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SUBJECT: FORWARDS RESPONSE TO QUESTIONS RE RELOAD SAFETY EVALUATION.

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FLORIDA POWER & LIGHT COMPANY

May 18, 1979
L-79-125

Office of Nuclear Reactor Regulation
Attention: Mr. R. W. Reid, Director
Operating Reactors Branch #4
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Reid:

Re: St. Lucie Unit #1
Docket No. 50-335
RSE Questions

We recently received several sets of questions from the NRC Staff on the St. Lucie 1, Cycle 3 Reload Safety Evaluation (RSE) which we forwarded to the Division of Operating Reactors on February 22, 1979. In order to facilitate NRC Review and minimize any impact on our restart schedule, we will be submitting responses to your questions as these responses become available. Attached are responses to questions 1.10 and 1.11, 2.1 through 2.9, and 2.19.

Very truly yours,

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/DKJ/cph

Attachment

cc: Mr. James P. O'Reilly, Region II
Harold F. Reis, Esquire

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Question 1.10

For the Seized Rotor event (page 59), please address the radiological consequences of the postulated fuel failure added to the permitted activity in the reactor coolant (TS 3.4.8). This would evaluate the consequences in which the seized rotor event occurred when the coolant activity was near the limit.

Response 1.10

The seized Rotor event analysis for cycle 3 shows a failed fuel percentage less than the 1% postulated in the FSAR analysis. Therefore, the consequences of a seized rotor event for Cycle 3 are no more severe than those for the reference case.

The calculation of the radiological consequences for the Seized Rotor event assumed 1% failed fuel due to the event plus an additional 0.2% failed fuel corresponding to the maximum allowed coolant activity of the technical specifications. Therefore, the radiological consequences of the seized rotor event were evaluated as occurring when the coolant activity was at the maximum limit. The radiological consequences of the Seized Rotor event for Cycle 3 are orders of magnitude lower than the dose acceptance criteria of the Seized Rotor SRP.

Question 1.11

In the response to Question 1.6 you state that the implied peaking factors F_r and F_{xy} are higher than the Tech Spec values by the uncertainty in these factors. If this is the case, then the Safety Analysis value should be greater than the Tech Spec value by this uncertainty. Explain why the Tech Spec and safety Analysis values are equal in your reload application.

Response 1.11

The measurement uncertainties are accounted for in the safety analyses.

The measurement uncertianty factor for F_r is listed in Table 6-1 of the Reload Application (Statistical Component of F_r^N @ 95/95 Confidence Level) along with other calculational factors which are also used in the safety analyses. These factors are not repeated in the tables presented in Section 7.0 of the Reload Application, since these tables only list core parameters and initial conditions for the various transients, consistent with the format used in the Reference Cycle Application and the FSAR. Even though Table 6-1 lists the uncertainty factor on F_r as 1.0513 (CE calculated value), a with the other factors listed in Table 6.1.

As indicated in Table 7.2, the initial peak linear heat rate assumed for NON-LOCA safety analyses is 16 KW/FT. The peak linear heat rate for LOCA is 14.8 KW/FT (Chapter 8, page 67). In order to account for the uncertainties on F_q, the en-core monitoring band Technical Specification on ASI has been on the LOCA peak linear heat rate limit of 14.8 KW/FT and also incorporates the 7% uncertainty on F_q as described in Section 9.1 of CENPD-199. When montoring on In-core Instrumentation, the F_q uncertainties are applied as indicated in Section 4.2.1.4 of the Technical Specifications. Because the initial peak linear heat rate used in the safety analyses is higher and therefore more deleterious than allowed per Tech Spec by at least the uncertainty factor, the uncertainties on F_q are accounted for in the safety analyses.

Question 2.1

(Application Page 9) What are "Guide Posts"?

Response 2.1

"Guide Posts" are the posts attached to the upper end fitting that are directly above the guide tubes, through which the CEA fingers or incore instrumentation pass into the guide tubes. See Figure 4.2-4 of the St. Lucie 1 FSAR for a drawing including upper end fitting posts.

Question 2.2

(Application Page 9) Are you using 14x14 fuel, 16x16 fuel or a mixture?

Response 2.2

Only 14x14 fuel is used in the St. Lucie Unit 1 core.

Page 9, Section 4.6 of the application describes a single Inconel clad tube of the size used for CEA cladding for either CE 16x16 or 14x14 fuel assemblies to be irradiated in the center guide tube of selected assemblies as a part of an Inconel 625 irradiation experiment. Due to delays in preparing the test, the Inconel irradiation experiment described in section 4.6 of the application will not be performed during Cycle 3.

Question 2.3

Do you have any reduced CEA guide tube flow hole assemblies?

Response 2.3

No. There are no reduced CEA guide tube flow hole assemblies in the St. Lucie core.

Question 2.4

On what date was Cycle 2 shutdown?

Response 2.4

Cycle 2 of St. Lucie Unit 1 was shutdown on April 1, 1979

Question 2.5

What was cycle 2 burnup?

Response 2.5

The cycle 2 burnup was 6452.55 EFPH (8385 MWD/MT).

Question 2.6

(Application Page 16) In cycle 2 the BOC HFP boron was 650 ppm. In cycle 3 it is 850 ppm. What is the reason for this big change?

Response 2.6

The BOC HFP boron concentration was increased for cycle 3 at BOC since there is more positive reactivity than at BOC for cycle 2. There is more positive reactivity since cycle 3 is designed to be a longer cycle than cycle 2 and therefore has more Kg of fresh U235 at BOC than did cycle 2. Cycle 3 is designed for burnup in the range of 9700 - 10,100 MWD/MT. Cycle 2 was designed for burnup in the range of 8000 - 8600 MWD/MT. Secondly, there is additional positive reactivity at BOC Cycle 3 since cycle 2 was shutdown at 8385 MWD/MT, short of the 8600 MWD/MT burnup the cycle was capable of achieving. Finally, the less reactive burable poison rods also contributed slightly to the additional positive reactivity at BOC cycle 3.

Question 2.7

(Application Page 10) It is here stated "the burnup capacity for full power operation is expected to be between 9700 MWD/MTU and 10,100 MWD/MTU". What does full power operation have to do with expected burnup?

Response 2.7

The achievable burnup does depend on the operating power level and core average temperature. Additional reactivity contributions from Doppler and moderator effects and from reduced xenon concentration occur for lower fuel and moderator temperatures and lower power levels, thus allowing burnup to be increased. The "burnup capacity for full power operation" of 9700-10,100 MWD/MTU means that this is the maximum predictable burnup achievable for operation at 100% power and the full power core inlet temperature.

Question 2.8

(Application Page 33) Why do you say 16 KW/FT for DBE's other than LOCA? Doesn't 16 KW/FT apply to LOCA as well?

Response 2.8

16 KW/FT does not apply to LOCA. As described in Chapter 8 of the application (page 67), the peak linear heat rate for LOCA is 14.8 KW/FT. The non-LOCA DBE's demonstrate acceptable performance at a peak linear heat rate of 16 KW/FT. However, due to its lower limit, LOCA determines the limiting condition of operation (LCO) with respect to KW/FT.

Question 2.9

Do you still have an RTD time constant of 8 seconds?

Response 2.9

Yes. The RTD time constant used for analysis purposes is 8.0 seconds as stated in Table 7.1-1 on page 36 of the applications. Actual response times determined by full power loop current steps response techniques were forwarded to the NRC on May 1, 1979 (L-79-107).

Question 2.19

In some other CE plants Shim Pin Perforations have been a problem. This problem appears not to have been addressed for St. Lucie 1. Has this been a problem, and if so, what is the present status on the problem?

Response 2.19

Hydriding of the burnable poison rod cladding occurred during Cycle 1 operation of the St. Lucie Unit 1 core. As reported and documented on page 2 of the Cycle 2 Reload Safety Evaluation, all burnable poison rods were replaced during Cycle 1. The cause of the hydriding was traced to a moisture content in excess of the maximum specified in the production of a batch of poison pellets installed in the poison rods at several CE plants. A topical report (CEN-38 (F)-P) submitted by CE to the NRC on October 20, 1976, addresses the St. Lucie poison rod hydriding problem.

As part of routine surveillance inspections performed during each refueling outage, fuel assemblies are visually inspected. No poison rod defects, other than those encountered in Cycle 1, have been observed, and no further defects of this type are expected to occur. The latest inspection report is to be issued shortly.