November 14, 1991

Docket No. 50-~~289~~ 289

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Mr. T. Gary Broughton, Vice President
and Director - TMI-1
GPU Nuclear Corporation
Post Office Box 480
Middletown, Pennsylvania 17057

Dear Mr. Broughton:

SUBJECT: EXEMPTION FROM 10 CFR 50.46(a)(1)(i), 10 CFR 50.44(a), AND APPENDIX K TO 10 CFR PART 50 - THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1 (TAC NO. 82019)

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 in order to install lead test assemblies using Zirlo clad fuel.

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

Sincerely,

/s/

Ronald W. Hernan, Sr. Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosure:
Exemption

cc w/enclosure:
See next page

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Mr. T. Gary Broughton
GPU Nuclear Corporation

Three Mile Island Nuclear Station,
Unit No. 1

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UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
GPU NUCLEAR CORPORATION, ET AL.	)	Docket No. 50-289
	)	
(Three Mile Island Nuclear Station, Unit No. 1)	)	

EXEMPTION

I.

GPU Nuclear Corporation (GPUN/licensee) and three co-owners hold Facility Operating License No. DPR-50, which authorizes operation of the Three Mile Island Nuclear Station, Unit No. 1 (TMI-1) (the facility) at power levels not in excess of 2568 megawatts thermal. This license provides, among other things, that the facility is subject to all rules, regulations, and Orders of the Nuclear Regulatory Commission (the Commission or the staff) now or hereafter in effect.

The facility is a pressurized water reactor located at the licensee's site in Dauphin County, Pennsylvania.

II.

During a meeting on January 18, 1991, GPUN informed the NRC staff of its intention to install, under the provisions of 10 CFR 50.59, four lead test assembles (LTAs) during the October 1991 refueling, two of which would contain Zirlo cladding. Zirlo is a Westinghouse Electric Company trade name for an alloy of zirconium. GPUN confirmed its intention in a letter to the NRC dated October 9, 1991.

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... ."

Title 10 of the Code of Federal Regulations, Section 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.

Section 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 Section 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, Westinghouse, have performed calculations that demonstrate the adequacy of this ECCS for Zirlo test assemblies; 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 Zirlo clad test assemblies at TMI-1. An evaluation of the acceptability of Zirlo clad fuel may be found in an NRC Safety Evaluation (SE) for the Virgil C. Summer Nuclear Station dated October 22, 1991 and in generic SEs dated July 1 and October 9, 1991, approving Westinghouse Topical Report WCAP-12610. 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 for these test assemblies; 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 core containing Zirlo clad fuel.

Section 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 core containing Zirlo will be within the design basis. An

evaluation of the acceptability of Zirlo clad fuel is contained in the staff's SEs dated July 1, October 9, and 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 would not 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 re-quirements of 10 CFR 50.44 to a reactor core containing 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 SEs dated July 1, October 9, and 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 Zirlo clad fuel.

IV.

Accordingly, the Commission has determined, pursuant to 10 CFR 50.12, that the exemptions as described in Section III are authorized by law, will not endanger life or property, and are otherwise in the public interest. The Commission 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) GPU Nuclear Corporation is 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 TMI-1 lead test assemblies using Zirlo clad fuel.

(2) GPU Nuclear Corporation is 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 TMI-1 lead test assemblies using Zirlo clad fuel.

(3) GPU Nuclear Corporation is 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 at TMI-1.

Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of these exemptions will have no significant impact on the quality of the human environment (56 FR 57904).

This exemption is effective upon issuance.

/s/

Gus C. Lainas, Acting Director
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 14th day of November 1991

* See previous concurrence

OFC	:PDI-4:LA	:PDI-4:PM	:SRXB *	:SPLB *	:PDI-4:D
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DATE	:11/	:11/	:11/7/91	:11/7/91	:11/

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November 14, 1991

Docket No. 50-~~320~~ 289

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SNorris	CHehl, RI

Mr. T. Gary Broughton, Vice President
and Director - TMI-1
GPU Nuclear Corporation
Post Office Box 480
Middletown, Pennsylvania 17057

Dear Mr. Broughton:

SUBJECT: EXEMPTION FROM 10 CFR 50.46(a)(1)(i), 10 CFR 50.44(a), AND APPENDIX K TO 10 CFR PART 50 - THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1 (TAC NO. M82019)

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Sincerely,

/s/

Ronald W. Hernan, Sr. Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosure:
Exemption

cc w/enclosure:
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UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
GPU NUCLEAR CORPORATION, ET AL.	)	Docket No. 50-289
	)	
(Three Mile Island Nuclear Station, Unit No. 1)	)	

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Section 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 core containing Zirlo will be within the design basis. An

evaluation of the acceptability of Zirlo clad fuel is contained in the staff's SEs dated July 1, October 9, and 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 would not 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 re-quirements of 10 CFR 50.44 to a reactor core containing 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 SEs dated July 1, October 9, and 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 Zirlo clad fuel.

IV.

Accordingly, the Commission has determined, pursuant to 10 CFR 50.12, that the exemptions as described in Section III are authorized by law, will not endanger life or property, and are otherwise in the public interest. The Commission 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) GPU Nuclear Corporation is 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 TMI-1 lead test assemblies using Zirlo clad fuel.

(2) GPU Nuclear Corporation is 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 TMI-1 lead test assemblies using Zirlo clad fuel.

(3) GPU Nuclear Corporation is 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 at TMI-1.

Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of these exemptions will have no significant impact on the quality of the human environment (56 FR 57904).

This exemption is effective upon issuance.

/s/

Gus C. Lainas, Acting Director
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 14th day of November 1991

* See previous concurrence

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