



NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

August 15, 1973

Mr. D L Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing
United States Atomic Energy Commission
Washington, D C 20545

Dear Mr. Ziemann:

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DFR-22

Response to July 16, 1973
AEC Letter on Fuel Densification

This letter is written in response to your letter of July 16, 1973 to Mr. Arthur V Dienhart (NSP) which presented the elements the AEC Staff wished to be included in the evaluation of fuel densification in boiling water reactors. Analysis for the Monticello reactor was done generically and is reported in Supplement 6 to General Electric Topical Report NEHM-10735, "Densification Considerations in BWR Fuel Design and Performance," which is being concurrently filed with AEC by General Electric.

The July 16, 1973 letter asked that the effects of densification using the Staff assumptions be analyzed for normal operation, anticipated transients and accidents including the loss-of-coolant accident (LOCA). Each of these events is discussed in NEHM-10735, Supplement 6; evaluation of the results presented show that the only significant effect of fuel densification involves the postulated LOCA.

As part of the Staff conclusions, the July 16, 1973 letter stated that if changes in design or operating conditions are necessary to maintain required margins we should submit proposed changes and operating limitations with the analysts. Section 6 of NEDM-10735, Supplement 6 presents, in Technical Specification format, two potential Limiting Conditions for Operation which would maintain required margins should the staff deriskification criteria be implemented. The LOCA analysis to meet this criteria was performed in two ways. First, the maximum allowable average planar linear heat generation rate (APLHGR) was determined as a function of exposure based on a very conservative interpretation of the Staff criteria. Second, an analysis was done using a suitably conservative alternative interpretation of the AEC criteria based on a statistical analysis of existing data; the maximum allowable APLHGR was likewise determined. The results are presented in Figures 4-SC1 and 4-SC2 of NEDM-10735, Supplement 6 along with a comparison to that allowed by current Technical Specification limits. In addition to the LOCA analysis, which determined allowable fuel bundle segment power levels, the Staff criteria on power spiking as it affects the normal operating linear heat generation rate of the hottest fuel pin was also determined. The maximum allowable LHGR is reduced from 17.5 kw/ft as shown in Figure 3-6 and discussed in Section 6 of NEDM-10735. A summary of results pertaining to the Monticello Plant is presented in column C of Table 6.2 of NEDM-10735, Supplement 6.

With regard to the postulated LOCA, previous analyses indicate that the Monticello Plant satisfies the Interim Acceptance Criteria applicable to this event without additional specific restriction or altered modes of operation. It is made clear in the July 16, 1973 letter that the principal effect of the

Staff's fuel densification models on the LOCA calculation is a modification of the 1000 btu/hr ft² gap conductance in the AEC approved GE ECCS evaluation mod 1. We recommend that the Staff continue to utilize the existing 1000 btu/hr ft² value for all analyses until such time as General Electric can reasonably complete development of a more sophisticated analytical model representing the changes of gap conductance in relation to the various phenomena, including fuel densification, associated with increasing exposure. There does not appear to be any safety reason for immediate action. Deferral of action until development of a complete analytical model upon which general agreement can be reached appears to be the preferable alternative.

We have reviewed the impact on Monticello cycle 2 operation, should the suggested General Electric Technical Specifications be implemented following AEC Staff evaluation. The ARIES limitations based on the LCM analysis appear to be more restrictive, at all times, than the LCM limitations imposed on normal operation; the latter, in themselves, would have minimal impact on cycle 2 operation. If the suitably conservative alternative approach were deemed appropriate, a maximum plant derate of 5% may be necessary near the end of cycle 2. If adherence to the more conservative interpretation of Staff criteria were required, it appears that a greater plant derate may be necessary during a significant portion of the remainder of cycle 2. It should be noted that the suggested Technical Specification limitations refer to bundle segment power rather than total plant power. A detailed analysis of the impact of these bundle power limitations on future plant operation is being initiated. Projected near-term operation indicates that the plant will operate below the beta curves of Figures 4-9C1 and 4-9C2 for the next one to two months and is currently below the gamma curve.

Having reviewed NEDM-10735 and Supplements 1 through 6, we agree with the General Electric position that the Staff criteria presented with the July 16, 1973 letter is overly conservative in light of existing data concerning BWR fuel densification. Based on comparisons of the information in Supplement 6 to NEDM-10735 and our current Monticello cycle 2 operating parameters, we believe that no immediate action is required and that normal operation may be safely continued.

It is requested that General Electric generic filing of NEDM-10735, Supplements 1 through 6 be referenced in the Monticello docket. Please advise us if any other action or additional information is required with regard to this matter.

Yours truly,



L. O. Mayer, Jr.
Director of Nuclear Support Services

LSM/NEV/hr

cc: B H Grier
G Chernoff
Minnesota Pollution Control Agency
Attn: K Daugen

NSP

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NSP
AEC

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Yours truly,



L O Mayer, PE
Director of Nuclear Support Services

LOM/MHV/br

cc: B H Grier
G Charnoff
Minnesota Pollution Control Agency
Attn. K Dzugan

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DESCRIPTION:

Ltr submitted on behalf of NSP....re our 7-16-73 ltr....trans the following:

ENCLOSURES:

Ltr dtd 8-15-73 fm NSP re our 7-16-73 ltr furnishing info re GE Topical Report NEDM-10735, "Densification Considerations in BWR Fuel Design and Performance".

NOTE: 1 cy Advance to Ziemann
1 cy Advance to Butler

PLANT NAME: Monticello

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FOR ACTION/INFORMATION 8-16-73 LB

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