

APR 19 1973

Docket No. 50-261

Carolina Power & Light Company
ATTN: Mr. E. E. Utley, Vice President
Bulk Power Supply Department
336 Fayetteville Street
Raleigh, North Carolina 27602

Change No. 17
License No. DPR-23

Gentlemen:

By letter dated January 5, 1973, you submitted an application for a change to the Technical Specifications appended to License No. DPR-23, as amended, for Unit No. 2 at the H. B. Robinson Steam Electric Plant. The proposed change would authorize the use of test assemblies in the reactor core provided that the enrichment of the test assemblies does not exceed 3.5 weight percent of Uranium 235.

During our review of your application, we informed your staff that certain changes to your proposal were necessary to meet our regulatory requirements. These changes have been made, and we have designated our action as Change No. 17. We conclude that Change No. 17 does not present significant hazards considerations not described or implicit in the Safety Analysis Report and that there is reasonable assurance that the health and safety of the public will not be endangered.

Pursuant to 10 CFR Part 50, Section 50.59, the Technical Specifications appended to License No. DPR-23 are changed as shown in Attachment A.

Sincerely,

151

Donald J. Skovholt
Assistant Director for
Operating Reactors
Directorate of Licensing

Enclosures:

1. Attachment A - Change No. 17
to the Technical Specifications
2. Safety Evaluation for Change No. 17

cp: see next page

APR 19 1973

cc w/enclosures:

George F. Trowbridge, Esquire
 Shaw, Pittman, Potts, Trowbridge
 & Madden
 910 - 17th Street, N. W.
 Washington, D. C. 20006

DISTRIBUTION

Docket File
 AEC PDR
 Local PDR
 RP Reading File
 Branch Reading File
 J. R. Buchanan, ORNL
 T. W. Laughlin, DTIE
 EPA (3)
 R. DeYoung, L:PWR
 D. J. Skovholt, L:OR
 R. L. Tedesco, L:CS
 ACRS (16)
 RO (3)
 OGC
 R. J. Schemel, L:OR-1
 T. J. Carter, L:OR
 R. W. Woodruff, L:OR-1 (2)
 N. Dube, L:OPS
 M. Jinks, DRA (4)
 S. A. Teets, L:OR-1
 T. Novak
 V. Stello

OFFICE ▶	L:OR-1 x-7434 <i>RW</i>	L:OR-1	L:OR-1 <i>RJS</i>	L:RS <i>emr</i>	L:RS <i>VStello</i>	L:OR <i>DJS</i>
SURNAME ▶	RWoodruff:dc	SATeets	RJSchemel	TNovak	VStello	DJSkovholt
DATE ▶	4/17/73	4/18/73	4/18/73	4/18/73	4/19/73	4/19/73

ATTACHMENT A

CHANGE NO. 17 TO THE TECHNICAL SPECIFICATIONS

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-261

1. To Specification 5.3.1.3, add the following:

"Four test assemblies may be loaded in the peripheral region⁽⁸⁾ of the core. The test assemblies and the fuel rods in each assembly must conform to the descriptions given in Reference 9. The test rods must be replaced with rods containing standard fuel before starting operation for Cycle 3."

2. On page 5.3-2, add the following:

"(8) FSAR - Figure 3.2.3-3, Amendment 2

(9) 'Description and Evaluation of Test Assemblies Containing Gadolinia Bearing Fuel Rods' submitted with letter dated January 5, 1973, from CP&L to the Director of Licensing."

OFFICE ▶						
SURNAME ▶						
DATE ▶						

APR 19 1973

Files (Robinson-2, Docket No. 50-261)
THRU: R. J. Schemel, Chief, ORB #1, L

Original signed by
Robert J. Schemel

SAFETY EVALUATION FOR TECHNICAL SPECIFICATION CHANGE NO. 17
RE FUEL RODS CONTAINING GADOLINIA

By letter dated January 5, 1973, Carolina Power & Light Company requested authority to install, in the reactor core, test fuel assemblies containing test fuel rods which do not affect safety considerations and which contain no more than 3.5 w/o U-235. The test assemblies are similar to standard assemblies except that some of the fuel rods are replaceable. CP&L's application does not speak to test fuel rods generally, but rather to specific fuel rods. Therefore, Change No. 17 addresses only the test assemblies and the test fuel rods described in the application.

The safety analysis submitted in CP&L's application pertains to irradiation in Region 4 of 48 test fuel rods containing mixed $UO_2-Gd_2O_3$ pellets. All the pellets are enriched to 2.27 w/o U-235; whereas, Technical Specification 5.3.1.3 permits reload fuel to be enriched to 3.5 w/o U-235. Pellets in 24 of the test fuel rods also contain 3.0 w/o Gd and in the remaining 24 rods contain 1.85 w/o Gd. The pertinent safety considerations for the test fuel rods are fuel melting and clad damage.

Adding Gd_2O_3 to UO_2 lowers the thermal conductivity of the fuel. For the test fuel, k/kF is 20% less than it is for standard fuel; thus, the radial temperature gradient for test fuel rods will be 20% greater than for standard fuel rods when both are producing the same amount of power. The test fuel rods are designed such that the power produced in them will not exceed 80% of the power produced in standard fuel rods. Therefore, for the same location in the core, test fuel rods and standard fuel rods may operate at the same temperature.

The melting point of UO_2 is decreased by the addition of Gd_2O_3 . For test fuel containing 3 w/o Gd, the melting point is 4530°F; whereas, the melting point for standard fuel is 5050°F. For unrestricted placement of test fuel in the core, the margin to fuel melting could be reduced. CP&L plans to load the test fuel rods in the peripheral region of the core for irradiation during the next fuel cycle (Cycle 2). Because the flux is low in the peripheral region, the power produced in the test fuel rods will be low as compared to the standard fuel rod producing maximum power. At the beginning of Cycle 2, the maximum power produced in test rods will be about 3 kW/ft; whereas, the maximum in standard rods⁽¹⁾

1
FSAR, Table 3.2.2-1

OFFICE ▶

SURNAME ▶

DATE ▶

permitted under Technical Specification 3.10.2.1 is 15.7 kW/ft. At the end of Cycle 2, the maximum power in test fuel will have increased to about 8 kW/ft because of burnup of Gd. These values of power for the test fuel rods provide acceptable margin to fuel melting.

CP&L has not discussed the operation of test fuel rods in regions of the core other than the peripheral region or in fuel cycles other than Cycle 2. Therefore, Change No. 17 limits irradiation of the test fuel rods to the peripheral region for Cycle 2.

The application includes discussion of the results of hazards analyses and the conclusion that the DNB ratio for any previously analyzed accident will not be below 1.3. Because of the low specific power generation in the test fuel rods, we are assured that the conclusion is sound.

The products of irradiation of gadolinium are terbium and dysprosium. CP&L does not discuss the affect of these elements on the thermal conductivity and melting point of fuel. However, UO₂-Gd₂O₃ fuel has been used in other reactors. Examination of UO₂-Gd₂O₃ fuel after irradiation to 6200 MWD/T has disclosed no adverse effects. Nevertheless, if all the test fuel rods were to fail, the fraction of fuel rods in the core which are failed would be increased by 0.15%; whereas, the Chemical and Volume Control System was analyzed⁽²⁾ for failure of 1.0% of the fuel.

We conclude that Change No. 17 does not present significant hazards considerations not described or implicit in the Safety Analysis Report and that there is reasonable assurance that the health and safety of the public will not be endangered.

151

R. W. Woodruff
Operating Reactors Branch #1
Directorate of Licensing

²FSAR, p. 9.2-9

OFFICE ▶						
SURNAME ▶						
DATE ▶						