Docket No. 50-298

OCT [illegible] 1974

Nebraska Public Power District
ATTN: Mr. J. Pilant, Manager
Licensing & Quality Assurance
Post Office Box 499
Columbus, Nebraska 68601

Gentlemen:

The Commission has filed the enclosed "Notice of Proposed Issuance of Amendment to Facility Operating License" with the Office of the Federal Register for publication. This notice relates to that portion of your request dated May 28, 1974, for approval of changes to the Limiting Conditions for Operations in the Technical Specifications relating to fuel densification.

Copies of our Safety Evaluation, the proposed license amendment with proposed changes to the Technical Specifications, and the Technical Report dated August 23, 1973, and its Supplement No. 1 also are enclosed for your information.

Sincerely,

[illegible] by
[illegible]

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

Enclosures:
1. Federal Register Notice
2. Safety Evaluation
3. Proposed License Amendment
4. Technical Report and
Supplement No. 1

cc w/enclosures:
See attached

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DATE ▶						

Form AEC-318 (Rev. 9-53) AECM 0240 GPO c43—16—81465-1 445-678

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cc w/enclosures:
Gene Watson, Attorney
Wilson, Barlow & Watson
Post Office Box 81686
Lincoln, Nebraska 68501

Mr. Arthur C. Gehr, Attorney
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Phoenix, Arizona 85004

Mr. William Siebert, Commissioner
Nemaha County Board of Commissioners
Nebraska County Courtroom
Auburn, Nebraska 68305

Anthony Z. Roisman, Esquire
Berlin, Roisman and Kessler
1712 N Street, NW.
Washington, D.C. 20036

Mr. James L. Higgins, Director
Department of Environmental Control
Executive Building, 2nd Floor
Lincoln, Nebraska 68509

Mr. Ed Vest
Environmental Protection Agency
1735 Baltimore Avenue
Kansas City, Missouri 64108

Auburn Public Library
1118 - 15th Street
Auburn, Nebraska 68305

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NEBRASKA PUBLIC POWER DISTRICT

DOCKET NO. 50-298

COOPER NUCLEAR STATION

PROPOSED AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No.
License No. DPR-46

1. The Atomic Energy Commission (the Commission) having found that:

   A. The application for amendment by Nebraska Public Power District (the licensee) dated May 28, 1974, 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; and

   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.

2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.C.(2) of Facility License No. DPR-46 is hereby amended to read as follows:

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"(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. __."

3. This license amendment is effective as of the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION

Karl R. Goller, Assistant Director
for Operating Reactors
Directorate of Licensing

Attachment:
Change No. __ to the
Technical Specifications

Date of Issuance:

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PROPOSED ATTACHMENT TO LICENSE AMENDMENT NO.

CHANGE NO. TO THE TECHNICAL SPECIFICATIONS

FACILITY OPERATING LICENSE NO. DPR-46

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

Replace pages 129, 130, and 131a of Appendix A of the Technical Specifications with the attached revised pages. Changed areas on the revised pages are reflected by marginal lines.

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3.5 BASES (cont'd.)

I. Average Planar LHGR

This specification assures that the peak cladding temperature following the postulated design basis loss-of-coolant accident will not exceed the 2300°F limit specified in the Interim Acceptance Criteria (IAC) issued in June 1971 considering the postulated effects of fuel pellet densification.

The peak cladding temperature following a postulated loss-of-coolant accident is primarily a function of the average heat generation rate of all the rods of a fuel assembly at any axial location and is only dependent secondarily on the rod to rod power distribution within an assembly. Since expected location variations in power distribution within a fuel assembly affect the calculated peak clad temperature by less than ± 20°F relative to the peak temperature for a typical fuel design, the limit on the average linear heat generation rate is sufficient to assure that calculated temperatures are within the IAC limit.

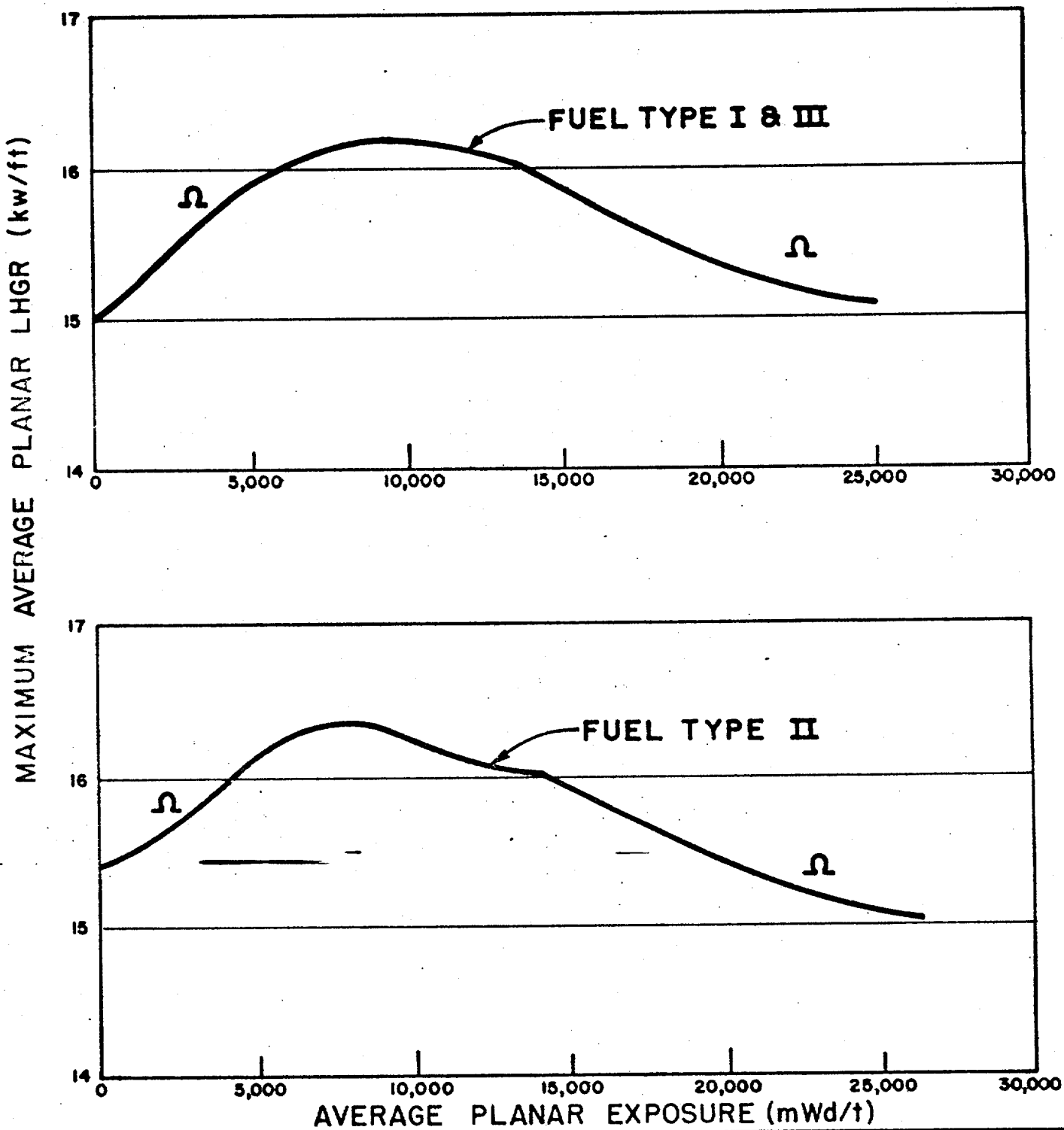
The maximum average planar LHGR's shown in Figure 3.5.1 are based on calculations employing the models described in the General Electric Report NEDM-10735 as modified by General Electric Report NEDO-20181, which was modified by the Regulatory staff in "Supplement to the Technical Report on Densification of General Electric Reactor Fuels, December 14, 1973".

The possible effects of fuel pellet densification were: (1) creep collapse of the cladding due to axial gap formation; (2) increase in the LHGR because of pellet column shortening; (3) power spikes due to axial gap formation; and (4) changes in stored energy due to increased radial gap size. Calculations show that clad collapse is conservatively predicted not to occur currently or during the next power operation cycle. Therefore, clad collapse is not considered in the analyses. Since axial thermal expansion of the fuel pellets is greater than axial shrinkage due to densification the analyses of peak clad temperature do not consider any change in LHGR due to pellet column shortening. Although the formation of axial gaps might produce a local power spike at one location on any one rod in a fuel assembly, the increase in local power density would be on the order of only 2% at the axial midplane. Since small local variations in power distribution have a small effect on peak clad temperature, power spikes were not considered in the analysis of loss-of-coolant accidents. Changes in gap size affect the peak clad temperature by their effect on pellet-clad thermal conductance and fuel pellet stored energy. The pellet-clad thermal conductance assumed for each rod is dependent on the steady state operating linear heat generation rate and the gap size. The pellet-clad thermal conductance was calculated using the General Electric GEGAP-III model described in NEDO-20181. For the most critical rod, the two standard deviation lower bound on initial pellet density was assumed. For the other 48 rods in the bundle the two standard deviation lower bound on the initial mean "boat" pellet density was assumed.

3.5 BASES (cont'd.)

J. Local LHGR

This specification assures that the linear heat generation rate in any rod is less than the design linear heat generation even if fuel pellet densification is postulated. The power spike penalty specified is based on the analysis presented in Section 3.2.1 of the GE topical report NEDM-10735 Supplement 6, and assumes a linearly increasing variation in axial gaps between core bottom and top, and assures with a 95% confidence, that no more than one fuel rod exceeds the design linear heat generation rate due to power spiking.



DATE	REVISIONS
5/20/74	REVISION #1

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

FIGURE 3.5.1 MAXIMUM ALLOWABLE AVERAGE PLANAR LHGR

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SCALE | DRAWING NO.

SAFETY EVALUATION BY THE DIRECTORATE OF LICENSING

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

EFFECTS OF CHANGING THE PELLET-CLAD THERMAL CONDUCTANCE

INTRODUCTION

In a letter dated May 28, 1974, the Nebraska Public Power District (NPPD) transmitted a series of proposed changes to the Technical Specifications, Appendix A, of Facility Operating License No. DPR-46 for the Cooper Nuclear Station (CNS). The proposed change addressed in this safety evaluation would increase the maximum average planar linear heat generation rate (MAPLHGR) specified in Section 3.5.I of the Technical Specifications.

BACKGROUND

As a result of the Regulatory staff's review of fuel densification and its effect on reactor operation, limits were incorporated into the Technical Specifications for the CNS to assure that, even with the postulated effects of densification, neither the 18.5 Kw/ft design value for the linear heat generation rate (LHGR) or the 2300°F Interim Acceptance Criteria (IAC) limit on the calculated peak clad temperature following a postulated loss of coolant accident (LOCA) would be exceeded. The background analyses and references pertinent to those specifications were included in the AEC Regulatory staff reports "Technical Report on Densification of General Electric Reactor Fuels" dated August 23, 1973 and "Supplement No. 2 to the Evaluation by the Directorate of Licensing USAEC in the Matter of NPPD CNS Docket No. 50-298" dated December 21, 1973.

Subsequently, General Electric (GE) submitted a report NEDO-20181, "GEGAP III, A Model for the Prediction of Pellet-Clad Thermal Conductance in BWR Fuel Rods", November 1973, with related proprietary information provided in NEDC-20181 Supplement I (Proprietary) November 1973. The AEC Regulatory staff has reviewed the GEGAP III model and has issued the report entitled "Supplement 1 to the Technical Report on Densification of General Electric

Reactor Fuels" dated December 14, 1973. In a letter from D. J. Skovholt to J. H. Hinds dated December 5, 1973, required modifications were transmitted to GE in an enclosure entitled "Modified GE Model for Fuel Densification" and their incorporation into the GE model was acknowledged in a letter from J. H. Hinds to V. A. Moore dated December 12, 1973.

EVALUATION

The GEGAP III pellet-clad thermal conductance model provides an exposure dependent gap conductance, including time dependent densification, time dependent gap closure due to fuel relocation, swelling and cladding creepdown and time dependent gap thermal conductivity due to release of fission products. As a result of the staff review several modifications to the GEGAP III model were incorporated which (1) employ constraints that conservatively limit the densification kinetics such that the maximum density occurs at a burnup no greater than 4000 MWD/TU, (2) requires the predicted density increase to be as high as that experienced by like fuel during an out-of-reactor resintering anneal of 1700°C for 24 hours (which has been found to predict conservatively the maximum observed in-reactor densification) and (3) applies a correction factor which conservatively reduces the effects of clad creepdown on gap closure. The staff has reviewed the GEGAP III model, as modified, and concluded that it is suitably conservative for the evaluation of densification effects in BWR fuel and acceptable for incorporation into the GE fuel densification model.

The proposed Technical Specifications submitted by NPPD are the result of applying the accepted GE model for fuel densification to the CNS. The GEGAP III model yields a calculated increase in pellet-clad conductance primarily due to fuel relocation and associated gap closure. An increase in gap conductance causes a decrease in stored energy in the fuel rods which, for a given MAPLHGR value, reduces the calculated peak clad temperature following a postulated LOCA, or, conversely, allows a compensating increase in MAPLHGR for a constant calculated peak clad temperature. The limit curves for MAPLHGR specified in the proposed change represent limiting values on LHGR and peak clad temperature following a LOCA. The staff concludes that the limitations on the MAPLHGR given in Figure 3.5.1 combined with the local LHGR limitations given in Specification 3.5.J of the Technical Specifications will assure that even after accounting for postulated effects of fuel densification the calculated peak clad temperature for the design basis LOCA will not exceed 2300°F and the design limits on LHGR and MCHFR will be maintained during normal and transient operations.

Along with the revised MAPLHGR specifications, the staff has incorporated appropriate Bases into the Technical Specifications. This change is implemented by replacing pages 129, 130 and 131a.

CONCLUSION

Based upon the above, and in conjunction with the referenced staff safety evaluations, it is concluded that there is reasonable assurance that operation of the CNS in conjunction with the proposed limits on the MAPLHGR will not endanger the health and safety of the public.

/s/

Joseph L. Sapir
Operating Reactors Branch #2
Directorate of Licensing

Concurred by
Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

Date: OCT [illegible] 1974

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UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NO. 50-298

NEBRASKA PUBLIC POWER DISTRICT

NOTICE OF PROPOSED ISSUANCE OF AMENDMENT
TO FACILITY OPERATING LICENSE

The Atomic Energy Commission (the Commission) is considering issuance of an amendment to Facility Operating License No. DPR-46 issued to Nebraska Public Power District (the licensee) for operation of the Cooper Nuclear Station located in Nemaha County, Nebraska (the facility).

The amendment would revise the provisions in the Technical Specifications relating to fuel densification in accordance with the licensee's application for amendment dated May 28, 1974.

Prior to issuance of the proposed license amendment, the Commission will have made the findings required by the Act and the Commission's regulations which are set forth in the proposed license amendment.

By November 15, 1974, the licensee may file a request for a hearing and any person whose interest may be affected by this proceeding may file a petition for leave to intervene. Requests for a hearing and petitions to intervene shall be filed in accordance with the Commission's "Rules of Practice" in 10 CFR Part 2. If a request for a hearing or a petition for leave to intervene is filed within the time prescribed in this notice, the Commission will issue a notice of hearing or an appropriate order.

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For further details with respect to this action, see (1) the application for amendment dated May 28, 1974, (2) the Commission's Technical Report on Densification of General Electric Reactor Fuels, dated August 23, 1973, and Supplement 1, dated December 14, 1973, (3) the proposed license amendment and changes to the Technical Specifications, and (4) a concurrently issued related Safety Evaluation by the Regulatory staff, which are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C., and at the Auburn Public Library, 1118 - 15th Street, Auburn, Nebraska 68305. A single copy of items (2), (3) and (4) above may be obtained upon request addressed to the U. S. Atomic Energy Commission, Washington, D. C. 20545, Attention: Deputy Director for Reactor Projects, Directorate of Licensing - Regulation.

Dated at Bethesda, Maryland, this 9th day of October 1974.

FOR THE ATOMIC ENERGY COMMISSION

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

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