

ATTACHMENT FOUR

PROPOSED TECHNICAL SPECIFICATION REVISIONS

3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.5.1 Each Reactor Coolant System accumulator shall be OPERABLE with:

- a. The isolation valve open and power removed,
- b. A contained borated water volume of between 6061 and 6655 gallons,
- c. A boron concentration of between 2300 and 2500 ppm, and
- d. A nitrogen cover-pressure of between 602 and 648 psig.

APPLICABILITY: MODES 1, 2 and 3\*.

ACTION:

- a. **INSERT A** *for reasons other than a.,*
- b. ~~With one accumulator inoperable, except as a result of a closed isolation valve, restore the inoperable accumulator to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 1000 psig within the following 6 hours.~~  
*24 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 RCS pressure to less than 1000 psig within the following 6 hours.~~

SURVEILLANCE REQUIREMENTS

4.5.1.1 Each accumulator shall be demonstrated OPERABLE:

- a. At least once per 12 hours by:
  - 1) Verifying ~~by the absence of alarms,~~ *that* the contained borated water volume and nitrogen cover-pressure in the tanks, and *are within their limits*
  - 2) Verifying that each accumulator isolation valve is open.

\* RCS pressure above 1000 psig.

~~\* One accumulator isolation valve may be closed for up to 2 hours in mode 3\* for surveillance testing per 4.0.5 or 4.4.6.2.2.~~

## INSERT A

With one accumulator inoperable due to boron concentration not within limits, restore the boron concentration to within the above limits within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 1000 psig within the following 6 hours.

EMERGENCY CORE COOLING SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)

- b. At least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to 70 gallons by verifying the boron concentration of the accumulator solution ~~of the~~ *INSERT B*
- c. At least once per 31 days when the RCS pressure is above 1000 psig by verifying that the circuit breaker supplying power to the isolation valve operator is oper.

~~4.6.1.2 Each accumulator water level and pressure channel shall be demonstrated OPERABLE at least once per 18 months by the performance of a CHANNEL CALIBRATION.~~

## INSERT B

This latter 6 hour surveillance is not required when the volume increase makeup source is the RWST and the RWST has not been diluted since verifying that its boron concentration is within the limits of Specification 3.5.5.

### 3/4.5 EMERGENCY CORE COOLING SYSTEMS

#### BASES

#### 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 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 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.

*INSERT C*

~~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. In order to perform check valve surveillance testing per 4.0.5 or 4.4.6.2.2 above 1000 psig RCS pressure, one accumulator isolation valve may be closed for up to 2 hours in mode 3 only.~~

The requirement to verify accumulator isolation valves shut with power removed from the valve operator when the pressurizer is solid ensures the accumulators will not inject water and cause a pressure transient when the Reactor Coolant System is on solid plant pressure control.

#### 3/4.5.2, 3/4.5.3, and 3/4.5.4 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.

## INSERT C

The allowed outage time limit for operation with one accumulator inoperable due to boron concentration not within limits reflects the fact that no credit is taken in the accident analysis for boron concentration in the accumulators during the LOCA blowdown phase. Injection of borated water provides the fluid medium for heat transfer from the core and prevents excessive clad temperatures, contributing to the filling of the reactor vessel downcomer. The downcomer water elevation head provides the driving force required for the reflooding of the reactor core. Negative reactivity is initially a function of the void formation in the core. One accumulator below the minimum boron concentration limit will have no effect on available ECCS water and an insignificant effect on core subcriticality during reflood. Boiling of ECCS water in the core during reflood concentrates boron in the saturated liquid that remains in the core. Boron concentration during the sump recirculation phase is dominated by the RWST boron concentration.

The allowed outage time limit for operation with one accumulator inoperable for any other reason has been determined to have an insignificant effect on the Callaway core damage frequency. The accumulator fault tree was quantified using an accumulator test and maintenance unavailability of 100 hours per calendar year.

### 3/4.5 EMERGENCY CORE COOLING SYSTEMS

#### 3/4.5.1 ACCUMULATORS

##### LIMITING CONDITION FOR OPERATION

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- c. A boron concentration of between 2300 and 2500 ppm, and
- d. A nitrogen cover-pressure of between 602 and 648 psig.

APPLICABILITY: MODES 1, 2 AND 3\*.

##### ACTION:

- a. With one accumulator inoperable due to boron concentration not within limits, restore the boron concentration to within the above limits within 72 hours or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 1000 psig within the following 6 hours.
- b. With one accumulator inoperable for reasons other than a., restore the inoperable accumulator to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and reduce RCS pressure to less than 1000 psig within the following 6 hours.

##### SURVEILLANCE REQUIREMENTS

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4.5.1.1 Each accumulator shall be demonstrated OPERABLE:

- a. At least once per 12 hours by:
  - 1) Verifying that the contained borated water volume and nitrogen cover-pressure in the tanks are within their limits, and
  - 2) Verifying that each accumulator isolation valve is open.

\* RCS pressure above 1000 psig.

## EMERGENCY CORE COOLING SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

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- b. At least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to 70 gallons by verifying the boron concentration of the accumulator solution. This latter 6 hour surveillance is not required when the volume increase makeup source is the RWST and the RWST has not been diluted since verifying that its boron concentration is within the limits of Specification 3.5.5.
  
- c. At least once per 31 days when the RCS pressure is above 1000 psig by verifying that the circuit breaker supplying power to the isolation valve operator is open.

### 3/4.5 EMERGENCY CORE COOLING SYSTEMS

#### BASES

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#### 3/4.5.1 ACCUMULATORS

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The requirement to verify accumulator isolation valves shut with power removed from the valve operator when the pressurizer is solid ensures the accumulators will not inject water and cause a pressure transient when the Reactor Coolant System is on solid plant pressure control.

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