

PRECURSOR DESCRIPTION AND DATA

NSIC Accession Number: 168829

Date: September 14, 1981

Title: Both Safety Injection Trains Inoperable Due to Valve Problems at San Onofre 1

The failure sequence was:

1. With the reactor at 87% power, No. 1 regulated power supply failed due to a filter choke failure.
2. This resulted in (1) failure of the dc power supplies for "A" steam generator steam flow, feed flow, and narrow range level transmitters; (2) failure of the feedwater flow and level controllers and consequent full open travel of the "A" feedwater control valve; (3) failure of all three loop steam flow and feed flow computers resulting in erratic steam and feed flow indications and erratic operation of the "B" and "C" feedwater control valves; and (4) automatic transfer of dc power supplies to the backup source providing for manual operation of all feedwater control valves.
3. The operator manually tripped the reactor because of erratic indications, erratic feedwater flow, and unresponsive controls.
4. Feedwater flow continued at varying rates (resulting in high steam generator levels) until reduced RCS pressure initiated a safety injection signal at 1735 psi.
5. Feedwater flow was terminated by automatic transfer of the feed pumps to safety injection service.
6. SI valves HV851A and HV851B failed to open as required because the differential pressure across the valves prevented their operation. Failure of these valves to open rendered the SI system inoperable. (Subsequent inspection, maintenance and testing indicated that consistent reliable valve operation could not be demonstrated with the feed pumps running).
7. RCS pressure decreased to 1700 psi and then recovered. Since feed pump discharge pressure is limited to approximately 1200 psi, no safety injection flow was required.

Corrective action:

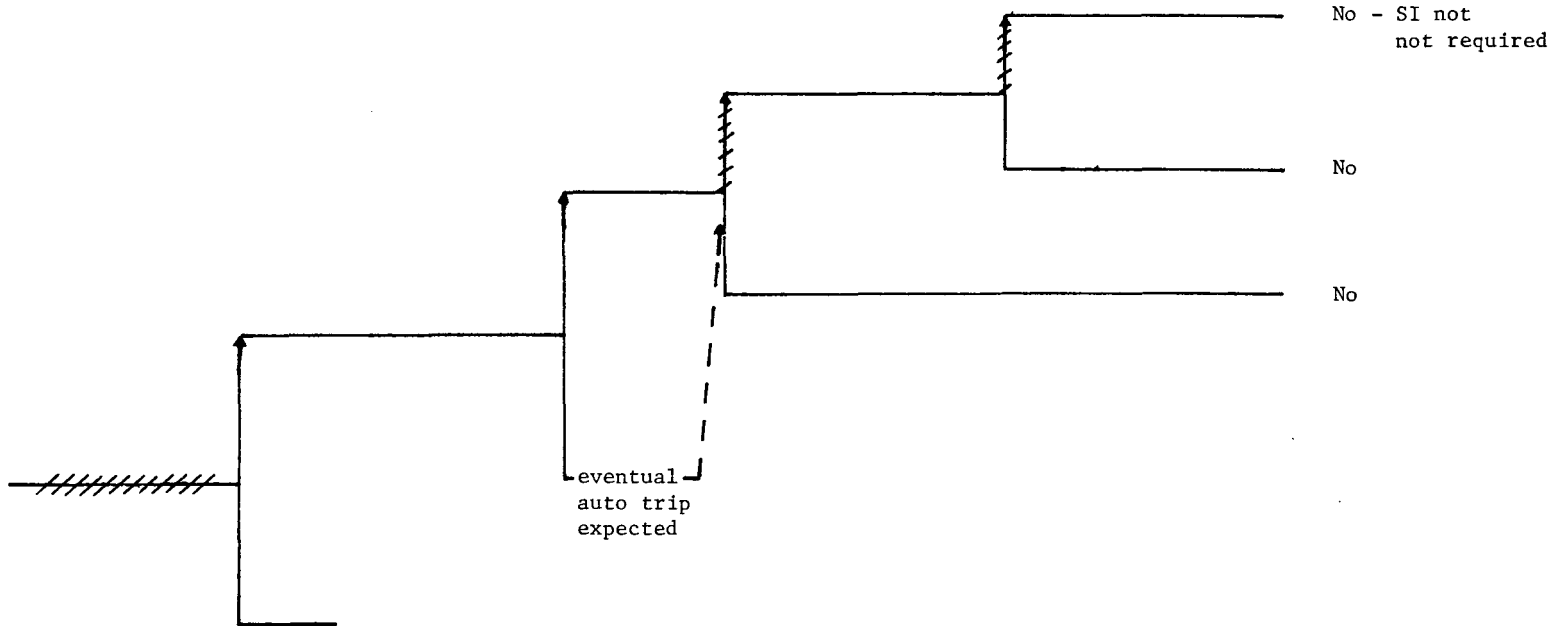
1. The No. 1 voltage regulator was first jumpered and then replaced.
2. The utility intended to implement changes requiring tripping of the feed pumps and relieving valve internal pressure prior to opening the safety injection valves.

Design purpose of failed system or component:

1. The regulated power supply provides an uninterruptible source of power for various instrumentation and controls.
2. The safety injection system provides a source of water for core cooling following a LOCA.

Reactor at 87% power and loss of #1 regulated power supply	Erratic secondary-side indications, feedwater flow, and unresponsive controls	Manual reactor trip	Continued feedwater flow resulting in steam generator overfill, RCS cooldown, and safety injection initiation	Valves HV851A, HV851B fail to open due to differential pressure, rendering the safety injection system unavailable
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Potential Severe Core Damage



Large LOCA	Safety injection	Low pressure recirculation	Potential Severe Core Damage	Sequence No.
			No	
			Yes	
			Yes	

NSIC 168829 - Sequence of Interest for Both Safety Injection Trains Inoperable Due to Valve Problems at San Onofre 1

CATEGORIZATION OF ACCIDENT SEQUENCE PRECURSORS

NSIC ACCESSION NUMBER: 168829

LER NO.: 81-020

DATE OF LER: September 14, 1981

DATE OF EVENT: September 3, 1981

SYSTEM INVOLVED: Vital power, safety injection

COMPONENT INVOLVED: Regulated power supply, isolation valves

CAUSE: Filter choke failure, valves would not operate with normal differential pressure

SEQUENCE OF INTEREST: LOCA

ACTUAL OCCURRENCE: Reactor trip, excessive cooldown, and failure of safety injection system to operate

REACTOR NAME: San Onofre 1

DOCKET NUMBER: 50-206

REACTOR TYPE: PWR

DESIGN ELECTRICAL RATING: 436 MWe

REACTOR AGE: 14.2 years

VENDOR: Westinghouse

ARCHITECT-ENGINEERS: Bechtel

OPERATORS: Southern California Edison

LOCATION: 5 miles south of San Clemente, California

DURATION: 871 days

PLANT OPERATING CONDITION: 87% power

TYPE OF FAILURE: Inadequate performance;
made inoperable

DISCOVERY METHOD: Operational event

COMMENT: NSIC 168830 provides additional information. Valve operability was satisfactory during installation testing prior to plant startup on April 11, 1977. Subsequently the valve surfaces degraded until they failed in 1981. There was no demand for valve operation in-service or full differential testing between installation and September 1981.