

September 30, 1994

Mr. T. C. McMeekin  
Vice President, McGuire Site  
Duke Power Company  
12700 Hagers Ferry Road  
Huntersville, North Carolina 28078-8985

Dear Mr. McMeekin:

SUBJECT: EXEMPTION FROM REQUIREMENTS OF 10 CFR 50.60, ACCEPTANCE CRITERIA FOR FRACTURE PREVENTION FOR LIGHT-WATER NUCLEAR POWER REACTORS FOR NORMAL OPERATION - MCGUIRE NUCLEAR STATION UNITS 1 AND 2 (TAC NOS. M89807 AND M89808)

The Commission has issued the enclosed exemption from the requirements of 10 CFR 50.60, Acceptance Criteria for Fracture Prevention for Light-Water Nuclear Power Reactors for Normal Operation. This exemption permits using the safety margins recommended in the American Society of Mechanical Engineers Code Case N-514, "Low Temperature Overpressure Protection" in lieu of the safety margins required by Appendix G to 10 CFR Part 50.

A copy of the exemption is being forwarded to the Office of Federal Register for publication.

Sincerely,

Original signed by:  
Victor Nerses for:

Herbert N. Berkow, Director  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Docket Nos. 50-369  
and 50-370

Enclosure:  
Exemption

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 30, 1994

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Vice President, McGuire Site  
Duke Power Company  
12700 Hagers Ferry Road  
Huntersville, North Carolina 28078-8985

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Sincerely,

A handwritten signature in cursive script, appearing to read "Victor N. Berkow for".

Herbert N. Berkow, Director  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Docket Nos. 50-369  
and 50-370

Enclosure:  
Exemption

cc w/enclosure:  
See next page

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McGuire Nuclear Station

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
DUKE POWER COMPANY	)	Docket Nos. 50-369
	)	and 50-370
(McGuire Nuclear Station	)	
Units 1 and 2)	)	

EXEMPTION

I.

The Duke Power Company (the licensee) is the holder of Facility Operating License Nos. NPR-9 and NPF-17, which authorize operation of the McGuire Nuclear Station, Units 1 and 2, respectively. The licenses provide, among other things, that the licensee is subject to all rules, regulations, and orders of the Commission now or hereafter in effect.

The facilities consist of two pressurized water reactors, McGuire Nuclear Station, Units 1 and 2, at the licensee's site located in Mecklenburg County, North Carolina.

II.

Title 10 CFR 50.60, "Acceptance Criteria for Fracture Prevention Measures for Light-water Nuclear Power Reactors for Normal Operation," states that all light-water nuclear power reactors must meet the fracture toughness and material surveillance program requirements for the reactor coolant pressure boundary as set forth in Appendices G and H to 10 CFR Part 50. Appendix G to 10 CFR 50 defines pressure/temperature (P/T) limits during any condition of normal operation, including anticipated operational occurrences and system hydrostatic tests to which the pressure boundary may be subjected

over its service lifetime. 10 CFR 50.60(b) specifies that alternatives to the described requirements in Appendices G and H to 10 CFR Part 50 may be used when an exemption is granted by the Commission under 10 CFR 50.12.

To prevent low temperature overpressure transients that would produce pressure excursions exceeding the Appendix G P/T limits while the reactor is operating at low temperatures, the licensee installed a low temperature overpressure (LTOP) system. The system includes pressure-relieving devices called Power-Operated Relief Valves (PORVs). The PORVs are set at a pressure low enough so that if an LTOP transient occurred, the mitigation system would prevent the pressure in the reactor vessel from exceeding the Appendix G P/T limits. To prevent the PORVs from lifting as a result of normal operating pressure surges (e.g., reactor coolant pump starting, and shifting operating charging pumps) with the reactor coolant system in a water solid condition, the operating pressure must be maintained below the PORV setpoint. In addition, in order to prevent cavitation of a reactor coolant pump, the operator must maintain a differential pressure across the reactor coolant pump seals. Hence, the licensee must operate the plant in a pressure window that is defined as the difference between the minimum required pressure to start a reactor coolant pump and the operating margin to prevent lifting of the PORVs due to normal operating pressure surges. The licensee LTOP analysis indicates that using the Appendix G safety margins to determine the PORV setpoint would result in a pressure setpoint within its operating window, but there would be no margin for normal operating pressure surges. Therefore, operating with these limits could result in the lifting of the PORVs and cavitation of the reactor coolant pumps during normal operation.

The licensee proposed that in determining the design setpoint for LTOP events for McGuire Units 1 and 2, the allowable pressure be determined using

the safety margins developed in an alternate methodology in lieu of the safety margins currently required by Appendix G, 10 CFR Part 50. Designated Code Case N-514, the proposed alternate methodology is consistent with guidelines developed by the American Society of Mechanical Engineers (ASME) Working Group on Operating Plant Criteria to define pressure limits during LTOP events that avoid certain unnecessary operational restrictions, provide adequate margins against failure of the reactor pressure vessel, and reduce the potential for unnecessary activation of pressure-relieving devices used for LTOP. Code Case N-514, "Low Temperature Overpressure Protection," has been approved by the ASME Code Committee. The content of this code case has been incorporated into Appendix G of Section XI of the ASME Code and published in the 1993 Addenda to Section XI. The NRC staff is revising 10 CFR 50.55a, which will endorse the 1993 Addenda and Appendix G of Section XI into the regulations.

An exemption from 10 CFR 50.60 is required to use the alternate methodology for calculating the maximum allowable pressure for the LTOP setpoint. By application dated June 28, 1994, the licensee requested an exemption from 10 CFR 50.60 for this purpose.

By letter dated August 18, 1994 (and further clarified by letter dated September 7, 1994), the licensee supplied additional information that described the use of a secondary side heat source to permit the heatup of the reactor coolant system, assuming that the exemption was not granted. Since the secondary side heat source could cause primary side transients, the staff considers the use of a secondary side heat source to be an undesirable method of operation.

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 or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. Special circumstances are present whenever, according to 10 CFR 50.12(a)(2)(ii), "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...".

The underlying purpose of 10 CFR 50.60 Appendix G is to establish fracture toughness requirements for ferritic materials of pressure-retaining components of the reactor coolant pressure boundary to provide adequate margins of safety during any condition of normal operation, including anticipated operational occurrences, to which the pressure boundary may be subjected over its service lifetime. Section IV.A.2 of this appendix requires that the reactor vessel be operated with P/T limits at least as conservative as those obtained by following the methods of analysis and the required margins of safety of Appendix G of the ASME Code.

Appendix G of the ASME Code requires that the P/T limits be calculated: (a) using a safety factor of 2 on the principal membrane (pressure) stresses, (b) assuming a flaw at the surface with a depth of one-quarter (1/4) of the vessel wall thickness and a length of six (6) times its depth, and (c) using a conservative fracture toughness curve that is based on the lower bound of static, dynamic, and crack arrest fracture toughness tests on material similar to the McGuire reactor vessel material.

In determining the setpoint for LTOP events, the licensee proposed to use safety margins based on an alternate methodology consistent with the proposed ASME Code Case N-514 guidelines. The ASME Code Case N-514 allows determination of the setpoint for LTOP events such that the maximum pressure in the vessel would not exceed 110% of the P/T limits of the existing ASME Appendix G. This results in a safety factor of 1.8 on the principal membrane stresses. All other factors, including assumed flaw size and fracture toughness, remain the same. Although this methodology would reduce the safety factor on the principal membrane stresses, the proposed criteria will provide adequate margins of safety to the reactor vessel during LTOP transients and will satisfy the underlying purpose of 10 CFR 50.60 for fracture toughness requirements.

Using the licensee's proposed safety factors instead of Appendix G safety factors to calculate the LTOP setpoint will permit a higher LTOP setpoint than would otherwise be required and will provide added margin to prevent normal operating surges from lifting the PORVs or cavitation of the reactor coolant pumps.

#### IV.

For the foregoing reasons, the NRC staff has concluded that the licensee's proposed use of the alternate methodology in determining the acceptable setpoint for LTOP events will not present an undue risk to public health and safety and is consistent with the common defense and security. The NRC staff has determined that there are special circumstances present, as specified in 10 CFR 50.12(a)(2), such that application of 10 CFR 50.60 is not necessary in order to achieve the underlying purpose of this regulation.



Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), an exemption is authorized by law, will not endanger life or property or common defense and security, and is, otherwise, in the public interest. Therefore, the Commission hereby grants the Duke Power Company an exemption from the requirements of 10 CFR 50.60 such that in determining the setpoint for LTOP events, the Appendix G curves for P/T limits are not exceeded by more than 10 percent in order to be in compliance with these regulations. This exemption is applicable only to LTOP conditions during normal operation.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not result in any significant adverse environmental impact. Publication of the Environmental Assessment and Finding of No Significant Impact in the Federal Register was delayed due to circumstances beyond the Commission's control. The Commission has determined that emergency circumstances exist and therefore is issuing this exemption pursuant to 10 CFR 51.13 and 51.35 without prior publication. Publication in the Federal Register will occur on October 3, 1994.

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION  
 Original signed by:  
 John F. Stolz, Acting Director  
 Division of Reactor Projects - I/II  
 Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland,  
 this 30th day of September, 1994.

*\*See previous  
 comments*

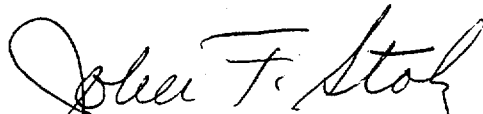
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FOR THE NUCLEAR REGULATORY COMMISSION



John F. Stolz, Acting Director  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland,  
this 30th day of September, 1994.

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