

## EMERGENCY CORE COOLING SYSTEMS

### LIMITING CONDITION FOR OPERATION (Continued)

#### ACTION: (Continued)

1. With the HPCI system inoperable, restore the HPCI system to OPERABLE status within 14 days or be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to  $\leq 200$  psig within the following 24 hours.
  2. With the HPCI system inoperable and either one LPCI subsystem or one CSS subsystem inoperable, restore the HPCI system to operable status within 72 hours or restore the LPCI subsystem/CSS subsystem to operable status within 72 hours. Otherwise, be in HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to  $\leq 200$  psig in the next 24 hours.
- d. For the ADS:
1. With one of the above required ADS valves inoperable, provided the HPCI system, the core spray system and the LPCI system are OPERABLE, restore the inoperable ADS valve to OPERABLE status within 14 days or be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to  $\leq 100$  psig within the next 24 hours.
  2. With two or more of the above required ADS valves inoperable, be in at least HOT SHUTDOWN within 12 hours and reduce reactor steam dome pressure to  $\leq 100$  psig within the next 24 hours.
- e. With a CSS and/or LPCI header  $\Delta P$  instrumentation channel inoperable, restore the inoperable channel to OPERABLE status within 7 days or determine the ECCS header  $\Delta P$  locally at least once per 12 hours; otherwise, declare the associated ECCS subsystem inoperable.
- f. The discharge line "keep filled" alarm instrumentation associated with a LPCI and/or CSS subsystem(s) may be in an inoperable status for up to 6 hours for required surveillance testing\* provided that the "keep filled" alarm instrumentation associated with at least one LPCI or CSS subsystem serviced by the affected "keep filled" system remains OPERABLE; otherwise, perform Surveillance Requirement 4.5.1.a.1.a.
- g. In the event an ECCS system is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

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\* This includes testing of the "Reactor Coolant System Interface Valves Leakage Pressure Monitors" associated with LPCI and CSS in accordance with Surveillance 4.4.3.2.3

## EMERGENCY CORE COOLING SYSTEM

### BASES •

#### ECCS-OPERATING and SHUTDOWN (Continued)

With the HPCI system inoperable, adequate core cooling is assured by the OPERABILITY of the redundant and diversified automatic depressurization system and both the CSS and LPCI systems. In addition, the reactor core isolation cooling (RCIC) system, a system for which no credit is taken in the safety analysis, will automatically provide makeup at reactor operating pressures on a reactor low water level condition. The HPCI out-of-service period of 14 days is based on the demonstrated OPERABILITY of redundant and diversified low pressure core cooling systems and the RCIC system. If any one LPCI subsystem or one CSS subsystem is inoperable in addition to an inoperable HPCI system, the inoperable LPCI subsystem/CSS subsystem or the HPCI system must be restored to OPERABLE status within 72 hours. In this condition, adequate core cooling is ensured by the OPERABILITY of the automatic depressurization system (ADS) and the remaining low pressure ECCS subsystems. However, the overall ECCS reliability is reduced because a single failure in one of the remaining OPERABLE subsystems concurrent with a design basis LOCA may result in reduced ECCS capability to perform its intended safety function. Since both a high pressure system (HPCI) and a low pressure subsystem are inoperable, a more restrictive Completion Time of 72 hours is required to restore either the HPCI system or the LPCI/CSS subsystem to OPERABLE status.

The surveillance requirements provide adequate assurance that the HPCI system will be OPERABLE when required. Although all active components are testable and full flow can be demonstrated by recirculation through a test loop during reactor operation, a complete functional test with reactor vessel injection requires reactor to be in HOT SHUTDOWN with vessel pressure not less than 200 psig. The pump discharge piping is maintained full to prevent water hammer damage and to provide cooling at the earliest moment.

Upon failure of the HPCI system to function properly after a small break loss-of-coolant accident, the automatic depressurization system (ADS) automatically causes selected safety-relief valves to open, depressurizing the reactor so that flow from the low pressure core cooling systems can enter the core in time to limit fuel cladding temperature to less than 2200°F. ADS is conservatively required to be OPERABLE whenever reactor vessel pressure exceeds 100 psig. This pressure is substantially below that for which the low pressure core cooling systems can provide adequate core cooling for events requiring ADS.

ADS automatically controls five selected safety-relief valves although the safety analysis only takes credit for four valves. It is therefore appropriate to permit one valve to be out-of-service for up to 14 days without materially reducing system reliability.