

Table 3.3.5.1-1 (page 3 of 6)  
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. LPCI System (continued)					
f. Low Pressure Coolant Injection Pump Start - Time Delay Relay					
Pump A,B,C,D (with diesel power)	1,2,3, 4(a), 5(a)	4	C	SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 0 seconds and ≤ 1 second
Pump A (with normal power)	1,2,3, 4(a), 5(a)	1	C	SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 0 seconds and ≤ 1 second
Pump B (with normal power)	1,2,3, 4(a), 5(a)	1	C	SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 6 seconds and ≤ 8 seconds
Pump C (with normal power)	1,2,3, 4(a), 5(a)	1	C	SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 12 seconds and ≤ 16 seconds
Pump D (with normal power)	1,2,3, 4(a), 5(a)	1	C	SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 18 seconds and ≤ 24 seconds
3. High Pressure Coolant Injection (HPCI) System					
a. Reactor Vessel Water Level - Low Low, Level 2	1, 2(d), 3(d)	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.5 SR 3.3.5.1.6	≥ 470 inches above vessel zero

(continued)

(a) When the associated subsystem(s) are required to be OPERABLE.

(d) With reactor steam dome pressure > 150 psig.

BASES

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APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY  
(continued)

1.e, 2.f. Core Spray and Low Pressure Coolant Injection Pump  
Start - Time Delay Relay

The reaction of the low pressure ECCS pumps to an initiation signal depends on the availability of power. If normal power (offsite power) is not available, the four RHR (LPCI) pumps start simultaneously after the standby power source (four diesel generators) is available while the CS pumps start simultaneously after a seven-second time delay. This time delay allows the start of LPCI pumps to avoid overloading the diesel generators. When normal power is available, the CS and RHR pump starts are staggered by shutdown board (i.e., A pumps start at 0 seconds, B pumps start at 7 seconds, C pumps start at 14 seconds, and D pumps start at 21 seconds). The purpose of this time delay, when power is being provided from the normal power source (offsite), is to stagger the start of the CS and LPCI pumps, thus limiting the starting transients on the 4.16 kV shutdown buses. The CS and LPCI Pump Start - Time Delay Relays are assumed to be OPERABLE in the accident and transient analyses requiring ECCS initiation. That is, the analyses assume that the pumps will initiate when required and excess loading will not cause failure of the power sources.

There are four CS Pump and four LPCI Pump Start - Time Delay Relays when power is being provided from the normal power source, one in each of the pump start logic circuits. While each time delay relay is dedicated to a single pump start logic, a single failure of a CS or LPCI Pump Start - Time Delay Relay could result in the loss of normal power to a 4.16 kV shutdown board due to a voltage transient on the associated shutdown bus (e.g., as in the case where ECCS pumps on one shutdown bus start simultaneously due to an

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(continued)

BASES

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APPLICABLE  
SAFETY ANALYSES,  
LCO, and  
APPLICABILITY

1.e, 2.f. Core Spray and Low Pressure Coolant Injection  
Pump Start - Time Delay Relay (continued)

inoperable time delay relay). This would result in the affected board being powered by the associated diesel. Therefore, the worst case single failure would be failure of a single pump to start due to a relay failure leaving seven of the eight low pressure ECCS pumps OPERABLE; thus, the single failure criterion is met (i.e., loss of one instrument does not preclude ECCS initiation). Since the CS pumps are 50% capacity pumps, the LOCA analysis does not take credit for a CS loop if one of the pumps is inoperable. Therefore, a 4.16 kV shutdown board failure results in the loss of one RHR pump and one CS loop (two CS pumps) for the LOCA analysis. The Allowable Value for the CS and LPCI Pump Start - Time Delay Relays is chosen to be long enough so that most of the starting transient of the first set of pumps is complete before starting the second set of pumps on the same 4.16 kV shutdown bus and short enough so that ECCS operation is not degraded.

There are also four CS and four LPCI Pump Start - Time Delay Relays when power is being provided by the standby source, one in each of the pump start logic circuits. While each relay is dedicated to a single pump start logic, a single failure of a Pump Start-Time Delay Relay could result in the failure of the two low pressure ECCS pumps (CS and LPCI) powered from the same shutdown board, to perform their intended function, (e.g., as in the case where both ECCS pumps on one shutdown board start simultaneously due to an inoperable time delay relay). This still leaves six of eight low pressure ECCS pumps OPERABLE; thus, the single failure criterion is met (i.e., loss of one instrument does not preclude

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