April 20, 1999

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 REGARDING SUBCOOLING MARGIN MONITORING USING SAFETY PARAMETER DISPLAY SYSTEM (TAC NO. MA4147)

Dear Mr. Cowan:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. **174** to Facility Operating License No. DPR-72 for Crystal River Unit 3. This amendment is in response to a Florida Power Company (FPC) request dated October 30, 1998, in which FPC proposed to delete a note regarding the number of required channels for the Degrees of Subcooling function, and to subdivide the Core Exit Temperature (Backup) function into two new functions. In a supplemental letter dated April 7, 1999, FPC requested that the amendment be implemented prior to commencing Cycle 12 operation.

A copy of the related Safety Evaluation is also 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, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosures: 1. Amendment No. **174** to DPR-72
2. Safety Evaluation

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

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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. **174**
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 30, 1998, as supplemented on April 7, 1999, 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

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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, 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. 174 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 its date of issuance and shall be implemented prior to commencing Cycle 12 operation.

FOR THE NUCLEAR REGULATORY COMMISSION

Sheri R. Peterson, Chief, Section 2
Project Directorate II
Division of Project Licensing Management
Office of Nuclear Reactor Regulation

Date of Issuance: April 20, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 174

TO FACILITY OPERATING LICENSE NO. DPR-72

DOCKET NO. 50-302

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contains vertical lines indicating the area of change.

Remove Page	Insert Page
3.3-41	3.3-41
B 3.3-125B	B 3.3-125B
B 3.3-137	B 3.3-137
B 3.3-138	B 3.3-138
B 3.3-138A	B 3.3-138A
B 3.3-138B	B 3.3-138B

Table 3.3.17-1 (page 1 of 1)
Post Accident Monitoring Instrumentation

FUNCTION	REQUIRED CHANNELS	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1
1. Wide Range Neutron Flux	2	E
2. RCS Hot Leg Temperature	2	E
3. RCS Pressure (Wide Range)	2	E
4. Reactor Coolant Inventory	2	F
5. Borated Water Storage Tank Level	2	E
6. High Pressure Injection Flow	2 per injection line	E
7. Containment Sump Water Level (Flood Level)	2	E
8. Containment Pressure (Expected Post-Accident Range)	2	E
9. Containment Pressure (Wide Range)	2	E
10. Containment Isolation Valve Position	2 per penetration(a)(b)	E
11. Containment Area Radiation (High Range)	2	F
12. Containment Hydrogen Concentration	2	E
13. Pressurizer Level	2	E
14. Steam Generator Water Level (Start-up Range)	2 per OTSG	E
15. Steam Generator Water Level (Operating Range)	2 per OTSG	E
16. Steam Generator Pressure	2 per OTSG	E
17. Emergency Feedwater Tank Level	2	E
18a. Core Exit Temperature (Thermocouple)	2 thermocouples per core quadrant	E
18b. Core Exit Temperature (Recorder)	2	E
19. Emergency Feedwater Flow	2 per OTSG	E
20. Low Pressure Injection Flow	2	E
21. Degrees of Subcooling	2	E
22. Emergency Diesel Generator kW Indication	2(c)	E

(a) Only one position indication is required for penetrations with one Control Room indicator.

(b) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(c) One indicator per EDG.

BASES

FUNCTION	CHANNEL A	CHANNEL B
15. Steam Generator Water Level (Operating Range)	**OTSG A:** SP-17-LI1 or SP-17-LIR **OTSG B:** SP-21-LI1 or SP-21-LIR	**OTSG A:** SP-18-LI1 **OTSG B:** SP-22-LI1
16. Steam Generator Pressure	**OTSG A:** MS-106-PI1 or MS-106-PIR **OTSG B:** MS-110-PI1 or MS-110-PIR	**OTSG A:** MS-107-PI1 or MS-107-PIR **OTSG B:** MS-111-PI1 or MS-111-PIR
17. Emergency Feedwater Tank Level	EF-98-LI1	EF-99-LI1
18a. Core Exit Temperature (Thermocouple) — Quadrant WX	IM-5G-TE/IM-6C-TE	IM-7F-TE/IM-2G-TE
Quadrant XY	IM-9E-TE/IM-13G-TE	IM-10C-TE/IM-11G-TE
Quadrant YZ	IM-9H-TE/IM-10O-TE	IM-10M-TE/IM-13L-TE
Quadrant ZW	IM-3L-TE/IM-6O-TE	IM-4N-TE/IM-6L-TE
18b. Core Exit Temperature (Recorder)	RC-171-TR	RC-172-TR
19. Emergency Feedwater Flow	**OTSG A:** EF-26-FI1 **OTSG B:** EF-24-FI1	**OTSG A:** EF-26-FI1 **OTSG B:** EF-24-FI1
20. Low Pressure Injection Flow	DHV-110 Hand/Auto station flow indication (DH-1-FK3-1)	DHV-111 Hand/Auto station flow indication (DH-1-FK4-1)
21. Degrees of Subcooling	EMCO-38	EMCO-39
22. Emergency Diesel Generator kW Indication	EGDG-1A Wattmeter SSF-AH Main control board indicator	EGDG-1B Wattmeter SSF-AX Main control board indicator

NOTES: For Function 18a, each quadrant requires at least 2 OPERABLE detectors, one from each channel. OPERABILITY of only one detector for any quadrant constitutes entry into Condition A of LCO 3.3.17. Any quadrant with no OPERABLE detector constitutes entry into Condition C of LCO 3.3.17. Separate Condition entry is allowed for each quadrant.

(continued)

BASES

LCO (continued)

17. Emergency Feedwater Tank Level

The dedicated emergency feedwater (EFW) tank provides the assured, safety grade water supply for the Emergency Feedwater System. The EFW tank inventory is monitored and displayed by 0 to 38 feet control room level indications. The control room indicators and alarms are considered the primary indication used by the operator. Therefore, the LCO deals specifically with this portion of the instrument string.

The design basis accidents which require emergency feedwater are those in which the main feedwater supply and/or the electrical supply to the vital feedwater auxiliaries has been lost, e.g., a feedwater line break or a loss of offsite power. In the event of such a loss of feedwater, the EFW tank is the initial source of water for the EFW System. As the EFW tank is depleted, manual operator action is necessary to replenish the EFW tank or to realign the suction to the EFW pumps. Since tank level is required by the operator for manual actions following an event, it has been included in this LCO.

18a. Core Exit Temperature (Thermocouple)

The core exit thermocouples (CETs) provide an indication of the reactor coolant temperature as it exits the active region of the core. The CETs provide input to accident monitoring instrumentation over a range of 0 to 2500°F, and include 16 separate temperature measurements from 16 CETs, four from each quadrant. These 16 core exit temperature measurements are continuously recorded in the control room on two separate recorders as described in Function 18b, and provide input to the Safety Parameter Display System (SPDS) for determining subcooling margin as described in Function 21. Since the distribution of OPERABLE CETs is important for assuring a representative indication of temperatures across the core, this LCO deals specifically with this portion of the instrument string.

The CETs are considered the primary indication of the reactor coolant temperature. The CETs are included in this LCO because the operator uses the indication from the CETs to monitor the cooldown of the RCS following a steam generator tube rupture or small break LOCA. Operator actions to maintain a controlled cooldown, such as adjusting OTSG level or pressure, would be prompted by this indication.

(continued)

BASES

LCO (continued)

18b. Core Exit Temperature (Recorder)

The core exit temperature recorders provide an indication of the reactor coolant temperature as it exits the active region of the core over a range of 0 to 2500°F. Input to each recorder is from eight CETs, two from each core quadrant, to provide a representative distribution of temperatures across the core. Since the control room display is the primary indication used by the operator, this LCO deals specifically with this portion of the instrument string.

Core exit temperature is considered the primary indication of the reactor coolant temperature, and is included in this LCO because the operator uses this indication to monitor the cooldown of the RCS following a steam generator tube rupture or small break LOCA. Operator actions to maintain a controlled cooldown, such as adjusting OTSG level or pressure, would be prompted by this indication.

19. Emergency Feedwater Flow

EFW Flow instrumentation is provided to monitor operation of decay heat removal via the OTSGs. The EFW injection flow to each OTSG (2 channels per OTSG, one associated with each EFW injection line) is determined from a differential pressure measurement calibrated to a span of 0 gpm to 1000 gpm. Each differential pressure transmitter provides an input to a control room indicator and the plant computer.

EFW Flow is used by the operator to determine the need to throttle flow during accident or transient conditions to prevent excessive RCS cooldown rates when low decay heat levels are present. EFW Flow is also used by the operator to verify that the EFW System is delivering the correct flow to each OTSG. However, the primary indication of this function is provided by OTSG level.

These instruments are not assumed to provide information required by the operator to take a mitigation action specified in the safety analysis. As such, they are not Type A variables. However, the monitors are deemed risk significant (Category 1) and are included within the LCO based upon this consideration.

(continued)

BASES

LCO (continued)

20. Low Pressure Injection Flow

Low pressure injection flow instrumentation is provided to monitor flow to the RCS following a large break LOCA. It is also used to monitor LPI flow during piggy back operation following a small break LOCA. The low pressure injection flow to the rector (2 channels, one associated with each LPI injection line) is determined from a differential pressure measurement calibrated to a span of 0 gpm to 5000 gpm.

The LPI flow indication is used by the operator to throttle the flow to < 2000 gpm prior to switching the pump suction from the BWST to the RB sump. This assures adequate net positive suction head (NPSH) is maintained to the pump. The indication is also used to verify LPI flow to the reactor as a prerequisite to termination of HPI flow.

Since low pressure injection flow is a Type A variable on which the operator bases manual actions required for event mitigation for which no automatic controls are provided, it has been included in this LCO.

21. Degrees of Subcooling

Two channels of subcooling margin with inputs from RCS hot leg temperature (T_H), core exit temperature, and RCS pressure are provided by the Safety Parameter Display System (SPDS). Multiple core exit temperatures are auctioneered with only the highest temperature being input to the monitor. The T_H inputs to the SPDS subcooling margin monitors operate over a range of 120 to 920°F. The core exit temperature inputs operate over a range of 0 to 2500°F. RCS pressure inputs operate over a wide range of 200 to 2500 psig and low range of 0 to 600 psig.

(continued)

BASES

LCO

21. Degrees of Subcooling (continued)

The subcooling margin monitors are used to verify the existence of, or to take actions to ensure the restoration of subcooling margin. Specifically, a loss of adequate subcooling margin during a LOCA requires the operator to trip the reactor coolant pumps (RCP's), to ensure high or low pressure injection, and raise the steam generator levels to the inadequate subcooling margin level. Since degrees of subcooling is a Type A variable on which the operator bases manual actions required for event mitigation for which no automatic control are provided, it has been included in this LCO.

22. Emergency Diesel Generator, kW Indication

The Emergency Diesel Generator (EDG) provides standby (emergency) electrical power in the case of Loss of Offsite Power (LOOP). EDG kW indication is provided in the control room to monitor the operational status of the EDG.

EDG Power (kW) output indication is a type A variable because EDG kW indication provides the control room operator EDG load management capabilities. EDG load management enables the operator to base manual actions of load start and stop for event mitigation.

(continued)

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 174TO FACILITY OPERATING LICENSE NO. DPR-72

SUBCOOLING MARGIN MONITORING USING SAFETY PARAMETER DISPLAY SYSTEM

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

1.0 INTRODUCTION

In a letter to the U.S. Nuclear Regulatory Commission (NRC) dated October 30, 1998, Florida Power Corporation (FPC), the licensee for Crystal River Unit 3 (CR-3), requested NRC's approval of amendments to its Operating License DPR-72, by incorporating modifications to the Improved Technical Specifications (ITS) for CR-3. The proposed modifications would delete a note regarding the number of required channels for the Degrees of Subcooling function, and would subdivide the Core Exit Temperature (backup) function into two new functions in ITS Table 3.3.17-1, Post-Accident Monitoring Instrumentation. In a letter dated April 7, 1999, FPC requested the amendment be implemented before commencing Cycle 12 operation. This letter did not affect the original no significant hazards consideration determination.

At present, each of the two primary subcooling-margin monitoring channels utilizes a non-safety-related Bailey digital monitor. If one of these two primary channels becomes inoperable, according to the current Note (d) of ITS Table 3.3.17-1, either channel of the Safety Parameter Display System (SPDS) which is monitoring this variable could be used as a backup, so that the Limiting Condition for Operation (LCO) for this function could be met. The proposed modification will remove the Bailey digital monitors and will designate the SPDS channels which are currently used as a backup, as the primary channels for the subcooling-margin monitoring function.

In their submittal, the licensee stated that the proposed ITS changes are the result of design modifications originally described and committed to in previous TS change request dated July 29, 1997, and are scheduled to be implemented during the forthcoming Refueling Outage 11. The licensee further stated that the proposed modifications will significantly improve the reliability and availability of information required by the control room operators following a design basis accident (DBA). The proposed improvements include enhanced trending capabilities for determining the effectiveness of emergency core cooling systems during the mitigation and recovery phases following DBAs.

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2.0 PROPOSED CHANGES

For the current subcooling monitoring function, the licensee's proposed design modification will remove the existing Bailey digital monitors and will separate the current SPDS instrumentation loops into two redundant channels each to be supplied from independent emergency power sources. Each SPDS channel will be designated as the primary channel for the subcooling-margin monitoring function. In the current ITS, SPDS channels serve as a backup to the digital channels for this function. The 16 environmentally qualified core exit temperature thermocouples which provide signals to main control room recorders and to the SPDS will be divided into 2 redundant channels with each containing 8 thermocouples, and with each channel powered from an independent emergency power source. Additional physical restraints will be installed on the components to prevent motion and minimize the probability of damage to instruments during a seismic event. The existing Core Exit Temperature (backup) function will be divided into two new functions. The following proposed ITS changes are a result of the proposed design changes described above.

ITS Table 3.3.17-1, Post-Accident Monitoring Instrumentation

2.11 Function 18, Core Exit Temperature (backup) will be divided into two separate functions.

- Function 18a, Core Exit Temperature (Thermocouple), is added with "2 thermocouples per core quadrant" as the number of required operable channels.
- Function 18b, Core Exit Temperature (Recorder), is added with "2" as the number of required operable channels.

Both functions will reference Condition E from Required Action D.1.

2.2 The number of required channels for Function 21, Degrees of Subcooling, is revised to delete reference to Note (d), and the note is removed from ITS Table 3.3.17-1. Current Note (d) indicates that the two channels of subcooling margin are backed up by either of two indications of subcooling margin based on similar inputs through the SPDS. The note further states that at least one SPDS channel must be available to provide this backup, and that with both SPDS channels INOPERABLE, Condition C is applicable. (Condition C requires restoration of one channel to OPERABLE status within 7 days, or be in MODE 3 within 6 hours and be in MODE 4 within 12 hours.)

2.3 Revise surveillance requirements (SRs), emergency operating procedures (EOPs), Bases and associated ACTION statements to reflect the proposed changes described above in items 1 and 2.

3.0 EVALUATION

For the degree of subcooling function, the current design configuration uses two non-safety related Bailey digital monitors as the two primary channels. In accordance with the ITS Table 3.3.17-1, if either one of the digital monitor channels becomes INOPERABLE, either indication

channel of the SPDS could be used as a backup to satisfy the ITS LCO. Since the proposed change removes the existing digital monitors and makes the SPDS channels the primary instrument channels for the subcooling margin monitoring function, Note (d) is no longer applicable and removal of this Note reflects the proposed design upgrades to the SPDS. Once the SPDS upgrades are implemented, the SPDS will serve as the primary indication for subcooling margin function. Following deletion of Note (d), the number of channels required for Degrees of subcooling function will be "2" to reflect two channels of SPDS being available. In their submittal, the licensee stated that the proposed change will make the number of channels required for this function consistent with other post-accident monitoring (PAM) functions. Also, the other proposed design improvements to the SPDS channels including additional redundancy, and improvement in seismic event sustaining capability will enhance reliability and availability of this function. The staff finds this acceptable.

In their submittal, the licensee stated that upon loss of both SPDS channels, the value of subcooling margin will be provided by manually plotting the current reactor conditions on a graphical plot of pressure and temperature. Thus, manual-plotting will serve as a backup to the SPDS. Operator instructions for this backup effort are contained in the appropriate revised EOPs. The values of pressure and temperature used for the manual plotting will be obtained from Regulatory Guide (RG) 1.97 Type A, Category 1 instrumentation that is seismically qualified. The licensee further noted that this backup process of manually plotting reactor conditions was discussed in a letter to the staff dated October 29, 1997.

The core exit temperature (CET) function using 16 thermocouples provides indication of the reactor coolant temperature as it exits the active region of the core. Although these thermocouples are environmentally qualified, they are not currently segregated into redundant channels. In their submittal, the licensee stated that the NRC staff, in a letter dated December 22, 1997, for Amendment No. 162, approved several changes to the CR-3 ITS including revising the number of required channels for the CET (backup) function and upgrading the classification of the Degrees of Subcooling variable from RG 1.97 Type B, Category 2, to a Type A, Category 1 variable. The proposed change will add a separate CET function and will separate the 16 thermocouples and associated instrumentation loops into two redundant channels with each channel powered from an independent source. This modification will ensure that the CET thermocouples meet the redundancy criterion in RG 1.97 for Type A, Category 1 instrumentation. Revised Functional Unit 18a will require a minimum of two thermocouples in each quadrant (at least one from each channel) to be OPERABLE and will make the number of required channels for this function consistent with the other PAM functions listed on ITS Table 3.3.17-1. The licensee further stated that two thermocouples in each core quadrant per channel will provide the capability to determine the overall distribution of temperatures across the core. This is acceptable to the staff.

Function 18b replaces the three existing, non-redundant, recorders on the main control board with two redundant recorders, one per each channel. Each recorder will be fed from separate and redundant emergency power supplies and will display temperature readings of eight thermocouples (two from each core-quadrant). The licensee stated that the proposed change will ensure that the redundancy criterion in RG 1.97 for Category 1 instrumentation will be met by the recorders. Also, the proposed change will make the number of required ITS channels for this function consistent with that for other PAM functions. This is acceptable to the staff.

The revision to SRs, Action statements, associated Bases and EOPs are consistent with the above described proposed changes to the ITS, and the changes in the power distribution circuits and, therefore, are acceptable to the staff.

4.0 STATE CONSULTATION

Based upon a letter dated March 8, 1991, from Mary E. Clark of the State of Florida, Department of Health and Rehabilitative Services, to Deborah A. Miller, Licensing Assistant, U.S. NRC, the State of Florida does not desire notification of issuance of license amendments.

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 (64 FR 2246). 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 CONCLUSION

Based on its review, the staff concludes that the proposed modification will improve the reliability and availability of the information required by the plant operator to assess the adequacy of core cooling following a DBA, and that the proposed ITS changes reflect design modifications for the subcooling margin monitoring function using the SPDS and core exit temperature indication function using 16 thermocouples which are consistent with the guidelines of RG 1.97 for PAM instrumentation. The staff therefore, finds the ITS changes to be acceptable.

Principal Contributor: S. V. Athavale

Date: April 20, 1999

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