

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3/4.5.1 ACCUMULATORS

COLD LEG INJECTION ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.5.1.1 Each cold leg injection accumulator shall be OPERABLE with:

- a. The isolation valve open,
- b. A contained borated water volume of between 7615 and 7960 gallons of borated water,
- c. A boron concentration in accordance with the requirements below,

<u>Number of TPBARs#</u>	<u>Minimum Boron</u>	<u>Maximum Boron</u>
0	2400 ppm	3800 ppm
1-250	2700 ppm	3800 ppm
251-500	2900 ppm	3800 ppm
501-1000	3200 ppm	3800 ppm
1001-2256	3500 ppm	3800 ppm

- d. A nitrogen cover-pressure of between 624 and 668 psig, and
- e. Power removed from isolation valve when RCS pressure is above 2000 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

- a. With one cold leg injection accumulator inoperable, except as a result of boron concentration not within limits, restore the inoperable accumulator to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to 1000 psig or less within the following 6 hours.
- b. With one cold leg injection accumulator inoperable due to the boron concentration not within limits, restore boron concentration to within limits within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to 1000 psig or less within the following 6 hours.

*Pressurizer pressure above 1000 psig.

The number of TPBARs in the reactor core is contained in the COLR for each fuel cycle.

3/4.5 EMERGENCY CORE COOLING SYSTEMS

BASES

3/4.5.1 ACCUMULATORS

The OPERABILITY of each cold leg injection accumulator ensures that a sufficient volume of borated water will be immediately forced into the reactor core in the event that the RCS pressure falls below the specified pressure of the accumulators. For the cold leg injection accumulators, this condition occurs in the event of a large or small rupture.

The limits on accumulator volume, boron concentration and pressure ensure that the assumptions used for accumulator injection in the safety analysis are met. The limits in the specification for accumulator nitrogen cover pressure and volume are operating limits and include instrument uncertainty. The analysis limits bound the operational limits with instrument uncertainty applied. The minimum boron concentration ensures that the reactor core will remain subcritical during the post-LOCA (loss of coolant accident) recirculation phase based upon the cold leg accumulators' contribution to the post-LOCA sump mixture concentration.

The accumulator power operated isolation valves are considered to be "operating bypasses" in the context of IEEE Std. 279-1971, which requires that bypasses of a protective function be removed automatically whenever permissive conditions are not met. In addition, as these accumulator isolation valves fail to meet single failure criteria, removal of power to the valves is required.

The limits for operation with an accumulator inoperable for any reason except boron concentration not within limits minimizes the time exposure of the plant to a LOCA event occurring concurrent with failure of an additional accumulator which may result in unacceptable peak cladding temperatures. Under these conditions, the full capability of one accumulator is not available and prompt action is required to place the reactor in a mode where this capability is not required. The 24 hours allowed to restore an inoperable accumulator to OPERABLE status is justified in Westinghouse Commercial Atomic Power (WCAP)-15049-A, Revision 1, dated April 1999. For an accumulator inoperable due to boron concentration not within limits, the limits for operation allow 72 hours to return boron concentration to within limits. This is based on the availability of ECCS water not being affected and an insignificant effect on core subcriticality during reflood because boiling of ECCS water in the core concentrates boron in the saturated liquid.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABILITY of two 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 accumulators 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.