

July 15, 1992

Docket No. 50-389

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Mr. J. H. Goldberg  
President - Nuclear Division  
Florida Power and Light Company  
P.O. Box 14000  
Juno Beach, Florida 33408-0420

Dear Mr. Goldberg:

SUBJECT: ST. LUCIE UNIT 2 - ISSUANCE OF AMENDMENT RE: MODERATOR TEMPERATURE COEFFICIENT (TAC NO. M82517)

The Commission has issued the enclosed Amendment No. 56 to Facility Operating License No. NPF-16 for the St. Lucie Plant, Unit No. 2. This amendment consists of changes to the Technical Specifications in response to your application dated December 17, 1991.

This amendment revises Technical Specification Section 3.1.1.4.c, "Moderator Temperature Coefficient" (MTC) by changing the MTC value from -27pcm/°F to -30 pcm/°F.

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 L. Raghavan for)

Jan A. Norris, Senior Project Manager  
Project Directorate II-2  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 56 to NPF-16
2. Safety Evaluation

cc w/enclosures:  
See next page

OFFICE	LA:PDII-2	PM:PDII-2	D:PDII-2	OGC	
NAME	DM	JNorris:ln	HBerkov	M/Thom	
DATE	7/16/92	7/7/92	7/17/92	7/16/92	

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Florida Power and Light Company

St. Lucie Plant

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DATED: July 15, 1992

AMENDMENT NO. 56 TO FACILITY OPERATING LICENSE NO. NPF-16 - ST. LUCIE, UNIT 2

Docket File

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

FLORIDA POWER & LIGHT COMPANY

ORLANDO UTILITIES COMMISSION OF

THE CITY OF ORLANDO, FLORIDA

AND

FLORIDA MUNICIPAL POWER AGENCY

DOCKET NO. 50-389

ST. LUCIE PLANT UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 56  
License No. NPF-16

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Florida Power & Light Company, et al. (the licensee), dated December 17, 1991, 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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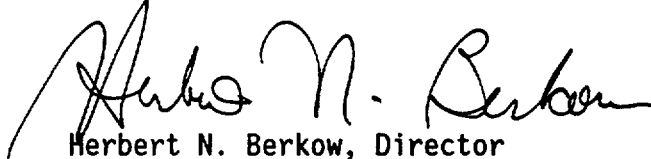
2. Accordingly, Facility Operating License No. NPF-16 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by amending paragraph 2.C.2 to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 56, are hereby incorporated in the license. The licensee 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.

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 15, 1992

ATTACHMENT TO LICENSE AMENDMENT NO. 56  
TO FACILITY OPERATING LICENSE NO. NPF-16  
DOCKET NO. 50-389

Replace the following page of the Appendix "A" Technical Specifications with the enclosed page. The revised page is identified by amendment number and contains vertical lines indicating the areas of change. The corresponding overleaf page is also provided to maintain document completeness.

Remove Page

3/4 1-5

Insert Page

3/4 1-5

## REACTIVITY CONTROL SYSTEMS

### MODERATOR TEMPERATURE COEFFICIENT

#### LIMITING CONDITION FOR OPERATION

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- 3.1.1.4 The moderator temperature coefficient (MTC) shall be:
- Less positive than +5 pcm/°F at  $\leq$  70% RATED THERMAL POWER,
  - Less positive than +3 pcm/°F at  $>$  70% RATED THERMAL POWER, and
  - Less negative than -30 pcm/°F at RATED THERMAL POWER.

APPLICABILITY: MODES 1 and 2\*#

#### ACTION:

With the moderator temperature coefficient outside any one of the above limits, be in at least HOT STANDBY within 6 hours.

#### SURVEILLANCE REQUIREMENTS

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4.1.1.4.1 The MTC shall be determined to be within its limits by confirmatory measurements. MTC measured values shall be extrapolated and/or compensated to permit direct comparison with the above limits.

4.1.1.4.2 The MTC shall be determined at the following frequencies and THERMAL POWER conditions during each fuel cycle:

- Prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading.
- At any THERMAL POWER, within 7 EFPD after reaching a RATED THERMAL POWER equilibrium boron concentration of 800 ppm.
- At any THERMAL POWER, within 7 EFPD after reaching a RATED THERMAL POWER equilibrium boron concentration of 300 ppm.

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\*With  $K_{eff}$  greater than or equal to 1.0.

#See Special Test Exceptions 3.10.2 and 3.10.5.

## REACTIVITY CONTROL SYSTEMS

### MINIMUM TEMPERATURE FOR CRITICALITY

#### LIMITING CONDITION FOR OPERATION

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3.1.1.5 The Reactor Coolant System lowest operating loop temperature ( $T_{avg}$ ) shall be greater than or equal to 515°F.

APPLICABILITY: MODES 1 and 2#.

ACTION:

With a Reactor Coolant System operating loop temperature ( $T_{avg}$ ) less than 515°F, restore  $T_{avg}$  to within its limit within 15 minutes or  $k_{eff}$  in HOT STANDBY within the next 15 minutes.

#### SURVEILLANCE REQUIREMENTS

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4.1.1.5 The Reactor Coolant System temperature ( $T_{avg}$ ) shall be determined to be greater than or equal to 515°F:

- a. Within 15 minutes prior to achieving reactor criticality, and
- b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System  $T_{avg}$  is less than 525°F.

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#With  $K_{eff}$  greater than or equal to 1.0.





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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 56

TO FACILITY OPERATING LICENSE NO. NPF-16

FLORIDA POWER & LIGHT COMPANY, ET AL.

ST. LUCIE PLANT, UNIT NO. 2

DOCKET NO. 50-389

1.0 INTRODUCTION

By letter dated December 17, 1991, Florida Power & Light Company (FPL) submitted a request to amend Facility Operating License NPF-16 for St. Lucie Unit 2. The proposed amendment would revise Technical Specification (TS) Section 3.1.1.4.c., "Moderator Temperature Coefficient" (MTC) by changing the negative limit from  $-27 \text{ pcm}/^{\circ}\text{F}$  to  $-30 \text{ pcm}/^{\circ}\text{F}$ . A pcm is a reactivity of  $10^{-5}$  delta k/k.

This change has been requested because recent comparisons of measured MTC values from the various MTC surveillances to calculated values indicate that the actual end-of-cycle (EOC) MTC is very close to the design values. Therefore, to avoid the possibility of having the measured MTC more negative than the TS limit, and to provide increased plant availability, FPL requested ABB-Combustion Engineering to perform the analyses necessary to justify the proposed change.

2.0 EVALUATION

A more negative MTC primarily impacts cooldown transients such as a decrease in feedwater temperature, increase in feedwater flow, increase in main steam flow, and inadvertent opening of a steam generator safety valve or atmospheric dump valve. During these events, the reduction in core temperature with a negative MTC causes a positive reactivity insertion and an associated increase in core power. Also impacted are reactivity and power distribution anomalies, the limiting event being the control element assembly (CEA) drop and asymmetric steam generator transients, causing a mismatch in heat removal and a subsequent inlet temperature asymmetry across the core.

The most limiting cooldown event with respect to departure-from-nucleate-boiling (DNB) and fuel centerline melt is the increased main steam flow event, which is initiated by a controller failure resulting in an opening of the turbine control valves at hot full power (HFP). Primary protection to prevent

exceeding these limits during this event is provided by the high power level and thermal margin/low pressure (TM/LP) trips. An MTC of  $-30 \text{ pcm}/^{\circ}\text{F}$  was assumed in the analysis which resulted in a high power level trip at 37.4 seconds. The minimum DNB ratio (DNBR) for the event was greater than the design limit of 1.28 and the maximum local linear heat generation rate was less than the design limit of 22 kw/ft. The radiological consequences are bounded by those predicted for the inadvertent opening of a steam generator safety valve or atmospheric dump valve. The site boundary doses for this latter event are not affected by a more negative MTC limit.

The most limiting event in the increased heat removal category is the post trip power excursion from an HFP or hot zero power (HZZP) steam line break. In addition to an effective MTC of  $-30 \text{ pcm}/^{\circ}\text{F}$ , the analysis assumed that on a safety injection actuation signal (SIAS), one high pressure safety injection (HPSI) pump fails to start.

For the HFP event, a low steam generator pressure trip setpoint of 540 psia was assumed for a reactor trip. The time loss of offsite power was assumed to be simultaneous with the time that the main steam isolation signal setpoint is reached at 460 psia. These assumptions result in the coastdown of the main feedwater pumps concurrent with the main feedwater isolation valve closure. The combination of trip time and delayed feedwater isolation results in the maximum cooldown of the reactor coolant system (RCS). A maximum return to power of 9.6% of rated thermal power occurred. The minimum DNBR during the transient did not violate the 1.3 limit using the MacBeth DNB correlation.

For the HZZP case, a low steam generator pressure trip setpoint of 540 psia was also assumed. Loss of offsite power was assumed to occur simultaneously with the steam line break. These assumptions lead to the lowest core flow at the time of return to power and results in a lower calculated DNBR. A maximum return to power of 4.4% of rated thermal power occurred. The minimum DNBR using the MacBeth correlation remained above the 1.3 limit.

A full length inadvertent CEA drop initially causes a power decrease and an ensuing fuel and moderator temperature reduction. With negative fuel (Doppler) and moderator coefficients, this temperature reduction inserts positive reactivity in the core, causing the core to return to its initial power with a lower moderator temperature. The dropped CEA also redistributes the core power, causing higher radial peaks in regions away from where the dropped CEA is located. A more negative MTC ( $-30 \text{ pcm}/^{\circ}\text{F}$ ) returns the core to its initial power at a higher moderator temperature than previously with an MTC of  $-27 \text{ pcm}/^{\circ}\text{F}$ . The event was analyzed parametrically to determine the maximum required overpower margin needed to ensure that DNBR and fuel centerline melt limits are not violated. The results indicated that this event, initiated from the Technical Specification limiting conditions for operation (LCOs), will not exceed the DNBR and centerline to melt design limits.

Asymmetric steam generator transients result from a load or feedwater flow change to one steam generator, causing a mismatch in heat removal by the steam generators and subsequent inlet temperature asymmetry across the core. This temperature asymmetry redistributes the power across the core, possibly causing higher radial peaks and a lower DNBR. The most limiting transient of this type is the inadvertent closure of a single main steam isolation valve. The more negative MTC aggravates the power redistribution across the core, resulting in higher radial peaks and larger margin degradation during the event. This event was reanalyzed with a larger radial peak increase due to the more negative MTC. The results show that the conservatism in the calculation of the required margins for the current reference analysis are sufficient to accommodate the increase in radial peaking accounting for temperature asymmetry. Therefore, the current docketed analysis and its results remain bounding for a negative MTC of  $-30 \text{ pcm}/^{\circ}\text{F}$ .

Therefore, a negative MTC of  $-30 \text{ pcm}/^{\circ}\text{F}$  does not cause a violation of the appropriate fuel design criteria or increase previously calculated site boundary doses.

### 3.0 TECHNICAL FINDING

Based on the above evaluation, the staff concludes that a negative MTC of  $-30 \text{ pcm}/^{\circ}\text{F}$  yields consequences for the design basis events which are within the limits of the acceptance criteria and the proposed change is acceptable.

### 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 4487). 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: L. Kopp

Date: July 15, 1992