

PRECURSOR DESCRIPTION AND DATA

NSIC Accession Number: 171667

Date: December 15, 1981

Title: Loss of Two Instrument Buses at Davis-Besse 1

The failure sequence was:

1. With the reactor at 74% power, "A" control rod drive breaker was deenergized as part of a Control Rod Drive Breaker Logic Test.
2. Construction personnel inadvertently caused a mechanical shock to nonessential breaker HAAEZ which caused a ground fault relay to activate and trip the breaker, resulting in loss of bus E2. This caused loss of the control rod drive Inductrol Power Supply which, in conjunction with the "A" CRD breaker being open for testing caused a loss of power to the control rods and a reactor trip.
3. The loss of bus E2 deenergized the power supply (E23) to the regulated instrumentation distribution panel YAR.
4. The inverter supply (YVA) for uninterruptable instrumentation distribution panel YAU had previously transferred to its alternate supply YAR due to a defective static sensing and transfer logic card in the static switch. Because of this, YAU was also deenergized when YAR deenergized. Panel YAU provides power to the following:
 - Integrated control system Y-bus
 - Nonnuclear instrumentation Y-bus
 - Control rod drive system bus 2
 - Station annunciator
 - Communication system A
 - CRD redundant position indicator
 - Computer peripherals
 - Main feed pump turbine 1-1 control
 - Reactor coolant pump 1-1-1 and 1-2-2 speed switches
5. Loss of YAU resulted in loss of indication on both saturation meters (due to a requirement for both saturation meters to be powered from both noninterruptible power supplies YAU and YBU), loss of auxiliary feed pump 1 flow indication, and trip of makeup pump 1 (when the makeup tank level time delay relay powered from YAU deenergized). Makeup pump 1-2 was in operation at the time.
6. During recovery, the auxiliary feedwater pumps were manually actuated using the steam and feedwater rupture control system and AFW pump 2 did not respond properly due to a maladjusted governor slip clutch and bent low speed stop pin.
7. Main steam safety valve SP17B4 opened and failed to properly reseal and was gagged.
8. Approximately 13 minutes after unit trip, bus E2 was reenergized from its alternate source by manually connecting bus E2 to its alternate feed on the B bus.

Corrective action:

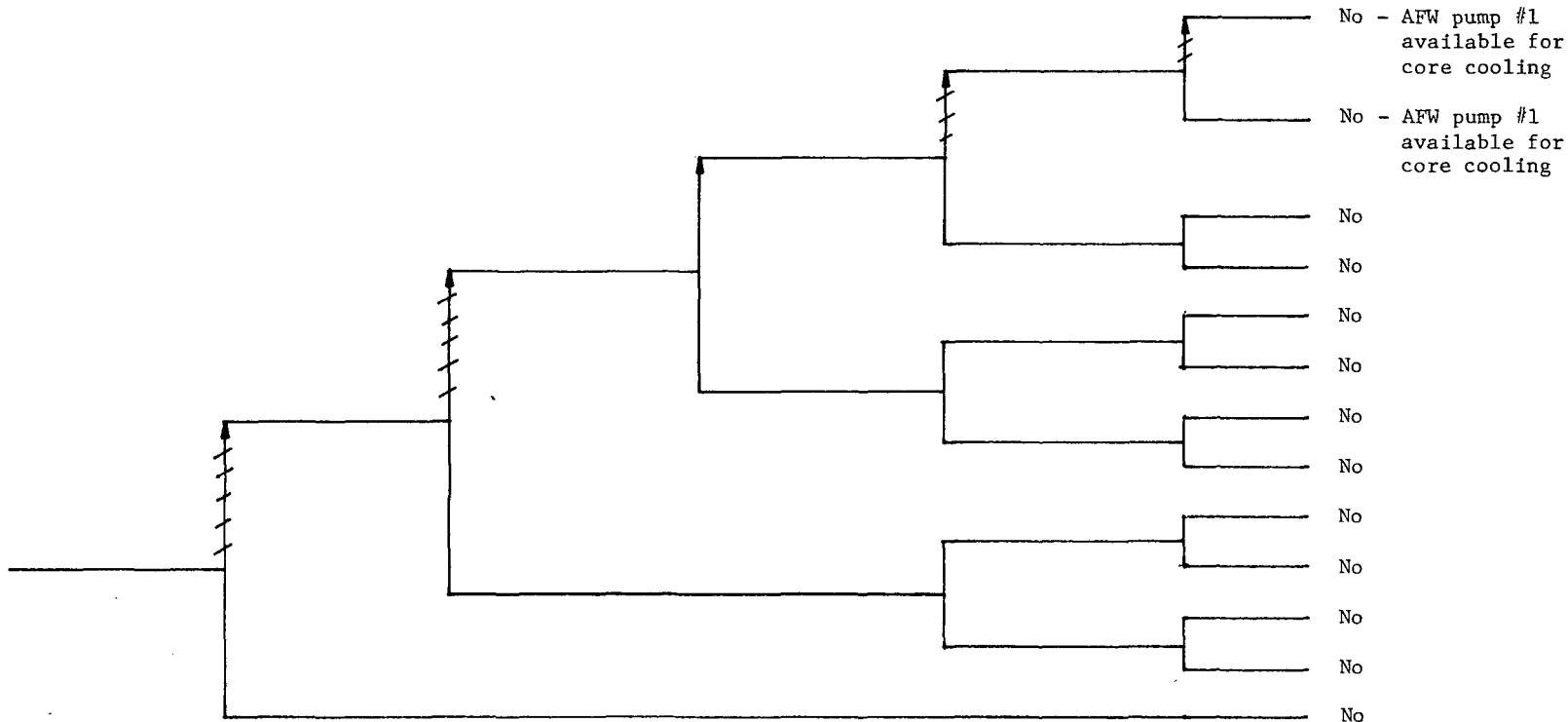
1. All type ITH relays at the unit were adjusted to as wide a gap as possible consistent with proper relay operation.
2. The defective static sensing and transfer logic card in inverter YVA was replaced and YAU was returned to its normal power supply.
3. The 2 AFW pump turbine governor slip clutch was adjusted and the low speed stop pin straightened. The governor was subsequently replaced with a space.
4. Saturation margin meter wiring was modified to power the meters from one power supply each.

Design purpose of failed system or component:

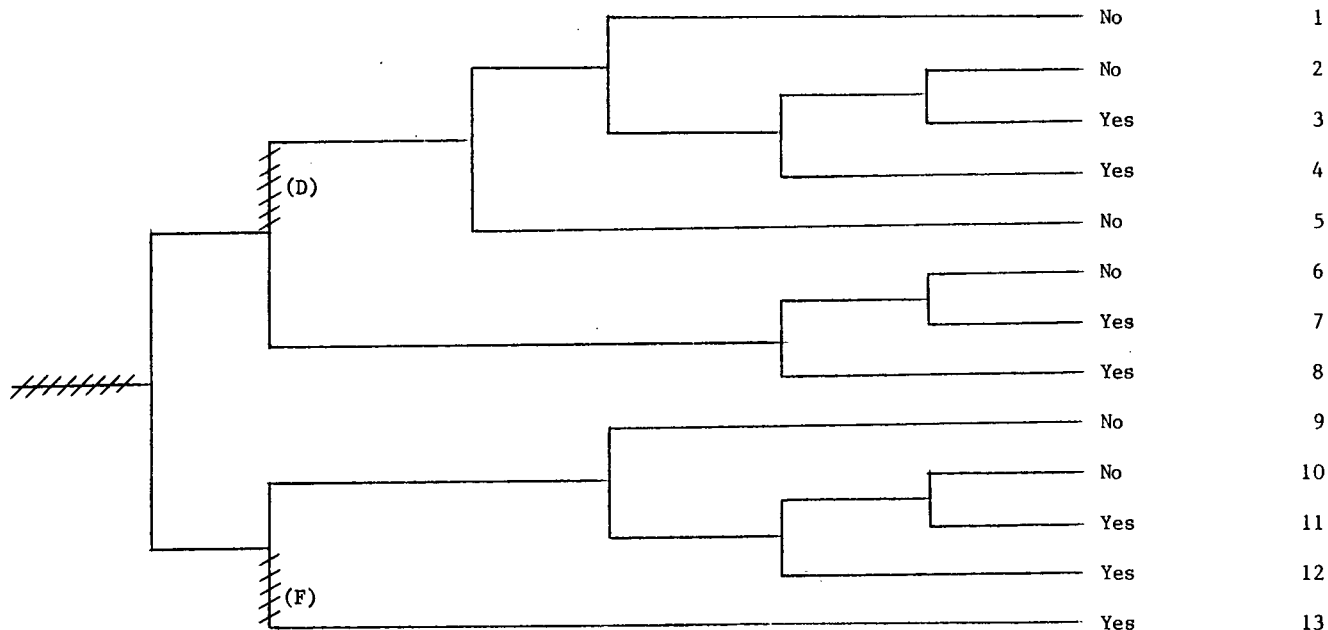
1. Uninterruptible buses provide a continuous source of power to instrumentation and control circuitry that cannot tolerate short-term power interruptions (for example, during diesel start and loading following a LOOP).
2. The auxiliary feedwater pumps provide cooling water to the steam generators when the main feedwater system is unavailable.
3. The makeup pumps provide RCS makeup during normal operation (separate HPI pumps are provided on Davis-Besse).
4. Safety valves provide overpressure protection.

Reactor at 74% power and "A" control rod drive breaker deenergized as part of CRD breaker logic test	Breaker HAAEZ inadvertently struck and trips, resulting in loss of bus E2, deenergization of panel YAR and reactor trip	Inverter supply YVA previously transferred to YAR due to defective static sensing and transfer logic cord	Bus YVA deenergized due to deenergization of YAR. Resultant loss of indication on both saturation meters, loss of AFW pump #1 flow indication, and trip of makeup pump 1-1	AFW pump #2 fails to start when manually actuated due to mis-adjusted governor slip clutch and bent low speed stop pin	Main steam relief valve SPI7B4 fails to fully reset
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Potential
Severe
Core
Damage



Loss of Main Feedwater	Reactor Trip	Auxiliary Feedwater and Secondary Heat Removal	PORV Demanded	PORV or PORV Isolation Valve Closure	High Pressure Injection	Long Term Core Cooling	Potential Severe Core Damage	Sequence No.
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NSIC 171667 - Sequence of Interest for Loss of Two Instrument Buses at Davis-Besse 1

CATEGORIZATION OF ACCIDENT SEQUENCE PRECURSORS

NSIC ACCESSION NUMBER: 171667

LER NO.: 81-037 Rev. 1

DATE OF LER: December 15, 1981

DATE OF EVENT: June 24, 1981

SYSTEM INVOLVED: Vital power, auxiliary feedwater

COMPONENT INVOLVED: Breaker, inverter, auxiliary feedwater pumps,
safety valve

CAUSE: Mechanical shock to breaker, faulted static sensing and
transfer logic card

SEQUENCE OF INTEREST: Loss of feedwater

ACTUAL OCCURRENCE: Loss of vital bus

REACTOR NAME: Davis-Besse 1

DOCKET NUMBER: 50-346

REACTOR TYPE: PWR

DESIGN ELECTRICAL RATING: 906 MWe

REACTOR AGE: 3.9 years

VENDOR: Babcock & Wilcox

ARCHITECT-ENGINEERS: Bechtel

OPERATORS: Toledo Edison

LOCATION: 21 miles east of Toledo, Ohio

DURATION: N/A

PLANT OPERATING CONDITION: 74% power

TYPE OF FAILURE: Inadequate performance;
failed to start;
made inoperable

DISCOVERY METHOD: Operational event

COMMENT: