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3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3/4.5.1 SAFETY INJECTION TANKS

LIMITING CONDITION FOR OPERATION

- 3.5.1 Each Reactor Coolant System safety injection tank shall be OPERABLE with:
- The isolation valve key-locked open and power to the valve removed,
 - A contained borated water level of between 1802 cubic feet (28% narrow range indication) and 1914 cubic feet (72 % narrow range indication),
 - A boron concentration between ~~2000~~²³⁰⁰ and 4400 ppm of boron, and
 - A nitrogen cover-pressure of between 600 and 625 psig.
 - Nitrogen vent valves closed and power removed.**
 - Nitrogen vent valves capable of being operated upon restoration of power.

APPLICABILITY: MODES 1*, 2*, 3,*†, and 4*†.

ACTION:

- With one safety injection tank inoperable, except as a result of a closed isolation valve, restore the inoperable tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
- With one safety injection tank inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in at least HOT STANDBY within 1 hour and be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1 Each safety injection tank shall be demonstrated OPERABLE:

- At least once per 12 hours by:
 - Verifying the contained borated water volume and nitrogen cover-pressure in the tanks is within the above limits, and

†With pressurizer pressure greater than or equal to 1837 psia. When pressurizer pressure is less than 1837 psia, at least three safety injection tanks must be OPERABLE, each with a minimum pressure of 254 psig and a maximum pressure of 625 psig, and a contained borated water volume of between 1415 cubic feet (60% wide range indication) and 1914 cubic feet (83% wide range indication). With all four safety injection tanks OPERABLE, each tank shall have a minimum pressure of 254 psig and a maximum pressure of 625 psig, and a contained borated water volume of between 962 cubic feet (39% wide range indication) and 1914 cubic feet (83% wide range indication). In MODE 4 with pressurizer pressure less than 430 psia, the safety injection tanks may be isolated.

*See Special Test Exceptions 3.10.6 and 3.10.8.

**Nitrogen vent valves may be cycled as necessary to maintain the required nitrogen cover pressure per Specification 3.5.1d.

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EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

2. Verifying that each safety injection tank isolation valve is open and the nitrogen vent valves are closed.

b. ~~At least once per 31 days and within 6 hours after each solution level increase of greater than or equal to 7% of tank narrow range level by verifying the boron concentration of the safety injection tank solution is between 2000 and 4400 ppm.~~

c. At least once per 31 days when the RCS pressure is above ~~700 psig~~ ^{430 psia} by verifying that power to the isolation valve operator is removed.

d. At least once per 18 months by verifying that each safety injection tank isolation valve opens automatically under each of the following conditions:

1. When an actual or simulated RCS pressure signal exceeds 515 psia, and

2. Upon receipt of a safety injection actuation (SIAS) test signal.

e. At least once per 18 months by verifying OPERABILITY of RCS-SIT differential pressure alarm by simulating RCS pressure > 715 psia with SIT pressure < 600 psig.

f. At least once per 18 months, when SITs are isolated, by verifying the SIT nitrogen vent valves can be opened.

g. At least once per 31 days, by verifying that power is removed from the nitrogen vent valves.

At least once per 31 days and whenever the tank is drained to maintain the contained borated water level within the limits of Specification 3.5.1 b, by verifying the boron concentration of the safety injection tank solution is between 2300 and 4400 ppm.

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

BASES

3/4.5.1 SAFETY INJECTION TANKS

The OPERABILITY of each of the Safety Injection System (SIS) safety injection tanks ensures that a sufficient volume of borated water will be immediately forced into the reactor core through each of the cold legs in the event the RCS pressure falls below the pressure of the safety injection tanks. This initial surge of water into the RCS provides the initial cooling mechanism during large RCS pipe ruptures.

The limits on safety injection tank volume, boron concentration, and pressure ensure that the safety injection tanks will adequately perform their function in the event of a LOCA in MODE 1, 2, 3, or 4.

A minimum of 25% narrow range corresponding to 1790 cubic feet and a maximum of 75% narrow range corresponding to 1927 cubic feet of borated water are used in the safety analysis as the volume in the SITs. To allow for instrument accuracy, 28% narrow range corresponding to 1802 cubic feet and 72% narrow range corresponding to 1914 cubic feet, are specified in the Technical Specification.

A minimum of 593 psig and a maximum pressure of 632 psig are used in the safety analysis. To allow for instrument accuracy 600 psig minimum and 625 psig maximum are specified in the Technical Specification.

A boron concentration of 2000 ppm minimum and 4400 ppm maximum are used in the safety analysis.

The SIT isolation valves are not single failure proof; therefore, whenever the valves are open power shall be removed from these valves and the switch keylocked open. These precautions ensure that the SITs are available during a Limiting Fault.

The SIT nitrogen vent valves are not single failure proof against depressurizing the SITs by spurious opening. Therefore, power to the valves is removed while they are closed to ensure the safety analysis assumption of four pressurized SITs.

All of the SIT nitrogen vent valves are required to be operable so that, given a single failure, all four SITs may still be vented during post-LOCA long-term cooling. Venting the SITs provides for SIT depressurization capability which ensures the timely establishment of shutdown cooling entry conditions as assumed by the safety analysis for small break LOCAs.

The limits for operation with a safety injection tank inoperable for any reason except an isolation valve closed minimizes the time exposure of the plant to a LOCA event occurring concurrent with failure of an additional safety injection tank which may result in unacceptable peak cladding temperatures. If a closed isolation valve cannot be immediately opened, the full capability of one safety injection tank is not available and prompt action is required to place the reactor in a MODE where this capability is not required.

For MODES 3 and 4 operation with pressurizer pressure less than 1837 psia the Technical Specifications require a minimum of 57% wide range corresponding

The Technical Specification lower limit of 2300 ppm in the SIT assures that the back leakage from RCS will not dilute the SIT's below the 2000 ppm limit assumed in the safety analysis prior to the time when draining of the SIT is necessary.

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