

Docket No. 50-395

October 22, 1991

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: EXEMPTION FROM 10 CFR 50.46(a)(1)(i), 10 CFR 50.44(a), AND  
APPENDIX K TO 10 CFR PART 50 - VIRGIL C. SUMMER NUCLEAR STATION,  
UNIT NO. 1 (TAC NO. M79121)

The Commission has issued the enclosed exemption from the requirements of 10 CFR 50.46 (a)(1)(i), 10 CFR 50.44(a), and Appendix K to 10 CFR Part 50, regarding the use of Zirlo clad fuel instead of Zircaloy clad fuel as specified in the rules. This exemption is necessary before the staff can issue the amendment that would allow you to use Zirlo clad fuel. That amendment, requested by your letter dated November 16, 1990, must be issued before the Zirlo clad fuel can be loaded into the reactor.

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

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

Enclosure:  
Exemption

cc: See next page

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\*See Previous Concurrence

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*Handwritten signature/initials*

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  
c/o Virgil C. Summer Nuclear Station  
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P. O. Box 88  
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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of

SOUTH CAROLINA ELECTRIC & GAS COMPANY

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY

(Virgil C. Summer Nuclear Station,  
Unit No. 1)

Docket No. 50-395

EXEMPTION

I.

South Carolina Electric & Gas Company and South Carolina Public Service Authority (the licensees) are the holders of Facility Operating License No. NPF-12, which authorizes operation of the Virgil C. Summer Nuclear Station, Unit No. 1. The license provides, among other things, that the licensees are subject to all rules, regulations, and orders of the Commission now or hereafter in effect.

The facility consists of a pressurized water reactor at the licensees' site located in Fairfield County, South Carolina.

II.

By letter dated November 16, 1990, the licensees requested an amendment to the Technical Specifications that would allow the use of fuel clad with Zirlo, a zirconium alloy similar to Zircaloy. Currently, the Technical Specifications allow only the use of Zircaloy clad fuel.

III.

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health and safety, and are

consistent with the common defense and security; and (2) when special circumstances are present. According to 10 CFR 50.12(a)(2)(ii), special circumstances are present when "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule...."

10 CFR 50.46 states "Each boiling and pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical Zircaloy cladding must be provided with an emergency core cooling system (ECCS) that must be designed such that its calculated cooling performance following postulated loss-of-coolant accidents conforms to the criteria set forth in paragraph (b) of this section. ECCS cooling performance must be calculated in accordance with an acceptable evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations, and other properties sufficient to provide assurance that the most severe postulated loss-of-coolant accidents are calculated." 10 CFR 50.46 then goes on to give specifications for peak cladding temperature, maximum cladding oxidation, maximum hydrogen generation, coolable geometry, and long term cooling. Since 10 CFR 50.46 specifically refers to fuels with Zircaloy cladding, the use of fuel with Zirlo cladding would, in effect, place the licensee outside the applicability of this section of the Code.

The underlying purpose of the rule is to ensure that facilities have adequate acceptance criteria for ECCS. The effectiveness of the ECCS will not be affected by a change from Zircaloy to Zirlo cladding. The licensee and its contractor have performed calculations that demonstrate the adequacy of this ECCS for a Zirlo core; therefore, due to the similarities in the material

properties of Zircaloy and Zirlo, the acceptability criteria for ECCS applied to reactors fueled with Zircaloy clad fuel are also applicable to the ECCS for the Summer Station reactor fueled with Zirlo clad fuel. An evaluation of the acceptability of Zirlo clad fuel may be found in the staff's Safety Evaluation (SE) dated October 22, 1991. Strict interpretation of the regulation would render the criteria of 10 CFR 50.46 inapplicable to Zirlo, even though analysis shows that applying the Zircaloy criteria to Zirlo fuel yields acceptable results. Application of the regulation in this instance would not meet the underlying purpose of the rule; therefore, special circumstances exist. The Commission, therefore, on its own initiative, has taken under consideration an exemption from 10 CFR 50.46(a)(1)(i) that would allow the licensee to apply the acceptance criteria of 10 CFR 50.46 to a reactor powered by Zirlo clad fuel.

10 CFR 50.44 provides requirements for control of hydrogen gas generated in part by Zircaloy clad fuel after a postulated loss-of-coolant-accident (LOCA). The intent of this rule is clearly to ensure that there is an adequate means of controlling generated hydrogen. The hydrogen produced in a post-LOCA scenario comes from a metal-water reaction. Metal-water reaction rate, as determined by applying the Baker-Just equation has been shown to be conservative for Zirlo clad fuel; therefore, the amount of hydrogen generated by metal-water reaction in a Zirlo core will be within the design basis. An evaluation of the acceptability of Zirlo clad fuel is contained in the staff's SE dated October 22, 1991. A strict interpretation of the rule in this instance would result in the criteria of 10 CFR 50.44 being inapplicable to Zirlo. Since application of the regulation is not necessary to meet the underlying purpose of

the rule, special circumstances exist. The Commission, therefore, on its own initiative, has taken under consideration an exemption to 10 CFR 50.44(a) that would allow the licensee to apply the requirements of 10 CFR 50.44 to a reactor powered by Zirlo clad fuel.

Paragraph I.A.5 of Appendix K to 10 CFR Part 50 states that the rates of energy release, hydrogen generation, and cladding oxidation from the metal-water reaction shall be calculated using the Baker-Just equation. The Baker-Just equation presumes the use of Zircaloy clad fuel. The intent of this part of the Appendix, however, is to apply an equation that conservatively bounds all post-LOCA scenarios. Due to the similarities in the composition of Zirlo and Zircaloy, the application of the Baker-Just equation in the analysis of Zirlo clad fuel will conservatively bound all post-LOCA scenarios. A complete evaluation of the acceptability of Zirlo clad fuel is contained in the staff's SE dated October 22, 1991. Since the use of the Baker-Just equation presupposes Zircaloy cladding, and since failure to apply Baker-Just would defeat the purpose of paragraph I.A.5 of Appendix K given that post-LOCA scenarios will be conservatively bounded, special circumstances exist. The Commission, therefore, on its own initiative, is considering an exemption from paragraph I.A.5 of Appendix K to 10 CFR Part 50 that would allow the licensee to apply the Baker-Just equation to a Zirlo clad fuel.

#### IV.

Accordingly, the Commission has determined, pursuant to 10 CFR 50.12, that exemptions as described in Section III are authorized by law, will not

endanger life or property, and are otherwise in the public interest; it has also determined that special circumstances exist pursuant to 10 CFR 50.12(a)(2)(ii). Therefore, the Commission hereby grants the following exemptions:

- (1) South Carolina Electric & Gas Company and South Carolina Public Service Authority are exempt from the requirements of 10 CFR 50.46(a)(1)(i) in that the acceptance criteria for emergency core cooling systems given in 10 CFR 50.46 for reactors using Zircaloy clad fuel may also be applied to the Summer Station Reactor using Zirlo clad fuel.
- (2) South Carolina Electric & Gas Company and South Carolina Public Service Authority are exempt from the requirements of 10 CFR 50.44(a) in that the requirements for hydrogen gas control given in 10 CFR 50.44 for reactors using Zircaloy clad fuel may also be applied to the Summer Station Reactor using Zirlo clad fuel.
- (3) South Carolina Electric & Gas Company and South Carolina Public Service Authority are exempt from the requirements of paragraph I.A.5 of Appendix K to 10 CFR Part 50 in that the Baker-Just equation, which presumes the use of Zircaloy clad fuel, is also applicable when using Zirlo clad fuel in the Summer Station Reactor.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of these exemptions will have no significant impact on the quality of the human environment (56 FR 52562 ).

This exemption is effective upon issuance.

Original signed by:  
Steven A. Varga, Director  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland  
this 22nd day of October 1991

\*See Previous Concurrence

*NO TECHNICAL  
OBJECTIONS*

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PD21 Reading - Summer

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