3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 ACCUMULATORS

COLD LEG INJECTION

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 8022 and 8256 gallons

c. A boron concentration of between 1900 and 2100 ppm,

d. A nitrogen cover-pressure of between 430 and 484 psig, and

e. A water level and pressure channel OPERABLE.

APPLICABILITY: MODES 1, 2, and 3*.

ACTION:

a. With one accumulator inoperable, except as a result of a closed isolation valve or boron concentration less than 1900 ppm, restore the inoperable accumulator to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

b. With one accumulator inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in at least HOT STANDBY within 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

c. With one accumulator inoperable due to boron concentration less than 1900 ppm and:

1) the volume weighted average boron concentration of the three limiting accumulators 1900 ppm or greater, restore the inoperable accumulator to OPERABLE status within 24 hours of the low boron determination or be in at least HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

2) the volume weighted average boron concentration of the three limiting accumulators less than 1900 ppm but greater than 1500 ppm, restore the inoperable accumulator to OPERABLE status or return the volume weighted average boron concentra-

*Pressurizer pressure above 1000 psig.

LIMITING CONDITION FOR OPERATION

ACTION: (cont'd)

tion of the three limiting accumulators to greater than 1900 ppm and enter ACTION c.1 within 6 hours of the low boron determination or be in HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

3) The volume weighted average boron concentration of the three limiting accumulators 1500 ppm or less, return the volume weighted average boron concentration of the three limiting accumulator to greater than 1500 ppm and enter ACTION c.2 within 1 hour of the low boron determination or be in HOT STANDBY within the next 6 hours and reduce pressurizer pressure to less than 1000 psig within the following 6 hours.

SURVEILLANCE REQUIREMENTS

4.5.1.1.1 Each cold leg injection accumulator 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 cold leg injection accumulator isolation valve is open.

b. At least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to 1% of tank volume not resulting from normal makeup by verifying the boron concentration of the accumulator solution;

c. At least once per 31 days when the RCS pressure is above 2000 psig by verifying that power to the isolation valve operator is disconnected by removal of the breaker from the circuit; and

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

1) When an actual or a simulated RCS pressure signal exceeds the P-11 (Pressurizer Pressure Block of Safety Injection) Setpoint,

2) Upon receipt of a Safety Injection test signal.

4.5.1.1.2 Each cold leg injection accumulator water level and pressure channel shall be demonstrated OPERABLE:

SURVEILLANCE REQUIREMENTS

a. At least once per 31 days by the performance of an ANALOG CHANNEL OPERATIONAL TEST, and

b. At least once per 18 months by the performance of a CHANNEL CALIBRATION.

3/4.5.1 ACCUMULATORS

The OPERABILITY of each Reactor Coolant System (RCS) accumulator 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 accumulators. This initial surge of water into the core provides the initial cooling mechanism during large RCS pipe ruptures.

The limits on accumulator volume, boron concentration and pressure ensure that the assumptions used for accumulator injection in the safety analysis are met. The use of "the three limiting accumulators" refers to the combination of the three accumulators which would inject the minimum volume weighted average boron concentration assuming the accumulator of highest concentration (the fourth) spills out the broken RCS pipe.

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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 an isolation valve closed 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. If a closed isolation valve cannot be immediately opened, 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.

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.

With the RCS temperature below 350°F, one OPERABLE ECCS subsystem is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

The allowed down time for the accumulators are variable based upon boron concentration to ensure that the reactor is shutdown following a LOCA and that any problems are corrected in a timely manner. Subcriticality is assured when boron concentration is above 1500 ppm, so additional down time is allowed when concentration is above 1500 ppm. A concentration of less than 1900 ppm in any single accumulator or as a volume weighted average may be indicative of a problem, such as valve leakage, but since reactor shutdown is assured, additional time is allowed to restore boron concentration in the accumulators.

ATTACHMENT 2

JUSTIFICATION AND SAFETY ANALYSIS

The proposed supplemental changes to the McGuire Technical Specifications would introduce a lower limit for the volume weighted average in the three limiting accumulators at 1500 ppm boron. This concentration would maintain shutdown of the reactor at zero power, K = 1.0, all control rod assemblies out, including a 1% uncertainty (FSAR Table 4.3.2-2). The action for a boron concentration of less than 1500 ppm would be to restore concentration to greater than 1500 ppm within one hour and enter the action for volume weighted average boron concentration in the 1500 - 1900 ppm range or proceed to Hot Shutdown. The existing Specification would allow this excursion for one hour, and once concentration is restored, shutdown is assured.

The probability of a LOCA during accumulator down time is small, thus the one hour window without assured shutdown is acceptable. When boron concentration is above 1500 ppm, shutdown is assured and the boron has served its purpose. Additional boron adds to the margin.

The proposed changes to the bases are to clarify the use of the "three limiting accumulators" and provide the reasoning behind the specification's Action statements with regards to the variable allowed times based upon the boron concentration.

ATTACHMENT 3

ANALYSIS OF SIGNIFICANT HAZARDS CONSIDERATION

Pursuant to 10 CFR 50.91, this analyses provides a determination that the proposed amendment to the Technical Specifications does not involve any significant hazards consideration, as defined by 10 CFR 50.92.

The proposed amendment would not:

1) Involve a significant increase in the probability or consequences of an accident previously evaluated. The proposed change would allow increased time with the boron concentration in the cold leg accumulators below 1900 ppm but greater than 1500 ppm. The change would not affect any accident mechanisms regarding probability of an accident since no hardware changes are made, and the consequences are unaffected since the same volume of water is injected for cooling purposes and the boron assures reactor shutdown following a LOCA.

2) Create the possibility of a new or different kind of accident from any accident previously evaluated. No hardware changes are made to create any new failure or accident sequences. The boron concentration in the water will assure reactor shutdown thus preventing a return to criticality after a LOCA.

3) Involve a significant reduction in a margin of safety. While the shutdown margin following a LOCA may be reduced if a LOCA were to occur with the boron concentration lower than 1900 ppm but greater than 1500 ppm, the increase in allowed time does not significantly affect the margin of safety.

Based upon the preceding analyses, Duke Power Company concludes that the proposed amendments do not involve a significant hazards consideration.