October 22, 1991

Docket No. 50-395

DISTRIBUTION
See attached page

Mr. John L. Skolds
Vice President, Nuclear Operations
South Carolina Electric & Gas Company
Virgil C. Summer Nuclear Station
P.O. Box 88
Jenkinsville, South Carolina 29065

Dear Mr. Skolds:

SUBJECT: ISSUANCE OF AMENDMENT NO. 105 TO FACILITY OPERATING LICENSE NO. NPF-12 REGARDING VANTAGE PLUS FUEL RELOAD - VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1 TAC NO. M79121)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 105 to Facility Operating License No. NPF-12 for the Virgil C. Summer Nuclear Station, Unit No. 1 (VCSNS). The amendment consists of changes to the Technical Specifications in response to your application dated November 16, 1990.

The amendment changes the Technical Specifications to allow Zirlo clad fuel assemblies and Zirlo filler rods to be installed in the VCSNS core.

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

Sincerely,

Orignal signed by:

George F. Wunder, Project Manager
Project Directorate II-1
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 105 to NPF-12
2. Safety Evaluation

cc w/enclosures:
See next page

OFC	LA:PD21:DRPE	PM:PD21:DRPE	OGC	D:PD21:DRPE			
NAME	PAnderson:	GWunder:	MYoung	EAdensam			
DATE	10/7/91	10/17/91	10/16/91	10/21/91			

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Document Name: SUMMER AMENDMENT 79121

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Mr. John L. Skolds
South Carolina Electric & Gas Company

Virgil C. Summer Nuclear Station

cc:

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Nuclear Coordinator
S.C. Public Service Authority
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

DOCKET NO. 50-395

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 105
License No. NPF-12

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by South Carolina Electric & Gas Company (the licensee), dated November 16, 1990, 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-12 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 105 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. South Carolina Electric & Gas Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Elinor G. Adensam

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

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 22, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 105

TO FACILITY OPERATING LICENSE NO. NPF-12

DOCKET NO. 50-395

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are indicated by marginal lines.

Remove Pages	Insert Pages
5 - 6	5 - 6

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 157 fuel assemblies with each fuel assembly normally containing 264 fuel rods with Zircaloy-4 or ZIRLO alloy cladding, except that limited substitution of fuel rods by filler rods consisting of Zircaloy-4, ZIRLO alloy, stainless steel, or by vacancies, may be made if justified by a cycle specific reload analysis. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.2 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.25 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 48 full length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. 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 9407 ± 100 cubic feet at a nominal T_{avg} of 586.8°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower 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. 105 TO FACILITY OPERATING LICENSE NO. NPF-12

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-395

1.0 INTRODUCTION

By a letter dated November 16, 1990, South Carolina Electric & Gas Company (SCE&G or the licensee) submitted a request for Technical Specification changes regarding a VANTAGE+ fuel reload for the V. C. Summer Nuclear Station, Unit 1 (Summer Station), Cycle 7 core. The VANTAGE+ fuel design is described in the Topical Report WCAP-12610, which was approved by the staff by letters dated July 1, and October 9, 1991. VANTAGE+ fuel design involves a new cladding material called Zirlo. Although Zirlo's material properties are similar to Zircaloy-4 material properties, the staff has limited the approval of the VANTAGE+ fuel applications for up to 60,000 MWd/MTU rod average burnup due to the lack of data beyond this range. The Technical Specification changes involve the use of VANTAGE+ fuel and Zirlo filler rods.

The Summer Station Cycle 7 core will have about 50-60 percent VANTAGE 5 and 40-50 percent VANTAGE+ fuel assemblies. The VANTAGE+ fuel includes the following features: Zirlo clad fuel rods and guide thimbles, reconstitutable top nozzle, intermediate flow mixing grids, axial blankets, integral fuel burnable absorbers. The VANTAGE+ core has been designed to have the same operating limits as the VANTAGE 5 core.

2.0 EVALUATION

(1) Mechanical Design

As indicated earlier, the VANTAGE+ fuel mechanical design is approved for licensing applications in the Topical Report WCAP-12610 up to a rod average burnup of 60,000 MWd/MTU. The VANTAGE+ fuel is designed to be mechanically compatible with VANTAGE 5 fuel, i.e., VANTAGE+ and VANTAGE 5 are, for all practical purposes, mechanically identical except for different clad material. Thus, from the fuel performance standpoint, the VANTAGE+ fuel is

essentially no different from the VANTAGE 5 fuel, and there are no mixed core concerns for Cycle 7. We therefore conclude that the VANTAGE+ fuel is acceptable for the Summer Station Cycle 7 reload from a mechanical design standpoint.

(2) Nuclear Design

The two features in VANTAGE+ fuel not present in VANTAGE 5 fuel that affect the nuclear design are: (1) use of the Zirlo alloy for fuel rods and guide thimbles, and (2) use of annular axial blanket pellets. The VANTAGE+ fuel has a slight neutronic difference from the VANTAGE 5 fuel nuclear design due to the presence of niobium in the Zirlo material, but this difference is insignificant. The use of annular axial blanket pellets is an optional design feature for Summer Station, and the effect on neutronics is also very minimal. We thus conclude that the VANTAGE+ fuel nuclear design is acceptable for the Summer Station Cycle 7 reload because the VANTAGE+ fuel nuclear design does not differ from the NRC-approved VANTAGE 5 fuel nuclear design in any significant manner.

(3) Thermohydraulic Design

The thermal and hydraulic analyses to support the VANTAGE+ fuel reload are identical to the currently-approved analyses of VANTAGE 5 fuel since all pertinent parameters and characteristics are identical to each other. We thus conclude that the VANTAGE+ fuel thermohydraulic design is acceptable for the Summer Station Cycle 7 reload.

(4) Non-Loss-of-Coolant Accident (LOCA) Safety Analysis

Based on the licensing basis accident analyses, the licensee determined that there are only two non-LOCA accidents affected by the use of Zirlo material: (1) locked rotor accident, and (2) a rod cluster control assembly (RCCA) ejection accident. According to the NRC-approved Topical Report WCAP-12610, the reanalysis showed that the use of the Zirlo alloy results in only a minor increase in the peak clad temperature compared to the Zircaloy-4 clad peak temperature. Since the resultant peak clad temperature increase is minor enough to be considered insignificant, the staff has concluded that the results of approved Zircaloy-4 clad analysis are applicable to the Zirlo clad for locked rotor accident. As for the RCCA ejection accident, the reanalysis showed that the use of Zirlo alloy results in a small reduction in fuel melting fraction and fuel-stored energy when compared to the Zircaloy-4 clad results which is not significant. Thus the peak RCS pressure is unaffected by the use of Zirlo alloy fuel clad. Based on the NRC-approved Topical Report WCAP-12610, therefore, we conclude that the licensee has adequately addressed the concern of non-LOCA accident analysis including locked rotor and RCCA ejection for the Summer Station Cycle 7 reload.

(5) LOCA Safety Analysis

The LOCA analysis was described in Appendices F and G of WCAP-12610. These Appendices were approved by the NRC staff in a Safety Evaluation (SE) dated October 9, 1991. The SE concluded that each licensee referencing Topical Report WCAP-12610, Appendices F and G, should apply for an exemption from the requirements of 10 CFR 50.46, and 50.44, to allow their application to Zirlo fuel. In the case of Summer Station, the Commission, on its own initative, has prepared such an exemption. This exemption will be issued along with the proposed amendment. The Safety Evaluation also concluded that the use of Baker-Just correlation to calculate metal-water reaction is conservative for Zirlo material. Thus, the SE found that the application of 10 CFR 50.44, 50.46 and Appendix K is appropriate for the Zirlo material and that the LOCA Safety Analysis as described in Appendices F and G of WCAP-12610 shows that Zirlo clad fuel is acceptable for the Summer Station Cycle 7 reload.

(6) Technical Specification Changes

Section 5.3, Reactor Core, Fuel Assemblies Section, was revised to incorporate the Zirlo alloys in addition to Zircaloy-4. As discussed in the evaluation, we have approved Topical Report WCAP-12610, therefore, this change is acceptable.

4.0 SUMMARY

We have reviewed the licensee submittal of VANTAGE+ fuel design and Technical Specification changes for the Summer Station Cycle 7 reload. Based on the NRC-approved Topical Report WCAP-12610 and the plant-specific analyses, we approve the use of VANTAGE+ fuel design and Technical Specification changes for Summer Station Cycle 7.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the appropriate South Carolina State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC 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 issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (56 FR 53076 - December 26, 1990). 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.

7.0 CONCLUSION

The Commission 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S. L. Wu

Date: October 22, 1991

AMENDMENT NO. 105 TO FACILITY OPERATING LICENSE NO. NPF-12 - SUMMER, UNIT No. 1

Docket File
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G. Wunder
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cc: Summer Service List