

May 21, 1990

Docket No. 50-302

DISTRIBUTION
See attached sheet

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: NUCLEAR HEAT FLUX
HOT CHANNEL FACTOR (TAC NO. 76412)

The Commission has issued the enclosed Amendment No. 129 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 (TSs) in response to your application dated March 15, 1990.

This amendment increases the fuel manufacturing tolerances as used in the calculation of nuclear heat flux hot channel factor from 1.4% to 2.0%.

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,

Original Signed By

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

Enclosures:

1. Amendment No. 129 to DPR-72
2. Safety Evaluation

cc w/enclosures:
See next page

OFC	: LA:PD22	: PM:PD22	: PM:PD22	: SRXB	: D:PDII-2	: OGC	:
NAME	: Miller	: Gwinder	: HSilver	: RJones	: HBerlow	: Mycen	:
DATE	: 4/20/90	: 4/30/90	: 4/20/90	: 5/2/90	: 5/7/90	: 5/11/90	:

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Document Name: CR/AMENDMENT

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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
SEBRING UTILITIES COMMISSION
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. 129
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 March 15, 1990, 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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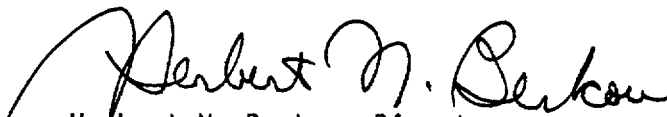
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-72 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 129, 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 within 30 days of issuance.

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: May 21, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 129

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

3/4 2-5
B 3/4 2-2

Insert

3/4 2-5
B 3/4 2-2

3/4.2 POWER DISTRIBUTION LIMITS

BASES

The specifications of this section provide assurance of fuel integrity during Condition I (Normal Operation) and II (Incidents of Moderate Frequency) events by: (a) maintaining the minimum DNBR in the core within the limit during normal operation and during short term transients, (b) maintaining the peak linear power density ≤ 18.0 kw/ft during normal operation, and (c) maintaining the peak power density ≤ 20.5 kw/ft during short term transients. In addition, the above criteria must be met in order to meet the assumptions used for the loss-of-coolant accidents.

The power-imbalance envelope and the insertion limit curves, defined in the CORE OPERATING LIMITS REPORT (COLR), are based on LOCA analyses which have defined the maximum linear heat rate such that the maximum clad temperature will not exceed the Final Acceptance Criteria of 2200°F following a LOCA. Operation outside of the power-imbalance envelope alone does not constitute a situation that would cause the Final Acceptance Criteria to be exceeded should a LOCA occur. The power-imbalance envelope represents the boundary of operation limited by the Final Acceptance Criteria only if the control rods are at the insertion limits, as defined in the COLR, and if the steady state limit QUADRANT POWER TILT exists. Additional conservatism is introduced by application of:

- a. Nuclear uncertainty factors.
- b. Thermal calibration uncertainty.
- c. Fuel densification effects.
- d. Hot rod manufacturing tolerance factors.

The conservative application of the above peaking augmentation factors considers the potential peaking penalty due to fuel rod blow.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original criteria are met.

The definitions of the design limit nuclear power peaking factors as used in these specifications are as follows:

- F_Q Nuclear Heat Flux Hot Channel Factor, is defined as the maximum local fuel rod linear power density divided by the average fuel rod linear power density, assuming nominal fuel pellet and rod dimensions.

POWER DISTRIBUTION LIMITS

BASES

F_N
 ΔH Nuclear Enthalpy Rise Hot Channel Factor, is defined as the ratio of the integral of linear power along the rod on which minimum DNBR occurs to the average rod power.

It has been determined by extensive analysis of possible operating power shapes that the design limits on nuclear power peaking and on minimum DNBR at full power are met, provided:

$$F_Q \leq 3.13; \quad \frac{F_N}{\Delta H} \leq 1.71$$

Power Peaking is not a directly observable quantity and therefore limits have been established on the bases of the AXIAL POWER IMBALANCE produced by the power peaking. It has been determined that the above hot channel factor limits will be met provided the following conditions are maintained.

1. Control rods in a single group move together with no individual rod insertion differing by more than $\pm 6.5\%$ (indicated position) from the group average height.
2. Regulating rod groups are sequenced with overlapping groups as required in Specification 3.1.3.6.
3. The regulating rod insertion limits of Specification 3.1.3.6 and the axial power shaping rod insertion limits of Specification 3.1.3.9 are maintained.
4. AXIAL POWER IMBALANCE limits are maintained. The AXIAL POWER IMBALANCE is a measure of the difference in power between the top and bottom halves of the core. Calculations of core average axial peaking factors for many plants and measurements from operating plants under a variety of operating conditions have been correlated with AXIAL POWER IMBALANCE. The correlation shows that the design power shape is not exceeded if the AXIAL POWER IMBALANCE is maintained within the limits defined in the COLR.

The design limit power peaking factors are the most restrictive calculated at full power for the range from all control rods fully withdrawn to minimum allowable control rod insertion and are the core DNBR design basis. Therefore, for operation at a fraction of RATED THERMAL POWER, the design limits are met. When using incore detectors to make power distribution maps to determine F_Q and F_N :

Δ

- a. The measurement of total peaking factor, F_Q^{Meas} , shall be increased by 2.0 percent to account for manufacturing tolerances and further increased by 7.5 percent to account for measurement error.

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

- a. Prior to initial operation above 75 percent of RATED THERMAL POWER after each fuel loading, and
- b. At least once per 31 Effective Full Power Days.
- c. The provisions of Specification 4.0.4 are not applicable.

4.2.2.2 The measured F_0 of 4.2.2.1 above, shall be increased by 2.0% to account for manufacturing tolerances and further increased by 7.5% to account for measurement uncertainty.

POWER DISTRIBUTION LIMITS

NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR - $F_{\Delta H}^N$

LIMITING CONDITION FOR OPERATION

3.2.3 $F_{\Delta H}^N$ shall be limited by the following relationship:

$$F_{\Delta H}^N < 1.71 [1 + 0.3(1-P)]$$

where $P = \frac{\text{Thermal Power}}{\text{Rated Thermal Power}}$

and $P \leq 1.0$

APPLICABILITY: MODE 1.

ACTION:

With $F_{\Delta H}^N$ exceeding its limit:

- a. Reduce THERMAL POWER at least 1% for each 1% that $F_{\Delta H}^N$ exceeds the limit within 15 minutes and similarly reduce the Nuclear Overpower Trip Setpoint and Nuclear Overpower based on RCS Flow and the AXIAL POWER IMBALANCE Trip Setpoint within 4 hours.
- b. Demonstrate through in-core mapping that $F_{\Delta H}^N$ is within its limit within 24 hours after exceeding the limit or reduce THERMAL POWER to less than 5% of RATED THERMAL POWER within the next 2 hours.
- c. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER above the reduced limit required by a or b, above; subsequent POWER OPERATION may proceed provided that $F_{\Delta H}^N$ is demonstrated through in-core mapping to be within its limit at a nominal 50% of RATED THERMAL POWER prior to exceeding this THERMAL POWER, at a nominal 75% of RATED THERMAL POWER prior to exceeding this THERMAL POWER and within 24 hours after attaining 95% or greater RATED THERMAL POWER.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 129 TO FACILITY OPERATING LICENSE NO. DPR-72

FLORIDA POWER CORPORATION, ET AL.

CRYSTAL RIVER UNIT NO. 3 NUCLEAR GENERATING PLANT

DOCKET NO. 50-302

BACKGROUND

By letter dated March 15, 1990, Florida Power Corporation (FPC or the licensee) requested an amendment to the Technical Specifications (TS) appended to Facility Operating License No. DPR-72 for the Crystal River Unit No. 3 Nuclear Generating Plant (CR-3). The proposed amendment would increase the fuel manufacturing tolerances as used in the calculation of nuclear heat flux hot channel factor from 1.4% to 2.0%.

EVALUATION

Nuclear heat flux hot channel factor (F_Q) is a design limit nuclear power peaking factor. Analyses of the possible power shapes have determined that the design limits on nuclear power peaking at full power are met provided that $F_Q < 3.13$. TS 3.2.2 requires that $F_Q < 3.13$ at full power.

F_Q is most restrictive when calculated at full power. This is true for all possible control rod bank positions. Therefore, if F_Q is within limits at full power, then for operation at a fraction of rated thermal power the design limits must also be met. When using the incore detectors to make the power distribution maps to determine F_Q , the measured peaking factor is increased by a certain percentage in order to account for manufacturing tolerances, and further increased in order to account for measurement error. Currently, TS surveillance section 4.2.2.2 requires that F_Q be increased by 1.4% to account for manufacturing tolerances and further increased by 7.5% to account for measurement uncertainty.

For fuel cycle 8, approximately one third of the fuel in the reactor will be replaced with new fuel purchased from Babcock & Wilcox. During fuel pellet fabrication for the cycle 8 fuel, two fuel pellet lots were found to have combinations of high average enrichment and variability that resulted in one of the U-235 gms/inch measurements being beyond the manufacturing specification limit. A statistical evaluation performed by Babcock & Wilcox indicated that for the worst case fuel lot, the actual manufacturing tolerance should be increased to 1.84%. Therefore, the licensee requested to increase the

tolerance as listed in the TS to 2.0% in order to be conservative and to provide a reasonable bounding value that is not likely to require a change in the future. The proposed change will not increase the F_Q limit, and F_Q shall remain below or equal to 3.13.

The staff has evaluated the licensee's proposed changes and finds that they are acceptable. Furthermore, as the requested increase in the error factor due to manufacturing tolerances would have the effect of reducing the allowable measured nuclear heat flux hot channel factor, the change is conservative.

SUMMARY

Based on our review, the changes proposed in this request are adequate and acceptable.

ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. We have 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. 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.

CONCLUSION

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: May 21, 1990

Principal Contributor:

G. Wunder

DATED: May 21, 1990

AMENDMENT NO. 129 TO FACILITY OPERATING LICENSE NO. DPR-72-CRYSTAL RIVER UNIT 3

Docket File

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PDII-2 Reading

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ACRS (10)

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OC/LFMB

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cc: Plant Service list