

FLORIDA POWER CORPORATION
CRYSTAL RIVER UNIT 3
DOCKET NO. 50-302/LICENSE NO. DPR-72
REQUEST NO. 194, REVISION 0
BORATED WATER SOURCES - OPERATING

LICENSE DOCUMENT INVOLVED: Technical Specifications

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DESCRIPTION OF REQUEST:

This request increases the maximum boron concentration in the Borated Water Storage Tank (BWST) during operation from 2,450 ppm to 3,000 ppm.

REASON FOR REQUEST:

Crystal River Unit 3 (CR-3) refueling canal water and the reactor coolant system (RCS) boron concentrations are typically maintained in the range of 2,450 ppm to 3,000 ppm to assure an increased measure of subcriticality with the control rods removed during shutdown conditions. Upon completion of refueling, the RCS and the BWST must be deborated to a boron concentration of $\leq 2,450$ ppm before entering Mode 4. Increasing the allowable BWST boron concentration to 3,000 ppm would permit the direct transfer of refueling canal water to the BWST without deboration. This direct transfer will reduce the CR-3 outage time.

EVALUATION OF REQUEST:

The minimum BWST boron concentration ensures that the reactor remains subcritical in the cold condition following the mixing of the BWST and RCS water volumes. The maximum concentration ensures that boron precipitation does not occur during the long term cooling period following a LOCA. The boron limits both ensure that the solution in the Reactor Building Emergency Sump following a LOCA has a pH of at least 7.0 prior to recirculation of the sump. This pH limit will minimize the evolution of iodine and minimize the effects of corrosion on the components in the Reactor Building. The BWST boron concentration range presently permitted for CR-3 is between 2,270 ppm and 2,450 ppm.

The minimum BWST boron concentration is not changing with this request. The boron concentration necessary to create the conditions necessary to allow the possibility of precipitation is greater than 40,000 ppm at 212°F. In the long term cooling period following a LOCA, analyses have shown that the maximum concentration in the reactor vessel will not exceed 10,000 ppm under the worst case. Therefore, an increase in the upper limit of the BWST concentration to 3,000 ppm is acceptable. Analyses have been performed that show that a boron concentration of 3000 ppm in combination with 1600 ppm trisodium phosphate dodecahydrate (TSP-C) [buffering agent in the storage containers located on the 95 ft elevation of the Reactor Building] will increase the RCS/BWST solution in the Reactor Building Emergency Sump to a pH of at least 7.0.

REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

- 3.1.2.9 Each of the following borated water sources shall be OPERABLE
- a. A concentrated boric acid storage system and associated heat tracing with:
 - 1. A minimum contained borated water volume of 6,000 gallons,
 - 2. Between 11,600 and 14,000 ppm of boron, and
 - 3. A minimum solution temperature of 105°F.
 - b. The borated water storage tank (BWST) with:
 - 1. A minimum contained borated water volume of 415,200 gallons,
 - 2. Between 2,270 and 3,000 ppm of boron, and
 - 3. A minimum solution temperature of 40°F.

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

ACTION:

- a. With the concentrated boric acid storage system inoperable, restore the storage system to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1% $\Delta k/k$ at 200°F within the next 6 hours; restore the concentrated boric acid storage system to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.
- b. With the borated water storage tank inoperable, restore the tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

The limit established for minimum boron concentration is based upon ensuring that with a minimum BWST level following a LOCA, the reactor will remain subcritical in the cold condition following mixing of the BWST and RCS water volumes. Large break LOCAs assume all control rods remain withdrawn from the core.

The minimum and maximum boron concentration limits both ensure that the solution in the reactor building emergency sump following a LOCA is within a pH range of 7.0 to 11.0 prior to recirculating the solution through the low pressure injection system and the reactor building spray system. This pH range will minimize the evolution of iodine and minimize the effects of chloride and caustic stress corrosion cracking on the mechanical systems and components within the reactor building.

The maximum boron concentration in the BWST is also based on the potential for boron precipitation in the core during the long term cooling period following a LOCA. BWST boron concentrations in excess of the limit could result in precipitation earlier than assumed in the analyses.

The OPERABILITY of one boron injection system during REFUELING ensures that this system is available for reactivity control while in Mode 6.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specification of this section (1) ensure that acceptable power distribution limits are maintained, (2) ensure that the minimum SHUTDOWN MARGIN is maintained, and (3) limit the potential effect of a rod ejection accident. OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original criteria are met. For example, misalignment of a safety or regulating rod requires a restriction in THERMAL POWER. The reactivity worth of a misaligned rod is limited for the remainder of the fuel cycle to prevent exceeding the assumptions used in the safety analysis.

The position of a rod declared inoperable due to misalignment should not be included in computing the average group position for determining the OPERABILITY of rods with lesser misalignments.

EMERGENCY CORE COOLING SYSTEMS

BORATED WATER STORAGE TANK

LIMITING CONDITION FOR OPERATION

3.5.4 The borated water storage tank (BWST) shall be OPERABLE with:

- a. A contained borated water volume of between 415,200 and 449,000 gallons,
- b. Between 2,270 and 3,000 ppm of boron, and
- c. A minimum water temperature of 40°F.

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

ACTION:

With the borated water storage tank inoperable, restore the tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 The BWST shall be demonstrated OPERABLE:

- a. At least once per 7 days by:
 1. Verifying the contained borated water volume in the tank,
 2. Verifying the boron concentration of the water.
- b. At least once per 24 hours by verifying the water temperature when outside air temperature is less than 40°F.

EMERGENCY CORE COOLING SYSTEMS

BASES

BORATED WATER STORAGE TANK (Continued)

The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics. The limits on contained water volume and boron concentration ensure a pH value of between 7.0 and 11.0 of the solution sprayed within the containment after a design basis accident. The pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion cracking on the mechanical systems and components.