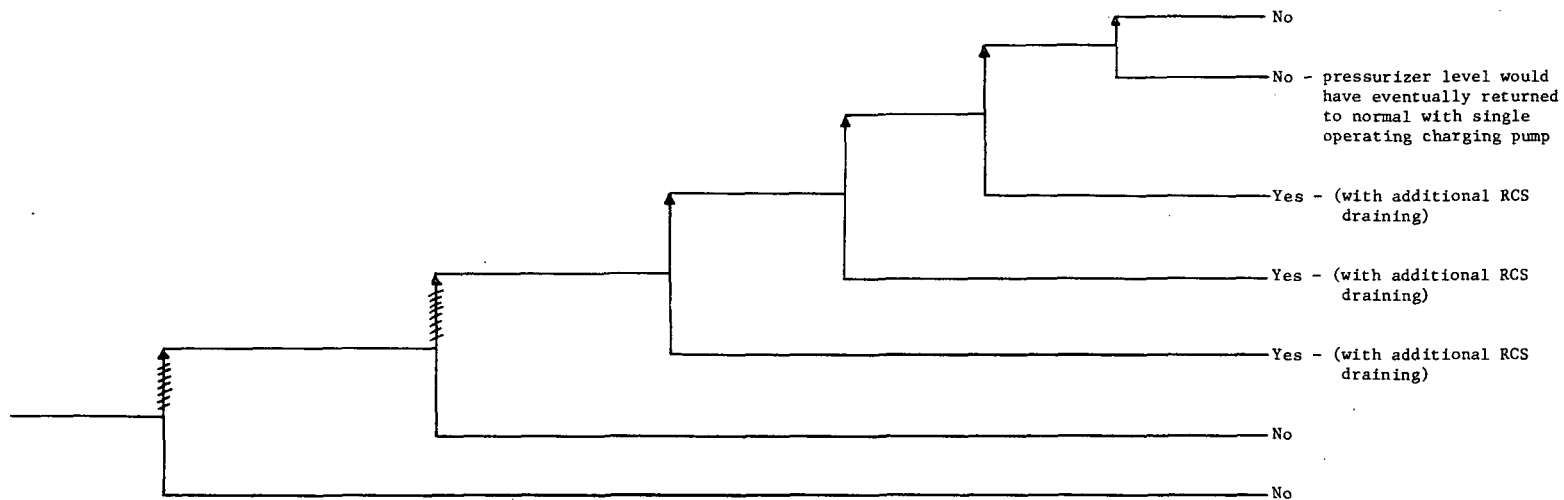
adjusting the charging flow to seal flow ratio.

4. Thirty-two minutes after the start of the Logic test the operator requested the dummy signals be removed from the steam generator level and pressurizer pressure instrumentation. Forty minutes after the test began all remaining dummy loads were removed.

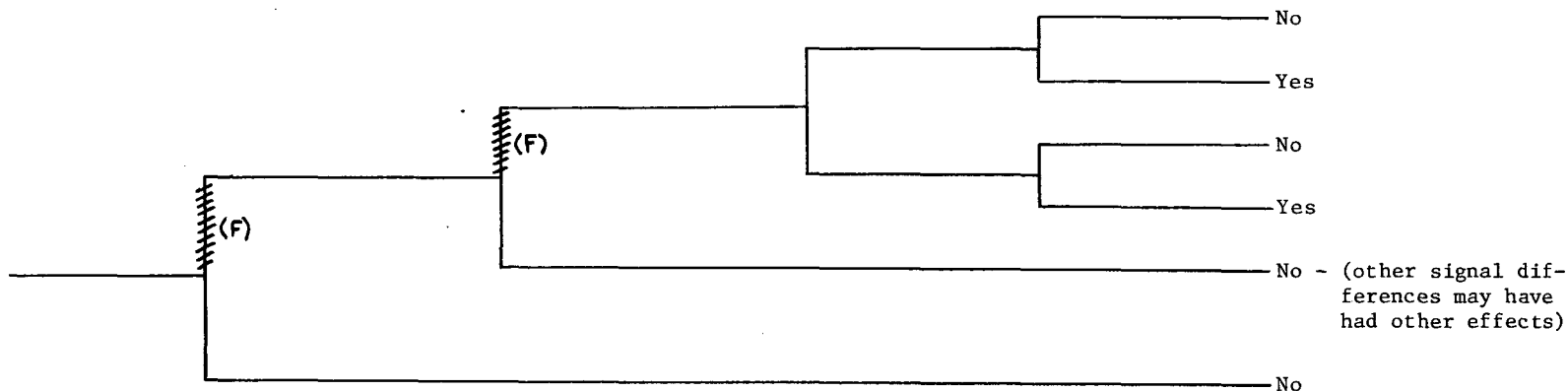
5. When actual indication was restored, the pressurizer level indicated zero. This isolated letdown and tripped the pressurizer heaters. (Subsequent calculations indicated the pressurizer level had dropped to within the surge line.)

6. The operator started a second charging pump and, within 30 minutes, the pressurizer level returned to normal.

Reactor in hot shutdown and RPS logic testing in progress	Dummy signals installed on all pressurizer level, pressurizer pressure, reactor coolant flow and steam generator level instrumentation	Difference between dummy pressurizer level and real pressurizer level at start of test causes reduced charging pump flow and subsequent pressurizer level decrease	Reactor coolant pump seal $\Delta P$ alarm	Operator attempts to clear alarm by controlling charging flow to seal flow ratio	All dummy signals removed, pressurizer level indicates zero. Consequent letdown isolation	Operator starts second charging pump and returns pressurizer level to normal	Potential Severe Core Damage
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Reactor in hot shutdown and RPS logic testing in progress	Dummy signals installed on all pressurizer level, pressurizer pressure, reactor coolant flow, and steam generator level instrumentation	Difference between dummy pressurizer level and real pressurizer level at start of test causes reduced charging pump flow and subsequent loss of coolant via letdown line	Unaffected non-nuclear instrumentation alerts operation to RCS problem	Dummy signals removed prior to significant RCS voiding	Potential Severe Core Damage
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# CATEGORIZATION OF ACCIDENT SEQUENCE PRECURSORS

NSIC ACCESSION NUMBER: 127384

DATE OF LER: July 25, 1977

DATE OF EVENT: July 12, 1977

SYSTEM INVOLVED: Reactor protection system, non-nuclear instrumentation, safety injection actuation.

COMPONENT INVOLVED: Pressurizer pressure and level, steam generator level, reactor coolant loop flow instrumentation.

CAUSE: Dummy signals installed on all this instrumentation, human error

SEQUENCE OF INTEREST: LOCA

ACTUAL OCCURRENCE: Dummy signals installed on instrumentation and subsequent loss of pressurizer level.

REACTOR NAME: Zion 2

DOCKET NUMBER: 50-304

REACTOR TYPE: PWR

DESIGN ELECTRICAL RATING: 1040 MWe

REACTOR AGE: 3.6 yr

VENDOR: Westinghouse

ARCHITECT-ENGINEERS: Sargent & Lundy

OPERATORS: Commonwealth Edison Co.

LOCATION: 40 miles north of Chicago, Ill.

DURATION: N/A

PLANT OPERATING CONDITION: hot shutdown

SAFETY FEATURE TYPE OF FAILURE: (a) inadequate performance; (b) failed to start; (c) made inoperable; (d) \_\_\_\_\_

DISCOVERY METHOD: operation event during testing

COMMENT: The existing test procedure required the use of dummy signals only when required. During the test, dummy signals were installed on all 31 instrument inputs even though none were needed.