

Mr. C. Randy Hutchinsc
 Vice President, Operations ANO
 Entergy Operations, Inc.
 1448 S. R. 333
 Russellville, AR 72801

January 28, 1997

SUBJECT: EXEMPTION FROM REQUIREMENTS OF 10 CFR 50.60, ACCEPTANCE CRITERIA FOR FRACTURE PREVENTION FOR LIGHTWATER NUCLEAR POWER REACTORS FOR NORMAL OPERATION - ARKANSAS NUCLEAR ONE, UNIT 2 (TAC NO. M77399)

Dear Mr. Hutchinson:

The Commission has issued the enclosed exemption for Arkansas Nuclear One, Unit 2 from the requirements of 10 CFR 50.60, "Acceptance Criteria for Fracture Prevention for Lightwater Nuclear Power Reactors for Normal Operation." This exemption permits using the safety margins recommended in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Case N-514, "Low Temperature Overpressure Protection" in lieu of the safety margins required by 10 CFR Part 50, Appendix G.

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

Sincerely,
 ORIGINAL SIGNED BY:
 Kombiz Salehi, Acting Project Manager
 Project Directorate IV-1
 Division of Reactor Projects III/IV
 Office of Nuclear Reactor Regulation

Docket Nos. 50-368

Enclosure: Exemption

cc w/encl: See next page

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

January 28, 1997

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1448 S. R. 333
Russellville, AR 72801

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Sincerely,

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Kombiz Salehi, Acting Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket Nos. 50-368

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cc w/encl: See next page

Mr. C. Randy Hutchinson
Entergy Operations, Inc.

Arkansas Nuclear One, Unit 2

cc:

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Russellville, AR 72801

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

| | | |
|--------------------------------|---|-------------------|
| In the Matter of |) | |
| |) | |
| ENTERGY OPERATIONS, INC. |) | Docket No. 50-368 |
| |) | |
| (Arkansas Nuclear One, Unit 2) |) | |

EXEMPTION

I.

Entergy Operations, Inc. (the licensee) is the holder of Facility Operating License No. NPF-6, which authorizes operation of Arkansas Nuclear One, Unit 2. The license provides, among other things, that the licensee is subject to all rules, regulations, and orders of the Commission now or hereafter in effect.

The facility consists of two pressurized water reactors, Arkansas Nuclear One, Units 1 and 2, located at the licensee's site in Pope County, Arkansas.

II.

In its letter dated April 11, 1996, the licensee requested an exemption from the Commission's regulations for Arkansas Nuclear One, Unit 2. Title 10 of the Code of Federal Regulations, Part 50, Section 60 (10 CFR 50.60), "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear

Power Reactors for Normal Operation," states that all lightwater 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 Part 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. It is specified in 10 CFR 50.60(b) 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 protection (LTOP) system. The system includes two relief valves to limit high system pressure. The relief valves 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 relief valves 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 solid water condition, the operating pressure must be maintained below the relief valve setpoint. However, the reactor coolant system pressure/temperature operating window at low temperatures is defined by the LTOP setpoint. Implementation of a LTOP setpoint without the additional margin allowed by American Society of Mechanical Engineers (ASME) Code Case N-514 would restrict the pressure/temperature operating window and would potentially result in

undesired actuation of the LTOP system. This constitutes an unnecessary burden that can be alleviated by the application of ASME Code Case N-514. Implementation of an LTOP setpoint as allowed by ASME Code Case N-514 does not significantly reduce the margin of safety associated with normal operational heatup and cooldown limits. Further, the LTOP guidelines will reduce the potential for an undesired lift of the LTOP valves.

The licensee has requested the use of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-514, "Low Temperature Overpressure Protection," which allows exceeding the Appendix G safety limits by 10 percent. ASME Code Case N-514, the proposed alternate methodology, is consistent with guidelines developed by the 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 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.

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 two 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 ANO-2 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 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 percent 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, thus, will satisfy the underlying purpose of 10 CFR 50.60 for fracture toughness requirements. The slight reduction in the membrane stress safety factor, as proposed by Code Case N-514, is compensated by increased safety from the standpoint of increased operational flexibility and the reduced potential for unnecessary opening of the LTOP relief valves. In summary, the use of Code Case N-514 is likely to improve overall safety when evaluated as part of the complete plant safety concern.

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), in 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 an exemption from the requirements of 10 CFR 50.60 allowing the use of alternate criteria as

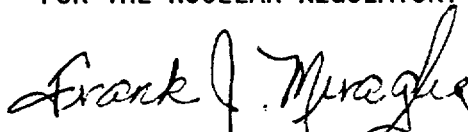
described by Code Case N-514, which permits exceeding the Appendix G safety factor by 10 percent during low temperature operations.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (61 FR 20846).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 28th day of January 1997

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read "Frank J. Miraglia". The signature is written in a cursive style with a large initial "F".

Frank J. Miraglia, Acting Director
Office of Nuclear Reactor Regulation