



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 14

TO FACILITY OPERATING LICENSE NO. NPF-16

FLORIDA POWER & LIGHT COMPANY, ET AL.

ST. LUCIE PLANT, UNIT NO. 2

DOCKET NO. 50-389

INTRODUCTION

By letter from C. O. Woody to F. J. Miraglia, dated December 30, 1985, and supplemented by letter dated March 17, 1986, Florida Power and Light Company (FPL) submitted a request to amend Appendix A of Facility Operating License NPF-16 for St. Lucie Plant, Unit No. 2. The proposed change to the Technical Specification on moderator temperature coefficient (MTC) would permit an MTC less positive than $+0.3 \times 10^{-4} \Delta k/k/^{\circ}F$ above 70% of rated thermal power. This change affects Technical Specification 3.1.1.4 and is evaluated herein.

EVALUATION

The MTC indicates the change in reactivity due to a uniform change in the moderator temperature, including the effect of moderator density changes with changes in moderator temperature. Typically, an increase in the moderator temperature causes a decrease in the core moderator density and, therefore, less thermalization, which reduces core reactivity. However, when soluble boron is present in the moderator, a reduction in moderator density causes a reduction in the amount of soluble boron in the core, thus producing a positive contribution to the MTC.

The necessity for the proposed Technical Specification change arises from the high reactor coolant system dissolved boron concentrations required to accommodate the longer 18-month St. Lucie operating cycles. These higher concentrations cause the beginning of cycle MTC to become more positive, at times approaching the Technical Specification limits on MTC. The current Technical Specification limit on MTC requires a value less positive than $+0.5 \times 10^{-4} \Delta k/k/^{\circ}F$ at and below 70% power and less positive than 0.0 above 70% power. In order to satisfy the more restrictive limit above 70% power during power ascensions, it has been necessary to hold at the 70% power plateau while xenon builds up. This buildup of xenon adds the negative reactivity necessary to reduce the critical boron concentration that, in turn, reduces the MTC below the Technical Specification positive limit. The requested change to permit an MTC of $+0.3 \times 10^{-4} \Delta k/k/^{\circ}F$ above 70% power would avoid this delay during power ascension.

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A positive MTC has an adverse effect on those transients and accidents that involve an increase in moderator temperature. These heatup events are caused by a decrease in heat removal by the secondary system, a decrease in reactor coolant flow rate, or reactivity and power distribution anomalies. In addition, it may also affect the reactivity insertion as a function of moderator density input to the LOCA evaluation. The licensee has reevaluated the impact of a $+0.3 \times 10^{-4} \Delta k/k/^{\circ}F$ MTC above 70% reactor power on these events. The two non-LOCA transients that were not bounded by previous reference analyses due to the more positive MTC above 70% power were the loss of condenser vacuum and the feedwater line break. These two events were reanalyzed by the licensee assuming an MTC of $+0.3 \times 10^{-4} \Delta k/k/^{\circ}F$ and an increase to 1500 plugged tubes per steam generator. The results indicate that fuel will not fail since the minimum transient DNBR remains above the design limit of 1.28, the peak reactor coolant system pressure does not exceed the upset pressure limit of 2750 psia, and doses remain within their allowable 10 CFR Part 100 limits. In addition, the loss of condenser vacuum event will not result in peak steam generator pressure in excess of its upset pressure limit of 1100 psia. The results of a reanalysis of these limiting transients support a $+0.3 \times 10^{-4} \Delta k/k/^{\circ}F$ MTC limit at greater than 70% reactor power.

In addition to the non-LOCA transients, a reevaluation was made to assess the impact of the increased positive MTC limit on the LOCA analysis. A reactivity insertion versus moderator density curve was calculated that included the additional reactivity insertion due to the change in moderator temperature. This calculated curve remained bounded by the reactivity versus moderator density curve used in the previous reference cycle LOCA calculation. Therefore, the LOCA results are not adversely affected by an increase in the MTC limit to $+0.3 \times 10^{-4} \Delta k/k/^{\circ}F$.

An assessment of the impact of a more positive MTC on those transients and accidents adversely affected by a positive MTC has indicated that those events continue to meet all the appropriate analyses criteria required by the NRC.

Based upon the above evaluation, the proposed change to Technical Specification 3.1.1.4 of the St. Lucie Unit 2 plant increasing the positive MTC limit to $+0.3 \times 10^{-4} \Delta k/k/^{\circ}F$ above 70% reactor power is acceptable.

ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or a change in a surveillance requirement. The 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 published a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. 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.

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 the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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