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INSTRUMENTATION

## 3/4.3.3 EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION

### LIMITING CONDITION FOR OPERATION

3.3.3 The emergency core cooling system (ECCS) actuation instrumentation channels shown in Table 3.3.3-1 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3.3-2 and with EMERGENCY CORE COOLING SYSTEM RESPONSE TIME as shown in Table 3.3.3-3.

APPLICABILITY: As shown in Table 3.3.3-1.

ACTION:

a. With an ECCS actuation instrumentation channel trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3.3-2, declare the channel inoperable until the channel is restored to OPERABLE status with its trip setpoint adjusted consistent with the Trip Setpoint value.

b. With one or more ECCS actuation instrumentation channels inoperable, within 24 hours take the ACTION required by Table 3.3.3-1.

c. With either ADS trip system "A" or "B" inoperable, restore the inoperable trip system to OPERABLE status:

   1. Within 7 days, provided that the HPCS and RCIC systems are OPERABLE; otherwise,

   2. Within 72 hours.

   Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to less than or equal to 128 psig within the following 24 hours.

### SURVEILLANCE REQUIREMENTS

4.3.3.1 Each ECCS actuation instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, and CHANNEL CALIBRATION operations for the OPERATIONAL CONDITIONS and at the frequencies shown in Table 4.3.3.1-1.

4.3.3.2 LOGIC SYSTEM FUNCTIONAL TESTS and simulated automatic operation of all channels shall be performed at least once per 18 months.

4.3.3.3 The ECCS RESPONSE TIME of each ECCS trip function shown in Table 3.3.3-3 shall be demonstrated to be within the limit at least once per 18 months. Each test shall include at least one channel per trip system such that all channels are tested at least once every N times 18 months where N is the total number of redundant channels in a specific ECCS trip system.



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TABLE 3.3 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION

| TRIP FUNCTION | MINIMUM OPERABLE CHANNELS PER TRIP SYSTEM(a) | APPLICABLE OPERATIONAL CONDITIONS | ACTION |
|---|---|---|---|
| C. DIVISION 3 TRIP SYSTEM | | | |
| 1. HPCS SYSTEM | | | |
| a. Reactor Vessel Water Level - Low, Low, Level 2 | 2(b) | 1, 2, 3, 4*, 5* | 30 |
| b. Drywell Pressure - High | 2(b) | 1, 2, 3 | 30 |
| c. Reactor Vessel Water Level-High, Level 8 | 2(c) | 1, 2, 3, 4*, 5* | 32 |
| d. Condensate Storage Tanks Level-Low | 2(d) | 1, 2, 3, 4*, 5* | 36 |
| e. Suppression Pool Water Level-High | 2(d) | 1, 2, 3, 4*, 5* | 36 |
| f. HPCS System Flow Rate-Low (Minimum Flow) | 1 | 1, 2, 3, 4*, 5* | 31 |
| g. Manual Initiation | 1/division | 1, 2, 3, 4*, 5* | 34 |

| | TOTAL NO. OF CHANNELS | CHANNELS TO TRIP | MINIMUM CHANNELS OPERABLE | APPLICABLE OPERATIONAL CONDITIONS | ACTION |
|---|---|---|---|---|---|
| D. LOSS OF POWER | | | | | |
| 1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage) | 2/bus | 1/bus | 2/bus | 1, 2, 3, 4**, 5** | 37 |
| 2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage Division 1 and 2) | 3/bus | 2/bus | 2/bus | 1, 2, 3, 4**, 5** | 38 |
| 3. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage Division 3) | 2/bus | 2/bus | 2/bus | 1, 2, 3, 4**, 5** | 38 |

TABLE NOTATIONS (6)

(a) A channel may be placed in an inoperable status for up to ~~2~~ hours during periods of required surveillance without placing the trip system in the tripped condition provided at least one other OPERABLE channel in the same trip system is monitoring that parameter.

(b) Also activates the associated division diesel generator.

(c) Provides signal to close HPCS pump discharge valve only on 2-out-of-2 logic.

(d) Provides signal to HPCS pump suction valves only.

* When the system is required to be OPERABLE per Specification 3.5.2 or 3.5.3.

** Required when ESF equipment is required to be OPERABLE.

\# Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 128 psig.





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TABLE 4.3.3.1-1

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| TRIP FUNCTION | CHANNEL CHECK | CHANNEL FUNCTIONAL TEST | CHANNEL CALIBRATION | OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED |
|---|---|---|---|---|
| A. DIVISION I TRIP SYSTEM | | | | |
| 1. RHR-A (LPCI MODE) AND LPCS SYSTEM | | | | |
| a. Reactor Vessel Water Level - Low Low Low, Level 1 | S | M Q | R | 1, 2, 3, 4*, 5* |
| b. Drywell Pressure - High | N.A. | M Q | R | 1, 2, 3 |
| c. LPCS Pump Discharge Flow-Low (Minimum Flow) | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| d. Reactor Vessel Pressure-Low (LPCS Permissive) | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| e. Reactor Vessel Pressure-Low (LPCI Permissive) | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| f. LPCI Pump A Start Time Delay Relay | N.A. | M Q | Q | 1, 2, 3, 4*, 5* |
| g. LPCI Pump A Flow-Low (Minimum Flow) | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| h. Manual Initiation | N.A. | R | N.A. | 1, 2, 3, 4*, 5* |
| 2. AUTOMATIC DEPRESSURIZATION SYSTEM TRIP SYSTEM "A"# | | | | |
| a. Reactor Vessel Water Level - Low Low Low, Level 1 | S | M Q | R | 1, 2, 3 |
| b. ADS Timer | N.A. | M Q | Q | 1, 2, 3 |
| c. Reactor Vessel Water Level - Low, Level 3 (Permissive) | S | M Q | R | 1, 2, 3 |
| d. LPCS Pump Discharge Pressure-High (Pump Running) | N.A. | M Q | R | 1, 2, 3 |
| e. LPCI Pump A Discharge Pressure-High (Pump Running) | N.A. | M Q | R | 1, 2, 3 |
| f. Manual Initiation | N.A. | R | N.A. | 1, 2, 3 |
| g. Inhibit Switch | N.A. | M Q | N.A. | 1, 2, 3 |



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TABLE 4.3.3.1-1 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| TRIP FUNCTION | CHANNEL CHECK | CHANNEL FUNCTIONAL TEST | CHANNEL CALIBRATION | OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED |
|---|---|---|---|---|
| B. DIVISION 2 TRIP SYSTEM | | | | |
| 1. RHR B AND C (LPCI MODE) | | | | |
| a. Reactor Vessel Water Level - Low Low Low, Level 1 | S | M Q | R | 1, 2, 3, 4*, 5* |
| b. Drywell Pressure - High | N.A. | M Q | R | 1, 2, 3 |
| c. Reactor Vessel Pressure-Low (LPCI Permissive) | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| d. LPCI Pump B Start Time Delay Relay | N.A. | M Q | Q | 1, 2, 3, 4*, 5* |
| e. LPCI Pump Discharge Flow-Low (Minimum Flow) | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| f. Manual Initiation | N.A. | R | N.A. | 1, 2, 3, 4*, 5* |
| 2. AUTOMATIC DEPRESSURIZATION SYSTEM TRIP SYSTEM "B"# | | | | |
| a. Reactor Vessel Water Level - Low Low Low, Level 1 | S | M Q | R | 1, 2, 3 |
| b. ADS Timer | N.A. | M Q | Q | 1, 2, 3 |
| c. Reactor Vessel Water Level - Low, Level 3 (Permissive) | S | M Q | R | 1, 2, 3 |
| d. LPCI Pump B and C Discharge Pressure-High (Pump Running) | N.A. | M Q | R | 1, 2, 3 |
| e. Manual Initiation | N.A. | R | N.A. | 1, 2, 3 |
| f. Inhibit Switch | N.A. | M Q | N.A. | 1, 2, 3 |





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TABLE 4.3.3.1-1 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| TRIP FUNCTION | CHANNEL CHECK | CHANNEL FUNCTIONAL TEST | CHANNEL CALIBRATION | OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED |
|---|---|---|---|---|
| C. DIVISION 3 TRIP SYSTEM | | | | |
| 1. HPCS SYSTEM | | | | |
| a. Reactor Vessel Water Level - Low Low, Level 2 | S | M Q | R | 1, 2, 3, 4*, 5* |
| b. Drywell Pressure-High | N.A. | M Q | R | 1, 2, 3 |
| c. Reactor Vessel Water Level-High, Level 8 | S | M Q | R | 1, 2, 3, 4*, 5* |
| d. Condensate Storage Tank Level - Low | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| e. Suppression Pool Water Level - High | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| f. HPCS System Flow Rate-Low (Minimum Flow) | N.A. | M Q | R | 1, 2, 3, 4*, 5* |
| g. Manual Initiation | N.A. | R | N.A. | 1, 2, 3, 4*, 5* |
| D. LOSS OF POWER | | | | |
| 1. 4.16 kV Emergency Bus Undervoltage (Loss of Voltage) | N.A. | N.A. | R | 1, 2, 3, 4**, 5** |
| 2. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage Division 1 and 2) | N.A | M*** | R | 1, 2, 3, 4**, 5** |
| 3. 4.16 kV Emergency Bus Undervoltage (Degraded Voltage Division 3) | N.A. | N.A. | R | 1, 2, 3, 4**, 5** |

TABLE NOTATIONS

#Not required to be OPERABLE when reactor steam dome pressure is less than or equal to 128 psig.

*When the system is required to be OPERABLE per Specification 3.5.2.

**Required when ESF equipment is required to be OPERABLE.

***The secondary time delay 3 second relays are exempt from this monthly testing. The secondary time delay relays associated with this logic will be functionally tested as part of the Logic System Functional Testing (Surveillance Requirement 4.3.3.2)





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TABLE 4.3.5.1-1

REACTOR CORE ISOLATION COOLING SYSTEM ACTUATION INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| FUNCTIONAL UNITS | CHANNEL CHECK | CHANNEL FUNCTIONAL TEST | CHANNEL CALIBRATION |
|---|---|---|---|
| a. Reactor Vessel Water Level - (Low Low, Level 2) | S | M Q | R |
| b. Reactor Vessel Water Level - High, Level (8) | S | M Q | R |
| c. Condensate Storage Tank Level - Low | S | M Q | R |
| d. Manual Initiation | N.A. | R | N.A. |

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TABLE 3.3.5-1

REACTOR CORE ISOLATION COOLING SYSTEM ACTUATION INSTRUMENTATION

| FUNCTIONAL UNITS | MINIMUM OPERABLE CHANNELS PER TRIP SYSTEM(a) | ACTION |
|---|---|---|
| a. Reactor Vessel Water Level - Low Low, Level 2 | 2 | 50 |
| b. Reactor Vessel Water Level - High, Level 8 | 2(b) | 51 |
| c. Condensate Storage Tank Water Level - Low Low | 2(c) | 52 |
| d. Manual Initiation | 1(d) | 53 |

(a) A channel may be placed in an inoperable status for up to 4 hours for required surveillance without placing the trip system in the tripped condition provided at least one other OPERABLE channel in the same trip system is monitoring that parameter.

(b) One trip system with two-out-of-two logic.

(c) One trip system with one-out-of-two logic.

(d) One trip system with one channel.

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TABLE 3.3.5-1 (Continued)

REACTOR CORE ISOLATION COOLING SYSTEM

ACTUATION INSTRUMENTATION

ACTION STATEMENTS

ACTION 50 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip System requirement:

a. For one trip system, place the inoperable channel(s) and/or that trip system in the tripped condition within ~~1 hour~~ 24 hours or declare the RCIC system inoperable.

b. For both trip systems, declare the RCIC system inoperable within 24 hours.

ACTION 51 - With the number of OPERABLE channels less than required by the minimum OPERABLE channels per Trip System requirement, declare the RCIC system inoperable within 24 hours.

ACTION 52 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip System requirement, place at least one inoperable channel in the tripped condition within ~~1 hour~~ 24 hours or declare the RCIC system inoperable.

ACTION 53 - With the number of OPERABLE channels one less than required by the Minimum OPERABLE Channels per Trip System requirement, restore the inoperable channel to OPERABLE status within 8 hours or declare the RCIC system inoperable.

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