

## REACTIVITY CONTROL SYSTEMS

### BORATION SYSTEMS

#### CHARGING PUMP - SHUTDOWN

##### LIMITING CONDITION FOR OPERATION

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3.1.2.3 One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 4, 5, and 6.

ACTION:

With no charging pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

##### SURVEILLANCE REQUIREMENTS

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4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE when tested pursuant to Specification 4.0.5.

4.1.2.3.2 All charging pumps, excluding the above required OPERABLE pump, shall be demonstrated inoperable\* by verifying that the motor circuit breakers are secured in the open position\*\* within 4 hours after entering MODE 4 from MODE 3 or prior to the temperature of one or more of the RCS cold legs decreasing below 325°F, whichever comes first, and at least once per 31 days thereafter, except when the reactor vessel head closure bolts are fully detensioned or the vessel head is removed.

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\*An additional pump may be made capable of injecting under administrative control for up to 1 hour during pump-swap operation, except during RCS water-solid conditions. Additionally, an inoperable pump may be energized for testing provided the discharge of the pump has been isolated from the RCS by a closed isolation valve with power removed from the valve operator, or by a manual isolation valve secured in the closed position.

\*\*An alternate method to assure pump inoperability may be used by placing the control room pump-control switch in the Pull-to-Lock position and isolating the discharge flow path of the pump from the RCS by at least one closed isolation valve. Use of the alternate method requires inoperability verification at least once every 12 hours.

## REACTIVITY CONTROL SYSTEMS

### BORATION SYSTEMS

#### CHARGING PUMPS - OPERATING

##### LIMITING CONDITION FOR OPERATION

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3.1.2.4 At least two charging pumps shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.\*

ACTION:

With only one charging pump OPERABLE, restore at least two charging pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least the limit specified in the CORE OPERATING LIMITS REPORT (COLR) for the above MODES at 200°F within the next 6 hours; restore at least two charging pumps to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 6 hours.

##### SURVEILLANCE REQUIREMENTS

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4.1.2.4 At least two charging pumps shall be demonstrated OPERABLE when tested pursuant to Specification 4.0.5.

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\*The provisions of Specifications 3.0.4 and 4.0.4 are not applicable for entry into MODE 3 for the centrifugal charging pump declared inoperable pursuant to Specification 4.1.2.3.2 provided that the centrifugal charging pump is restored to OPERABLE status within 4 hours or prior to the temperature of one or more of the RCS cold legs exceeding 375°F, whichever comes first.

## EMERGENCY CORE COOLING SYSTEMS

### ECCS SUBSYSTEMS - T<sub>avg</sub> GREATER THAN OR EQUAL TO 350°F

#### SURVEILLANCE REQUIREMENTS

##### 4.5.2 (Continued)

- d. At least once per 18 months by:
- 1) Verifying automatic interlock action of the RHR system from the Reactor Coolant System to ensure that with a simulated or actual Reactor Coolant System pressure signal greater than or equal to 440 psig, the interlocks prevent the valves from being opened.
  - 2) A visual inspection of the containment sump and verifying that the subsystem suction inlets are not restricted by debris and that the sump components (trash racks, screens, etc.) show no evidence of structural distress or abnormal corrosion.
- e. At least once per 18 months, during shutdown, by:
- 1) Verifying that each automatic valve in the flow path actuates to its correct position on (Safety Injection actuation and Automatic Switchover to Containment Sump) test signals, and
  - 2) Verifying that each of the following pumps start automatically upon receipt of a Safety Injection actuation test signal:
    - a) Centrifugal charging pump,
    - b) Safety Injection pump, and
    - c) RHR pump.
- f. By verifying OPERABILITY of each pump when tested pursuant to Specification 4.0.5:
- 1) Centrifugal charging pump;
  - 2) Safety Injection pump; and
  - 3) RHR pump.

EMERGENCY CORE COOLING SYSTEMS

ECCS SUBSYSTEMS - T<sub>avg</sub> GREATER THAN OR EQUAL TO 350°F

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SURVEILLANCE REQUIREMENTS

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4.5.2 (Continued)

g. By verifying the correct position of each electrical and/or mechanical position stop for the following ECCS throttle valves:

- 1) Within 4 hours following completion of each valve stroking operation or maintenance on the valve when the ECCS subsystems are required to be OPERABLE, and
- 2) At least once per 18 months.

High Head SI System  
Valve Number

SI-V-143  
SI-V-147  
SI-V-151  
SI-V-155

Intermediate Head SI System  
Valve Number

SI-V-80  
SI-V-85  
SI-V-104  
SI-V-109  
SI-V-117  
SI-V-121  
SI-V-125  
SI-V-129

h. NOT USED

## EMERGENCY CORE COOLING SYSTEMS

### BASES

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#### 3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS (Continued)

When the RCS has a vent area equal to or greater than 18 square inches, or the RCS is in a reduced inventory condition, i.e., whenever reactor vessel water level is lower than 36 inches below the reactor vessel flange, one Safety Injection pump may be made OPERABLE when in MODE 5 or MODE 6 with the reactor vessel head on and the vessel head closure bolts not fully detensioned. When operating in this configuration, cold overpressure protection is provided by either the mechanical vent opening in the RCS boundary, equal to or greater than 18 square inches, or the additional void volume existing when operating in a reduced inventory condition. Either configuration is required to be present prior to making the SI pump OPERABLE. This required RCS vent area or reduced inventory condition and the cold overpressure protection surveillance requirements to verify the presence of the RCS vent area or verify that the reactor vessel water level is lower than 36 inches below the reactor vessel flange provides assurance that a mass addition transient can be mitigated and that adequate cold overpressure protection is provided.

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. With the exception of the operating centrifugal charging pump, the ECCS pumps are normally in a standby, non-operating mode. As such, flow path piping has the potential to develop voids and pockets of entrained gases. Maintaining the piping from the refueling water storage tank (RWST) to the RCS full of water (by verifying at the accessible ECCS piping high points and pump casings, excluding the operating centrifugal charging pump) ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent water hammer, pump cavitation, and pumping of non-condensable gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following a safety injection (SI) signal or during shutdown cooling. The 31 day Frequency takes into consideration the gradual nature of gas accumulation in the ECCS piping and the procedural controls governing system operation. Surveillance Requirements for throttle valve position stops and flow balance testing<sup>1</sup> provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses.

Verifying that the RHR system suction valve interlock is OPERABLE ensures that the RCS will not pressurize the RHR system beyond its design pressure. The value specified in the surveillance requirement ensures that the valves cannot be opened unless the RCS pressure is less than 440 psig. Due to bistable reset design, and the instrument uncertainty, the valves could be open above the interlock setpoint, but below the reset

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<sup>1</sup> Refer to the Technical Requirements Manual for flow balance criteria.