November 30, 1998

Mr. John Paul Cowan
Vice President, Nuclear Operations
Florida Power Corporation
ATTN: Manager, Nuclear Licensing (SA2A)
Crystal River Energy Complex
15760 W. Power Line Street
Crystal River, Florida 34428-6708

SUBJECT: CRYSTAL RIVER UNIT 3 - STAFF EVALUATION AND ISSUANCE OF AMENDMENT RE: POST-LOCA BORON DILUTION PRECIPITATION PREVENTION (TAC NO. M99892)

Dear Mr. Cowan:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 171 to Facility Operating License No. DPR-72 for Crystal River Unit 3 (CR-3). This amendment is in response to your request dated October 31, 1997, in which you proposed to change the credited boron precipitation prevention methodology for CR-3. Since you concluded that this change in methodology represented an unreviewed safety question, the change required prior NRC approval. You also provided additional information by letters dated December 13, 1997, February 27, 1998, and April 24, 1998, which did not affect the original no significant hazards determination.

The amendment approves changes to the Final Safety Analysis Report (FSAR), with the exception that credit for hot leg nozzle gaps as a means of controlling potential boron precipitation was not approved, and requires that the changes be submitted with the next update of the FSAR pursuant to 10 CFR 50.71(e). A copy of the related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by:

L. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosures: 1. Amendment No. 171 to DPR-72
2. Safety Evaluation

cc w/enclosures: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Florida Power Corporation
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Crystal River, Florida 34428-6708

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Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-302

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Mr. John Paul Cowan
Florida Power Corporation

CRYSTAL RIVER UNIT NO. 3
GENERATING PLANT

cc:

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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. 171
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 October 31, 1997 as supplemented December 13, 1997, February 27 and April 24, 1998, 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.

2. Accordingly, changes to the updated Final Safety Analysis Report (FSAR) to reflect changes to the boron precipitation prevention methodology at Crystal River Unit 3, as set forth in the application for amendment by Florida Power Corporation dated October 31, 1997 as supplemented December 13, 1997, February 27 and April 24, 1998, are authorized, with the exception that credit for hot leg nozzle gaps as a means of controlling potential boron precipitation is not acceptable. The licensee shall submit the revised description authorized by this amendment with the next update of the FSAR in accordance with 10 CFR 50.71(e).

3. This license amendment is effective as of its date of issuance and shall be implemented as specified in (2), above.

FOR THE NUCLEAR REGULATORY COMMISSION

Frederick J. Hebdon

Frederick J. Hebdon, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Date of Issuance: November 30, 1998

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 171 TO FACILITY OPERATING LICENSE NO. DPR-72

BORON PRECIPITATION PREVENTION METHODOLOGY

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

1.0 INTRODUCTION

By letter dated October 31, 1997, (Ref. 1) as supplemented by letters dated December 13, 1997 and February 27 and April 24, 1998 (Refs. 2 - 4), Florida Power Corporation (FPC) requested an amendment to its Facility Operating License No. DPR-72 for Crystal River Unit 3 (CR-3). The amendment request addresses the methodology for post-loss of coolant accident (LOCA) boron precipitation prevention for CR-3. FPC determined the change in methodology represents an unreviewed safety question (USQ), in that it represents a change in methodologies previously approved by the U.S. Nuclear Regulatory Commission (NRC). Therefore, the change required prior NRC approval. The December 13, 1997, February 27 and April 24, 1998, supplements did not affect the original no significant hazards determination.

2.0 BACKGROUND

Subsection 50.46 of Title 10 of the *Code of Federal Regulations* (CFR) requires that long term cooling be addressed as part of the requirements for emergency core cooling system (ECCS) capability. This includes addressing potential boron precipitation, a topic addressed in the 1976 licensing basis for CR-3 (Ref. 5). In 1991, the Babcock & Wilcox (B&W) analyses determined that the reactor vessel vent valves (RVVVs) would not be effective for breaks in the reactor coolant pump (RCP) discharge pipes that were below the elevation of the pipe center line at the connection with the reactor vessel (RV), and an auxiliary pressurizer spray (APS) rate of 40 gpm would not always prevent boron precipitation in those operating regions where it was previously credited (Ref. 6). In early 1993, the issues were believed resolved (Refs. 7 and 8) but, in 1996, the NRC questioned crediting flow through hot leg nozzle gaps for boron precipitation control and questioned if there were fully-qualified methods for preventing boron precipitation (Refs. 9 - 15). Then it was discovered that failure of engineered safeguards motor control center (MCC) 3AB could disable both active methods relied upon at CR-3 for preventing boron precipitation (Ref. 16), which resulted in failure to meet the single failure requirement of Appendix K Item I.D.1. FPC has addressed prevention of boron precipitation and the above issues in their license amendment request and supplements. The staff included information contained in related documents (Refs. 17 and 18) in its review.

3.0 EVALUATION

3.1 Evaluation Model (EM)

Subsection 50.46(a)(1)(i) states that ECCS cooling performance must be calculated in accordance with an acceptable EM. The staff's evaluation of FPC EM's is as follows:

- Transport of Boron in Steam. FPC referenced a model that included transport of boron due to solubility of boron in steam, reference to an Electric Power Research Institute (EPRI) computer program, and a discussion of the effect of solutes on carryover of boron in steam (Refs. 3 and 19). FPC did not credit, nor did the NRC review, transport of boron in steam.

- Boron Concentration as a Function of Temperature. The B&W Owners Group (B&WOG) extended the range of boron concentration versus temperature in Ref. 19 by submitting data based upon Ref. 20. No accuracy or uncertainty data were submitted. The B&WOG included a 4 weight percent reduction consistent with past regulatory practice and indicated that the presence of lithium hydroxide, sodium hydroxide, and trisodium phosphate would be expected to increase the solubility limit, but it did not credit this potential increase. Inclusion of the 4 weight percent reduction, not taking credit for an increase in solubility due to other solutes, consideration of the FPC estimates of the frequency of occurrence of LOCAs of concern here, and use of the decay heat selection consistent with Appendix K, are sufficient conservatisms for the staff to accept the submitted data for purposes of this amendment request.

- Core Mixing Volume Modeling. The fluid volume from the bottom of the core to the large holes in the upper plenum cylinder, a total of 1591 ft^3, is assumed applicable to boron concentration due to core boiling. EM calculations of the liquid contained in this volume range from less than 800 ft^3 following refill in a large break LOCA to 1200 ft^3 after a few hours. For a small break LOCA that involves core uncovery, the liquid volume is reported to be sufficient to contain all boron that can be concentrated by boiling up to that time, and the 1200 ft^3 is stated to be applicable in the longer term. FPC, therefore, used 1200 ft^3 for its calculations. This is acceptable.

  A void distribution and a complex circulation pattern are expected throughout the core which will influence froth level at the top of the core. However, from the froth region, FPC is only crediting spillover from the upper plenum into the upper downcomer via the RVVVs as a boron removal method, and potential questions applicable to other boron removal methods from the froth region do not need to be addressed in this review.

  FPC's modeling of the core mixing volume is equivalent to the typical cup mixing model the staff has previously approved for boron concentration calculations. FPC's core mixing volume model is acceptable.

- Correlation of Core Boron Concentration with Time. FPC presents examples of acceptable conditions that credit the correlation of an increase in boron solubility with an increase in temperature. Results are often presented as a function of time to, for example, illustrate that a small break LOCA may result in high pressure (and hence high temperature) for an extended time and, therefore, it will take a long time before sufficient boron can concentrate in the core for there to be a concern. This is valid when illustrating a licensing basis calculation, but it is not valid for establishing compliance when operator actions may increase cooldown rate and reduce the time to when boron precipitation is of potential concern. Consequently, time-based correlations are not part of accepted models when temperature is properly the independent variable. Thus, a correlation showing time to reach a core boron concentration that may be of concern versus break size may not be used for determination of operator response (presuming one even knows the break size). Conversely, a suitable correlation showing time to reach a concentration that may be of concern versus excore temperature, which is measured, is acceptable when operator guidance is keyed to excore temperature.

- Dump to Sump (DTS) Analysis. The staff audited FPC's modeling of flow through pipes and fittings and its calculations of heat transfer between the water and pipe wall when calculating DTS flow characteristics as part of this review. FPC estimated maximum emergency sump screen loadings on the basis of a temperature distribution in the water based on its pipe flow analysis. It conservatively applied the maximum calculated loading over the entire screen rather than accounting for an estimated loading distribution based upon an estimated plume distribution. The FPC modeling of DTS flow behavior is acceptable.

- Auxiliary Pressurizer Spray (APS) Analysis. The staff audited FPC's modeling of flow through pipes and fittings and its calculations of pressurizer filling when calculating APS characteristics as part of this review. The FPC calculation of pressurizer fill time is conservatively limited to APS flow and does not credit flow from the RCS. The FPC modeling of APS behavior is acceptable.

- Correlation of Emergency sump and Core Boron Concentration. FPC addressed water holdup and time delay between an occurrence in the core and its corresponding reflection in the emergency sump. It accounted for time delay between taking a sample in the emergency sump, arrival of the sample at the boronometer, time to perform the boron concentration analysis, sampling accuracy, and time to transmit the results to the control room. It correlated emergency sump boron concentration measurements to core boron concentration in Ref. 2, and by letter dated January 19, 1998, it stated that a 25% factor of safety was applied to the Ref. 2 emergency sump boron concentration difference curve for purposes of implementing the correlation. The staff approved the correlation with the 25% safety factor in Ref. 21.

  FPC provided a recalculated correlation in Ref. 4 that included the 25% safety factor. The staff finds the Ref. 4 correlation to be acceptable for correlating emergency sump boron concentration measurements with core concentration for purposes of guiding boron control actions. Addressing the time delays consistent with the Ref. 3 guidance and examples is acceptable.

- Other Reactor Coolant System (RCS) Modeling. Ref. 19 describes a boron concentration model that consists of six control volumes and 12 junctions. RCS pressure and time history is provided by a RELAP 5 thermal-hydraulic model that was benchmarked to the B&W EM (Ref. 16) for the lowered loop design. The staff audited these models as part of this review and finds them acceptable over the range used by FPC for its boron concentration analyses as described in the FPC documentation.

Except for specific statements regarding generic acceptance, the staff's assessment of the above EMs is limited to use for analysis of boron precipitation control at CR-3. The staff findings do not apply for any other purpose.

3.2 <u>Means of Controlling Core Boron Concentration at Crystal River Unit 3</u>

FPC describes two passive means of preventing boron precipitation – the RVVVs and hot leg nozzle gaps. It has determined that RVVVs are ineffective (1) if decay heat generation rate is equivalent to or less than about a month after extended full power operation for a large cold leg and (2) if there is a cold leg break of a certain size range between the RCP discharge and the RV at an elevation below the pipe centerline at the junction of the pipe to the RV. The staff audited the FPC calculations of RVVV behavior as part of this review and finds them acceptable.

FPC has evaluated the hot leg nozzle gaps and calculated that gaps will exist during cooldown and during long term heat removal following cooldown that are sufficient to prevent boron precipitation. It has calculated that a 90 percent blockage of the gaps will still prevent boron precipitation, but it has not shown that the gaps will remain open in the presence of debris that may be entrained in RCS water. Consequently, the staff does not accept crediting hot leg nozzle gaps as a means of controlling potential boron precipitation.

FPC describes two active means for preventing boron precipitation – APS and DTS. FPC states that the DTS method is restricted to indicated core exit temperature less than 286°F (indicated pressure of 47 psia) to protect the emergency sump screen from potential overpressure damage. It further states that, based upon licensing-type calculations, DTS will prevent boron precipitation whenever it can be placed in operation. APS has no comparable pressure restriction.

The DTS method establishes flow through the core by opening the hot leg to the reactor building (RB) emergency sump via the Decay Heat Removal (DHR) drop line. This is accomplished by securing one low-pressure injection (LPI) train, opening three valves in the desired flow path, opening one valve for 6 seconds (travel time for full open is nominally 105±2 seconds), and then opening the fifth valve to initiate flow. The staff observed simulator runs that included DTS initiation. Operator actions appeared reasonable, although the timed valve opening of 6 seconds has a potential for operator error. This is addressed in FPC's procedures by cross-checking the opening time before opening the fifth valve and by performing a flow check as discussed in the next paragraph. (Note the flow check would be completed before hot water reached the throttled valve, and if the throttled valve were opened too wide, it could be closed before hot water reached the valve and consequently induced a load on the emergency sump screen.) The conservatism in calculating flow dynamics, in determining flow rate via a temperature measurement, and in accounting for emergency sump screen loading makes the opening time less critical than one would otherwise expect, and the cross-checks of opening time and flow rate tend to compensate for potential error in the timed opening. Further, the likelihood that DTS will be needed is low and DTS would generally be used only if APS were not available. Consequently, potential DTS failure has low safety significance.

FPC has attached a strap-on thermocouple to the DHR drop line immediately outside the RB wall. This can be read locally and anticipated dose rates for design basis events should permit reading. Drop line temperature prior to initiation of DTS will be approximately the local auxiliary building temperature, significantly lower than the hot leg temperature. Consequently, a temperature increase can be observed when hot water from the RCS hot leg reaches the thermocouple location. The time between initiation of flow and the observed temperature change in conjunction with the known distance from the hot leg to the thermocouple location allows calculation of flow rate. Procedures are in place to perform this monitoring and calculation.

FPC plans to monitor RB emergency sump boron concentration if conditions may exist where boron can concentrate in the core. FPC has an on-line post-accident sampling system (PASS) designed to sample and evaluate various sample streams during an accident, including the RB emergency sump. A PASS subassembly would be used for automated gamma isotopic and boron analyses of RB emergency sump water. Alternatively, samples representative of emergency sump water may be obtained from vent valves located on DHR system piping that is circulating emergency sump water, which addresses failure of the PASS system or plugging of sample piping and associated valves. If sump sampling is not successful, then FPC actions will be based upon excore thermocouple readings and time since initiation of the LOCA. Hence, sump sampling is not necessary to achieve success.

The staff finds that the procedures for initiating DTS operation are acceptable and DTS monitoring may be accomplished by the combination of DHR drop line temperature monitoring and emergency sump boron sampling. The DTS method is acceptable.

The pressurizer will contain steam, with perhaps a small quantity of non-condensable gas, for LOCAs of concern with respect to boron concentration. Operation of APS will be reflected by an increasing pressurizer level as cold APS water condenses steam, a level change that can be readily translated into flow rate. Further, little water will flow into the RCS until sufficient steam is condensed such that pressurizer pressure becomes greater than pressure at the hot leg junction with the pressurizer surge line. Consequently, it will typically be more than an hour before the APS system can provide water to the RV. Pressurizer level monitoring during this time allows assessment of the adequacy of the APS flow rate. Once the pressurizer has filled and APS water is flowing into the RV, the effectiveness can be monitored via RB emergency sump boron concentration monitoring, as discussed above. The APS method is acceptable.

FPC licensing-type calculations established that there is no region of operation where an active means fails to control core boron concentration if both APS and DTS are available. If APS fails, boron dilution is not needed for conditions where pressure is so high that DTS operation is prohibited, and the single failure criterion is satisfied. If DTS fails and RCS pressure is greater than 35 psia, decay heat will be low enough that APS will be effective before core boron concentration becomes of concern. However, if DTS fails and RCS pressure is less than 35 psia, APS will not perform the function for up to 13 hours (21 hours from time of LOCA initiation), depending on the RCS pressure. Consequently, the single failure criterion is not met. Note, however, if realistic calculations are used, APS is predicted to provide sufficient flow to address boron precipitation concerns over the entire accident.

Failure of Motor Control Center (MCC) 3AB will disable both APS and DTS because of inability to open a drop line valve that is located inside the RB and inability to open two valves in the APS line, one of which is located inside the RB. This is an additional condition where the single failure criterion is not satisfied.

3.3 Exemption From the Single Failure Requirement of Appendix K Item I.D.1

By Ref. 16, FPC requested an exemption from the Appendix K, Item I.D.1, single failure requirement for the MCC 3AB condition. The NRC extended the exemption to cover the 13 hours when the APS was ineffective (on a licensing basis). The exemption was issued on October 29, 1998.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATIONS

The amendment changes requirements 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 amendments involve 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 (62 FR 60731). Accordingly, the 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 the amendment.

6.0 CONCLUSIONS

The staff has found that FPC's amendment request meets regulatory requirements with the exception of the MCC 3AB failure and a short time following initiation of certain LOCAs when the APS cannot be credited for licensing purposes. These constitute a failure to meet the single failure requirement of Appendix K, Item I.D.1. The staff additionally found that the failure to meet the single failure criteria has no discernable effect on the likelihood of core damage or upon public health and safety, and it meets the applicable regulatory requirements for granting an exemption. Consequently, an exemption from the single failure requirement of Appendix K, Item I.D.1, was issued on October 29, 1998. With the granting of this exemption, the staff finds that the FPC proposed change to the methodology for boron precipitation prevention (except for crediting hot leg nozzle gaps) meets all applicable regulations and licensing requirements.

Based on the consideration discussed above, the staff finds 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 to Facility Operating License No. DPR-72 is consistent with the health and safety to the public.

Principal Contributors: W. Lyon

Date: November 30, 1998

7.0 REFERENCES

(1) Cowan, John Paul, "License Amendment Request #223, Revision 0, Post LOCA Boron Precipitation Mitigation Plan,", Letter to NRC from Vice President, Nuclear Production, FPC, 3F1097-32, October 31, 1997.

(2) Rencheck, M. W., "Additional Information on License Amendment Request #220 - Revision of Operating License Condition 2.C.(5) (NRC TAC No. M99128)," Letter to NRC from Director, Nuclear Engineering and Projects, FPC, 3F1297-43, December 13, 1997.

(3) Holden, J. J., "Finalized Summary Report for License Amendment Request # 223 - Post-LOCA Boron Precipitation Prevention (NRC TAC Number M99892)," Letter to NRC from Director, Site Nuclear Operations, FPC, 3F0298-12, February 27, 1998.

(4) Grazio, R. E., "Clarification of Post-LOCA Boron Precipitation Prevention - License Amendment Request #223 (NRC TAC Number M99892) - Crystal River Unit 3," Letter to NRC from Director, Nuclear Regulatory Affairs, FPC, 3F0498-17, April 24, 1998.

(5) "Supplement No. 3 to the Safety Evaluation Report by the Office of Nuclear Reactor Regulation in the Matter of FPC, et al., Crystal River Unit No. 3, Docket No. 50-302," NRC, December 30, 1976.

(6) "Licensee Event Report 91-011-00," Letter to NRC from FPC, December 4, 1991.

(7) "Post-LOCA Reactor Vessel Recirculation to Avoid Boron Precipitation," Letter from B&W Owners Group to NRC, OG-1136, February 4, 1993.

(8) Thadani, A. C., "Post-LOCA Reactor Vessel Recirculation to Avoid Boron Precipitation," Letter to B&W Owners Group from NRC, March 9, 1993.

(9) "NRC Integrated Inspection Report 50-302/96-04 Notice of Violation, Letter to FPC from NRC, 3N0696-18, June 17, 1996.

(10) "Crystal River Nuclear Generating Plant Unit 3 - Boron Precipitation Following Design Basis Accident - Request for Information Pursuant to 10 CFR 50.54(f)," Letter to FPC from NRC, 3N0396-17, June 26, 1996.

(11) "Crystal River Unit 3 Integrated Performance Assessment Process (IPAP) Final Assessment Report (NRC Inspection Report No. 50-302/96-201)," Letter to FPC from NRC, 3N0896-12, August 23, 1996.

(12) "NRC Inspection Report No. 50-302/96-19," Letter to FPC from NRC, 3N0197-04, January 7, 1997.

(13) "Notice of Violation and Exercise of Enforcement Discretion (NRC Inspection Report Nos. 50-302/96-12 and 50-302/96-19)," Letter to FPC from NRC, 3N0397-09, March 12, 1997.

(14) "Notice of Violation and Exercise of Enforcement Discretion (NRC Inspection Report Nos. 50-302/96-12 and 50-302/96-19), NRC to FPC letter, 3N0397-09, dated March 12, 1997," Letter to FPC from NRC, April 11, 1997.

(15) "Notice of Violation and Exercise of Enforcement Discretion (NRC Inspection Report Nos. 50-302/96-12 and 50-302/96-19), NRC to FPC letter, 3N0597-13, dated May 16, 1997," Letter to FPC from NRC, 3F0697-12, June 16, 1997.

(16) Cowan, John Paul, "Request for Exemption from 10 CFR Part 50, Appendix K, Section I.D.1 - Crystal River Unit 3 (NRC TAC Number M99892)," Letter to NRC from Vice President, Nuclear Operations, FPC, 3F0698-09, June 4, 1998.

(17) Holden, J. J., "Additional Information Regarding the Post-LOCA Boron Precipitation Prevention Plan for CR-3," Letter to NRC from Director, Site Nuclear Operations, FPC, 3F1297-12, December 4, 1997.

(18) Holden, J. J., "Post LOCA Boron Precipitation Mitigation Plan," Letter to NRC from Director, Site Nuclear Operations, FPC, 3F0997-28, September 12, 1997.

(19) Henshaw, Michael E., "'Post LOCA Boron Concentration Management,' FTI Document No. 51-1266113-00 (Proprietary), March 1997," Letter to J. L. Birmingham, NRC, from Chairman, B&W Owners Group Analysis Committee, OG-1644, March 27, 1997.

(20) Kracek, Morey, and Merwin, "The System, Water-Boron Oxide," American Chemical Society Paper, April 19, 1938.

(21) Raghavan, L., "Crystal River Nuclear Generating Plant Unit 3 - Issuance of License Amendment Re: License Condition 2.C.(5) for Flow Indication (NRC TAC No. M99120)." Letter from Senior Project Manager, Project Directorate II-3, Nuclear Regulatory Commission to Roy A. Anderson, Senior Vice President, Nuclear Operations, FPC, January 27, 1998.