

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

SAFETY INJECTION TANKS

LIMITING CONDITION FOR OPERATION

3.5.1 Each reactor coolant system safety injection tank shall be OPERABLE with:

- a. The isolation valve open,
- b. A contained borated water volume of between 1413 and 1539 cubic feet (equivalent to an indicated level between 80.1% and 87.9%, respectively),
- c. Between 2200 and 3000 ppm of boron, and
- d. A nitrogen cover-pressure of between 600 and 624 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

- a. With one safety injection tank inoperable, due to boron concentration not within limits, restore the boron concentration to within limits within 72 hours, or be in HOT STANDBY within the next 6 hours and reduce pressurizer pressure to <700 psia within the next 12 hours.
- b. With one safety injection tank inoperable due to inability to verify level or pressure, restore the SIT to OPERABLE status within 72 hours, or be in HOT STANDBY within the next 6 hours and reduce pressurizer pressure to < 700 psia within the next 12 hours.
- c. With one safety injection tank inoperable for reasons other than ACTION a or b, restore the SIT to OPERABLE status within 24 hours, or be in HOT STANDBY within the next 6 hours and reduce pressurizer pressure to <700 psia within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1 Each safety injection tank shall be demonstrated OPERABLE:

- a. At least once per 12 hours by:
 1. Verifying the contained borated water volume and nitrogen cover-pressure in the tanks, and
 2. Verifying that each safety injection tank isolation valve (2CV-5003, 2CV-5023, 2CV-5043 and 2CV-5063) is open.

*With pressurizer pressure \geq 700 psia.

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EMERGENCY CORE COOLING SYSTEMS

BASES

NUREG-1366, "Improvements to Technical Specifications Surveillance Requirements," Section 7.4 discusses surveillance requirements for the instrumentation channels used in the measurement of water level and pressure in SITs. It is the recommendation of the NUREG that when one SIT is inoperable due only to the inability to verify water level and pressure, 72 hours be allowed to restore SIT to an OPERABLE status.

If one SIT is inoperable, for a reason other than boron concentration or the inability to verify level or pressure, the SIT must be returned to OPERABLE status within 24 hours. In this condition, the total contents of the three remaining SITs cannot be assumed to reach the core during a LOCA, contrary to the assumptions of 10 CFR 50, Appendix K.

CEOG "Joint Applications Report for Safety Injection Tank AOT/STI Extension," CE NPSD-994, provides a series of deterministic and probabilistic findings that support 24 hours as being either "risk beneficial" or "risk neutral" in comparison to shorter periods for restoring the SIT to OPERABLE status. The report discusses best-estimate analysis that confirmed that, during large-break LOCA scenarios, core melt can be prevented by either operation of one LPSI pump or the operation of one HPSI pump and a single SIT.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABILITY of two separate and independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA assuming the loss of one subsystem through any single failure consideration. Either subsystem operating in conjunction with the safety injection tanks is capable of supplying sufficient core cooling to limit the peak cladding temperatures within acceptable limits for all postulated break sizes ranging from the double-ended break of the largest RCS cold leg pipe downward. In addition, each ECCS subsystem provides long term core cooling capability in the recirculation mode during the accident recovery period.

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the accident analyses are met and that subsystem OPERABILITY is maintained. Surveillance requirements of throttle valve position stops and flow balance testing 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. The acceptance criteria specified in the Surveillance Requirements for HPSI single pump flow, HPSI differential pressure, and LPSI differential pressure does not account for instrument error.

3/4.5.4 REFUELING WATER TANK (RWT)

The OPERABILITY of the RWT as part of the ECCS ensures that a sufficient supply of borated water is available for injection by the ECCS and CSS in the event of a LOCA. The limits on RWT minimum volume and boron concentration ensure that 1) sufficient water is available within containment to permit recirculation cooling flow to the core, and (2) the reactor will remain subcritical in the cold condition following mixing of the RWT and the RCS water volumes with all control rods inserted except for the most reactive control assembly. These assumptions are consistent with the LOCA analyses.

MARKUP OF CURRENT ANO-2 TECHNICAL SPECIFICATIONS

(FOR INFO ONLY)

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APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

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- b. With one safety injection tank inoperable due to inability to verify level or pressure, restore the SIT to OPERABLE status within 72 hours, or be in HOT STANDBY within the next 6 hours and reduce pressurizer pressure to < 700 psia within the next 12 hours.
- ~~b+c.~~ With one safety injection tank inoperable for reasons other than ~~boron concentration~~ ACTION a or b, restore the SIT to OPERABLE status within ± 24 hours, or be in HOT STANDBY within the next 6 hours and reduce pressurizer pressure to <700 psia within the next 12 hours.

SURVEILLANCE REQUIREMENTS

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~~— If one SIT is inoperable, for a reason other than boron concentration, the SIT must be returned to OPERABLE status within 1 hour. In this condition, the required contents of three SITs cannot be assumed to reach the core during a LOCA. Due to the severity of the consequences should a LOCA occur in these conditions, the 1 hour completion time to open the valve, remove power to the valve operator, or restore proper water volume or nitrogen cover pressure ensures that prompt action will be taken to return the inoperable SIT to OPERABLE status. The completion time minimizes the exposure of the plant to a LOCA while a SIT is inoperable.~~

If one SIT is inoperable, for a reason other than boron concentration or the inability to verify level or pressure, the SIT must be returned to OPERABLE status within 24 hours. In this condition, the total contents of the three remaining SITs cannot be assumed to reach the core during a LOCA, contrary to the assumptions of 10 CFR 50, Appendix K.

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The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the accident analyses are met and that subsystem OPERABILITY is maintained. Surveillance requirements of throttle valve position stops and flow balance testing 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. The acceptance criteria specified in the Surveillance Requirements for HPSI single pump flow, HPSI differential pressure, and LPSI differential pressure does not account for instrument error.

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