

April 7, 1988

Docket No. 50-400

DISTRIBUTION  
See attached list

Mr. E. E. Utley  
Senior Executive Vice President  
Power Supply and Engineering & Construction  
Carolina Power & Light Company  
Post Office Box 1551  
Raleigh, North Carolina 27602

Dear Mr. Utley:

SUBJECT: ISSUANCE OF AMENDMENT NO. 5 TO FACILITY OPERATING LICENSE  
NO. NPF-63 - SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1,  
REGARDING STORAGE AND HANDLING OF FUEL ELEMENTS (TAC NO. 65447)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 5 to Facility Operating License No. NPF-63 for the Shearon Harris Nuclear Power Plant, Unit 1. This amendment consists of changes to the Technical Specifications in response to your request dated May 26, 1987, as supplemented by letter dated November 2, 1987.

The amendment modifies Specification 5.3 of the Technical Specifications to allow only storage and handling of fuel elements having a maximum fuel enrichment of 4.2 weight percent uranium-235.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's regular Bi-weekly Federal Register notice.

Sincerely,

*151*

Bart C. Buckley, Senior Project Manager  
Project Directorate II-1  
Division of Reactor Projects I/II

Enclosures:

1. Amendment No. 5 to NPF-63
2. Safety Evaluation

cc w/enclosures:  
See next page

LA:PD21:DRPR  
PAnderson  
*3/23/88*

*BCB*  
PM:PD21:DRPR  
BBuckley  
*3/30/88*  
*4/6/88*

D:PD21:DRPR  
EAdensam  
*4/7/87*

BB0407  
05000400  
PDR

Mr. E. E. Utley  
Carolina Power & Light Company

cc:

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Radiation Protection Section  
Division of Facility Services  
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AMENDMENT NO. 5 TO FACILITY OPERATING LICENSE NO. NPF-63 - HARRIS, UNIT 1

DISTRIBUTION:

Docket No. 50-400

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

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-400

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 5  
License No. NPF-63

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Carolina Power & Light Company, et al. (the licensee), dated May 26, 1987, as supplemented November 2, 1987, 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.
2. Accordingly, the license is amended by changes to the Technical Specifications, as indicated in the attachment to this license amendment; and paragraph 2.C.(2) of Facility Operating License No. NPF-63 is hereby amended to read as follows:

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PDR ADOCK 05000400  
P PDR

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, as revised through Amendment No. 5, are hereby incorporated into this license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

151

Elinor G. Adensam, Director  
Project Directorate II-1  
Division of Reactor Projects I/II

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: April 7, 1988

*OK with  
Changes to  
license  
4/6/88*

*BCB*

LA:PD21:DRPR  
PAnderson/  
3/23/88

PM:PD21DRPR  
BBuckley  
3/30/88

OGC  
3/ /88

D:PD21:DRPR  
EAdensam  
4/1/88

ATTACHMENT TO LICENSE AMENDMENT NO. 5

FACILITY OPERATING LICENSE NO. NPF-63

DOCKET NO. 50-400

Replace the following page of the Appendix A Technical Specifications with the enclosed page. The revised area is indicated by a marginal line.

Remove Pages

5-6

Insert Pages

5-6

## DESIGN FEATURES

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### DESIGN PRESSURE AND TEMPERATURE

5.2.2 The containment building is designed and shall be maintained for a maximum internal pressure of 45.0 psig and a peak air temperature of 380°F.

### 5.3 REACTOR CORE

#### FUEL ASSEMBLIES

5.3.1 The core shall contain 157 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy-4. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.5 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.2 weight percent U-235.

#### CONTROL ROD ASSEMBLIES

5.3.2 The core shall contain 52 shutdown and control rod assemblies. The shutdown and rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80% silver, 15% indium, and 5% cadmium, or 95% hafnium with the remainder zirconium. All control rods shall be clad with stainless steel tubing.

### 5.4 REACTOR COOLANT SYSTEM

#### DESIGN PRESSURE AND TEMPERATURE

5.4.1 The Reactor Coolant System is designed and shall be maintained:

- a. In accordance with the Code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,
- b. For a pressure of 2485 psig, and
- c. For a temperature of 650°F, except for the pressurizer which is 680°F.

#### VOLUME

5.4.2 The total water and steam volume of the Reactor Coolant System is 9410± 100 cubic feet at a nominal  $T_{avg}$  of 588.8°F.

### 5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological station shall be located as shown on Figure 5.1-1.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 5 TO FACILITY OPERATING LICENSE NO. NPF-63  
CAROLINA POWER & LIGHT COMPANY  
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1  
DOCKET NO. 50-400

## 1.0 INTRODUCTION

By letter dated May 26, 1987, as supplemented by letter dated November 2, 1987, the Carolina Power & Light Company (the licensee) requested a change to the Shearon Harris, Unit 1, Technical Specifications (TS) (Appendix A to Facility Operating License NPF-63). The proposed change would modify Specification 5.3 of the TS to allow only storage and handling of fuel elements having a maximum fuel enrichment of 4.2 weight percent (w/o) U-235. The current TS restrict the maximum fuel enrichment to 3.9 w/o U-235. The licensee's submittal of May 26, 1987, includes a Westinghouse report, "Criticality Analysis of Shearon Harris Fuel Racks," January 1987, which supports the requested amendment. Plant operation using the higher enriched fuel will be demonstrated to be acceptable by a cycle specific reload safety evaluation performed prior to each fuel loading. The criticality analysis and the environmental considerations associated with this amendment are delineated below.

## 2.0 EVALUATION

The Shearon Harris spent fuel storage racks consist of square stainless steel cans having an inside dimension of 8.75 inches and a 0.75 inch wall thickness. On the outer surface of each side of the cans, Boraflex sheets having a minimum area density of 0.02 grams per square centimeter of Boron-10 (B-10) are held in place by a thin-walled stainless steel wrapper plate. The rack structure maintains these cans on a 10.5 inch center-to-center spacing. The spent fuel is normally stored in pool water containing about 2000 ppm of soluble boron which results in about a 30% reduction in reactivity. However, for conservatism the spent fuel racks are calculated assuming no soluble boron in the water.

The KENO-IV Monte Carlo computer code was used to calculate the reactivity of the fuel storage array. Neutron cross section data from the CSRL-V 227 group library was generated for input to KENO-IV using the NITAWL and XSDRNPM codes. These models have been benchmarked against experimental data and have been found to adequately reproduce the critical values.

The spent fuel pool criticality calculations were based on no burnable poison or control rods in the fuel assemblies, unirradiated fuel with 4.2 w/o U-235, and, as previously mentioned, no soluble boron in the water. In addition, a worst case calculation was made to ensure that the maximum  $k_{eff}$  for fuel



assemblies in the spent fuel racks will be less than the NRC acceptance criterion of 0.95. For this calculation, the most adverse combination of dimensional tolerances was assumed, as well as pure water moderator, at a temperature of 68° F and a density of 1.0 grams per cubic centimeter and the minimum poison loading of 0.02 grams B-10 per square centimeter in the Boraflex. The resulting  $k_{eff}$  is 0.9448, including uncertainties at a 95/95 probability/confidence level, thus meeting the NRC acceptance criterion for criticality.

It is possible to postulate events which could lead to an increase in storage rack reactivity, such as misplaced fuel assemblies. However, for such events, credit may be taken for the approximately 2000 ppm of boron in the spent pool water by application of the double contingency principle of ANSI N16.1-1975. This states that one is not required to assume two unlikely, independent, concurrent events to provide for protection against a criticality accident. The reduction in  $k_{eff}$  caused by the borated water more than offsets the reactivity addition caused by credible accidents.

Based on the above evaluation, the staff concludes that the spent fuel storage racks at the Shearon Harris Nuclear Power Plant can accommodate Westinghouse 17x17 standard or optimized fuel assemblies of up to 4.2 w/o U-235 enrichment in every storage cell and maintain  $k_{eff}$  less than or equal to 0.95.

### 3.0 ENVIRONMENTAL CONSIDERATIONS

This amendment involves a change in the storage of facility components located within the restricted areas as defined in 10 CFR Part 20. The staff has determined that this 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.

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 the amendment.

### 4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (52 FR 47779) on December 16, 1987. The Commission consulted with the State of North Carolina. No public comments or requests for hearing were received, and the State of North Carolina did not have any comments.

The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulation, and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: E. Branagan  
L. Kopp  
G. Staley  
B. Buckley

Dated: APR 07 1988