UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

July 23, 1992

Docket No. 50-302

Mr. Percy M. Beard, Jr.
Senior Vice President,
Nuclear Operations
Florida Power Corporation
ATTN: Manager, Nuclear
Operations Licensing
P. O. Box 219-NA-2I
Crystal River, Florida 32629

Dear Mr. Beard:

SUBJECT: CRYSTAL RIVER UNIT 3 - ISSUANCE OF AMENDMENT RE: BORATED WATER STORAGE TANK BORON CONCENTRATION (TAC NO. M82890)

The Commission has issued the enclosed Amendment No. 146 to Facility Operating License No. DPR-72 for the Crystal River Unit No. 3 Nuclear Generating Plant (CR-3). This amendment consists of changes to the Technical Specifications (TS) in response to your application dated February 13, 1992.

This amendment changes the upper limit for boron concentration in the borated water storage tank (BWST) from 2,450 ppm to 3,000 ppm. The lower limit remains unchanged.

Please note that in accordance with your requested schedule, this amendment is effective as of the start of the Cycle 9 mid-cycle outage. You are requested to inform us in writing of the date this event takes place.

We recognize that in response to a letter from the Babcock & Wilcox Company (B&W) dated November 7, 1991, you may have modified the method for preventing boron precipitation during long-term cooling following a loss-of-coolant accident (LOCA) at CR-3. We are currently evaluating the information from B&W generically. However, as part of our review of this amendment, we have concluded that the effect of increasing the maximum allowable boron concentration in the BWST to 3000 ppm on the ability to prevent boron precipitation during long-term cooling following a LOCA is negligible. Consequently, approval of this amendment is not contingent on the outcome of the generic review of long-term cooling methods. It should also be noted that although prevention of boron precipitation during long-term cooling following a LOCA was a consideration in our review, approval of this amendment should not be construed as tacit acceptance by us of any changes you have made in procedures for preventing boron precipitation.

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A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/s/
Harley Silver, Senior Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 146to DPR-72
2. Safety Evaluation

cc w/enclosures:
See next page

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A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Harley Silver, Senior Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 146to DPR-72
2. Safety Evaluation

cc w/enclosures:
See next page

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Generating Plant

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

FLORIDA POWER CORPORATION
CITY OF ALACHUA
CITY OF BUSHNELL
CITY OF GAINESVILLE
CITY OF KISSIMMEE
CITY OF LEESBURG
CITY OF NEW SMYRNA BEACH AND UTILITIES COMMISSION, CITY OF NEW SMYRNA BEACH
CITY OF OCALA
ORLANDO UTILITIES COMMISSION AND CITY OF ORLANDO
SEMINOLE ELECTRIC COOPERATIVE, INC.
CITY OF TALLAHASSEE

DOCKET NO. 50-302

CRYSTAL RIVER UNIT 3 NUCLEAR GENERATING PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 146
License No. DPR-72

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Florida Power Corporation, et al. (the licensees) dated February 13, 1992, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-72 is hereby amended to read as follows:

   Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 146, are hereby incorporated in the license. Florida Power Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the start of the Cycle 9 mid-cycle outage and shall be implemented before startup from the Cycle 9 mid-cycle outage.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 23, 1992

ATTACHMENT TO LICENSE AMENDMENT NO. 146

FACILITY OPERATING LICENSE NO. DPR-72

DOCKET NO. 50-302

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Remove	Insert
3/4 1-16	3/4 1-16
3/4 5-7	3/4 5-7
B 3/4 1-3	B 3/4 1-3
B 3/4 5-3	B 3/4 5-3

SURVEILLANCE REQUIREMENTS (Continued)

3. Verifying the concentrated boric acid storage system solution temperature when it is the source of borated water.

b. At least once per 24 hours by verifying the BWST temperature when it is the source of borated water and the outside air temperature is < 40°F.

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% Δk/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.

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.

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.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (Continued)

The maximum rod drop time permitted is consistent with the assumed rod drop time used in the safety analyses. Measurement with $T_{avg} \geq 525°F$ and with reactor coolant pumps operating ensures that the measured drop times will be representative of insertion times experienced during a reactor trip at operating conditions.

Control rod positions and OPERABILITY of the rod position indicators are required to be verified on a nominal basis of once per 12 hours with frequent verifications required if an automatic monitoring channel is inoperable. These verification frequencies are adequate for assuring that the applicable LCO's are satisfied.

OPERABILITY of either rod position indicator (API or RPI) and satisfying the associated surveillance requirement agreement criteria assures the ability to determine group average position within 1.5%.

The limitation on Axial Power Shaping Rod insertion is necessary to ensure that power peaking limits are not exceeded.

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.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 146 TO FACILITY OPERATING LICENSE NO. DPR-72

FLORIDA POWER CORPORATION, ET AL.

CRYSTAL RIVER UNIT NO. 3 NUCLEAR GENERATING PLANT

DOCKET NO. 50-302

1.0 INTRODUCTION

By letter dated February 13, 1992, Florida Power Corporation (FPC, the licensee) requested revisions to Technical Specifications (TS) Sections 3.1.2.9 and 3.5.4 and TS Bases 3/4.1.2 and 3/4.5.4 of Facility Operating License No. DPR-72 for the Crystal River Unit 3 (CR-3) Nuclear Generating Plant. The proposed revision changes the upper limit for boron concentration in the borated water storage tank (BWST) from the present value of 2,450 ppm to 3,000 ppm. The lower concentration limit would remain unchanged. This change is predicated on another proposed amendment that requests approval for the use of trisodium phosphate dodecahydrate (TSP-C) in place of sodium hydroxide as the post-LOCA buffering agent.

2.0 BACKGROUND

The CR-3 refueling canal water and the reactor coolant system (RCS) boron concentrations are typically maintained in the range of 2,450 to 3,000 ppm. After refueling, under the present TS, the licensee would have to reduce the boron concentration to less than or equal to 2,450 ppm before entering Mode 4. The proposed increase in allowable upper limit BWST boron concentration would permit direct transfer of refueling canal water to the BWST without deboration and reduce the outage time.

3.0 EVALUATION

The BWST boron concentration range presently permitted for CR-3 is between 2,270 and 2,450 ppm. The minimum BWST boron concentration is not being changed by this amendment. Only the upper limit is being increased to 3,000 ppm. The minimum BWST boron concentration assures a subcritical reactor in the cold condition following the mixing of the BWST and RCS water volumes. The maximum BWST boron concentration assures that boron precipitation does not occur during the long-term cooling period associated with the post-LOCA conditions. Also, the limiting range in BWST boron concentration assures a pH

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of at least 7.0 for the solution in the reactor building emergency sump for the post-LOCA scenario. The acceptable pH range will minimize the evolution of iodine and the effects of corrosion on reactor building components.

The licensee has stated that the boron concentration necessary to possibly create a precipitation condition is 40,000 ppm at a temperature of 212 °F. During post-LOCA conditions, the boron concentration in the reactor vessel would not exceed 10,000 ppm under the worst-case scenario. Therefore, the licensee has concluded that the increase for the upper limit of the BWST boron concentration to 3,000 ppm would be acceptable. Further, the licensee has evaluated the effects of combining a boron concentration of 3,000 ppm and trisodium phosphate dodecahydrate (1600 ppm) for the RCS/BWST solution in the reactor building emergency sump. The evaluation has indicated that the pH of the solution would increase to an acceptable level of at least 7.0.

The staff has evaluated the proposed TS change and related justifications considering boron precipitation and a pH level of at least 7.0. The staff finds that the proposed increase to 3,000 ppm for the upper limit of the boron concentration is acceptable based on empirical data used in the evaluation and approval of similar TS changes for other operating power plants. This data establishes the pH level for specific combinations of TSP-C and boric acid concentrations, and determines the minimum temperature (°F) that would assure the solubility of boric acid in water. The results agree with the licensee's conclusions that boron precipitation is precluded for the proposed concentrations of boric acid and TSP-C, and that the pH level can be increased to a level above 7.0.

4.0 STATE CONSULTATION

Based upon the written notice of the proposed amendment, the Florida State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding (57 FR 11109). Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: F. Rinaldi

Date: July 23, 1992