

## B 3.3 INSTRUMENTATION

### B 3.3.5.1 Loss of Auxiliary Power (LOP) Instrumentation

#### BASES

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**BACKGROUND** Successful operation of the required safety functions of the Emergency Core Cooling Systems (ECCS) is dependent upon the availability of adequate power sources for energizing the pump motors. The LOP instrumentation monitors the 4.16 kV essential buses and source breakers. The Loss of Auxiliary Power “Pump Bus Power Monitor” instrumentation determines if there is sufficient power available to allow the starting of the ECCS pump motors in sequence.

Each 4.16 kV essential bus has its own independent LOP Pump Bus Power Monitor instrumentation and associated trip logic. The 4.16 kV power availability for each bus is monitored by two different methods, which can be considered as two different LOP Pump Bus Power Monitor power availability monitoring Channels: 4.16kV Essential Bus Loss of Voltage channel and 4.16 kV Essential Bus source breaker position channel.

The 4.16 Essential Bus Loss of Voltage Channel is monitored by two (2) undervoltage relays for each emergency bus, whose outputs are arranged in a one-out-of-two logic configuration (i.e., either undervoltage relay must sense 4kV power is available to provide a permissive to allow the Core Spray and RHR pumps to start in sequence). The undervoltage relays are shown in the Core Spray System Schematic Diagrams.

The 4.16 kV Essential Bus source breaker position Channel is monitored by breaker contacts on the three (3) Essential Bus Power Source breakers for each essential bus (from the EDG, 1AR or the Non-Essential Bus respectively) (i.e., one source breaker must indicate the source breaker is closed and therefore 4kV power is available at the essential bus to provide a permissive to allow the Core Spray and RHR pumps to start in sequence). The 4.16kV Essential Bus source breaker contacts for the three (3) Essential Bus Power Source breakers are shown in the RHR System Schematic Diagrams.

Either Bus Power Monitoring Channel will provide the permissive signal to allow both the Core Spray and RHR pumps to start in sequence.

BASES

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY The LOP instrumentation is required to ensure the availability of adequate power sources for energizing the ECCS pump motors. The LOP instrumentation monitors the 4.16 kV essential buses and source breakers. The Loss of Auxiliary Power Pump Bus Power Monitor instrumentation determines if there is sufficient power available to allow the starting of the ECCS pump motors in sequence.

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ACTIONS A Note has been provided to modify the ACTIONS related to LOP instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable LOP instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable LOP instrumentation channel.

A.1

With one channel of a Function inoperable in one trip system, the Function is not capable of performing the intended function for that trip system. Therefore, only 12 hours is allowed to restore the inoperable channel to OPERABLE status.

If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, Condition B must be entered and its Required Action taken.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 12 hour Completion Time is acceptable because it minimizes risk while allowing time for restoration of channels.

BASES

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ACTIONS (continued)

B.1

If any Required Action and associated Completion Time are not met, or if two Loss of Auxiliary Power instrument channels are inoperable in one or both trip systems, the associated Function is not capable of performing the intended function. Therefore, the associated low pressure ECCS Pumps are declared inoperable immediately. This requires entry into applicable Conditions and Required Actions of LCO 3.5.1 and LCO 3.5.2, which provide appropriate actions for inoperable Core Spray and RHR Pumps.

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SURVEILLANCE  
REQUIREMENTS

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the channel in the same trip system is monitoring that parameter. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken.

TSR 3.3.5.1.1

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Frequency of TSR 3.3.5.1.1 is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

BASES

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- REFERENCES
1. USAR, Section 8.4.1.3.
  2. USAR, Section 6.2.
  3. USAR, Section 14.7.2.
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