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SUBJECT: Forwards response to NRC 860903 request for addl info re util 860421 proposal to delete License Condition 2. C. 19 from License NPF-16. Condition requires NRC approval of new analysis addressing potential gas-gap burnup fuel release.

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OCTOBER 07 1986

L-86-400

Office of Nuclear Reactor Regulation
Attention: Mr. Ashok C. Thadani, Director
PWR Project Directorate #8
Division of PWR Licensing-B
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Thadani:

Re: St. Lucie Unit 2
Docket No. 50-389
NPF-16 License Condition 2.C.19

By letter L-86-173, dated April 21, 1986, Florida Power & Light Company (FPL) submitted a proposal and supporting analysis to delete License Condition 2.C.19 from Facility Operating License NPF-16. This License Condition requires FPL to submit and obtain NRC approval of a new analysis that addresses potential gas-gap release for extended burnup fuel.

By letter dated September 3, 1986 (E. G. Tourigny to C. O. Woody), the NRC identified additional information required to continue its review of the proposed License Conditon deletion. The attached responds to the staff's request for additional information.

Please contact us if you have any questions about this submittal.

Very truly yours,

C. O. Woody
Group Vice President
Nuclear Energy

COW/EJW/gp

Attachment

cc: Dr. J. Nelson Grace, Region II, USNRC
Mr. Alan Schubert, Florida Dept. of Health and Rehabilitative Services
Harold F. Reis, Esquire

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ATTACHMENT

QUESTIONS FOR PROPOSED ST. LUCIE UNIT NO. 2
OPERATING LICENSE CONDITION AMENDMENT
DOCKET NO. 50-389, NPF-16 LICENSE CONDITION 2.C.19
TAC NO. 61332

1. How was the peak rod power history in Figure 1 determined? Does the power history bound normal operational transients? What conservatisms have been included to assure that this history is bounding? This is of particular concern because the rod linear powers allowed by the Technical Specifications exceed those in Figure 1.

Response:

The peak rod power history shown on Figure 1 is based on St. Lucie Unit 2 Cycle 3 steady-state kw/ft fuel performance data. These data were generated in a manner to assure that future cycles are bounded, including necessary conservatisms. The fuel temperatures shown on Figure 1 were calculated at the indicated peak steady-state kw/ft values and include the gap conductance degradation due to fission gas release attributable to short-term transient power variations associated with operational transients which take the linear heat rate up to the allowed Technical Specification kw/ft limits. It is important to note that the assemblies of concern for this analysis are those with high burnup (> 38,000 MWD/MTU) and consequently low power generation. As a result, the possibility of achieving the rod linear power allowed by Technical Specifications with these high burnup assemblies is unrealistic and conservative. In addition, since the release fraction and fission product concentration of the controlling isotope is proportional to the kw/ft (and associated fuel temperature), the assemblies with the lower burnup (and hence higher reactivities) are more limiting as far as the fuel handling accidents are concerned. These accidents are more limiting early in life before the initiation of fuel pellet-clad contact.

Any normal operational transients that would impact the rod linear heat rate will preferentially affect fuel below 38 GWD/MTU. This is due to the low reactivity/power associated with the higher burnup fuel. The latter, in conjunction with the conservatisms included in the generation of the fuel rod power history, provides a strong basis of confidence that the power history bounds normal operational transients.

2. Has the ANSI/ANS 5.4 model been incorporated in the FATES3A code and used for the fuel temperature calculations provided in Figures 2 and 3?

Response:

The ANSI/ANS 5.4 model is not incorporated in FATES3A. As stated in paragraph 2 of the safety analysis report, the fuel rod radial temperature distributions shown on Figures 2 and 3 were generated with the NRC approved FATES3A code using bounding fuel rod power histories. These temperature distributions, which are a function of fuel rod burnup and local power level, were then used as an input to the applicable equations found in ANSI/ANS-5.4-1982 to calculate the I-131 release fractions.

3. The approach used in this analysis to calculate an average release for a rod based on the average linear power and one axial node assumes that fission gas release is linear in relation to local power and temperature when in fact it is a very non-linear phenomena. (The use of the factor between assembly to peak rod power in this analysis also assumes linearity.) Fuel performance codes such as FATES3A were developed with the capability to model several axial nodes at different powers and temperatures in order to account for this non-linearity. Please show that this one axial node approach used to calculate fission gas release for a rod is conservative in relation to an analysis with several axial nodes.

Response:

A bounding axial distribution of kw/ft was used. The axial distribution of the peak kw/ft was calculated for each of the burnup ranges. This peak axial kw/ft was then conservatively assumed to extend over the entire length of the fuel in each burnup interval. That is, the decrease in kw/ft near the top and bottom ends of the fuel was not credited in computing the release fraction. This is conservative because:

1. the release fraction decreases as fuel temperatures decrease due to decreasing linear heat rates near the bottom and top of the fuel rods (as shown in Figures 2 and 3), and,

2. the equilibrium limiting isotope concentration also decreases as a function of decreasing kw/ft.