

FROM:

Northern States Power Company
 Minneapolis, Minnesota 55401
 L. O. Mayer

DATE OF DOCUMENT:

2-3-72

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TO:

Dr. Morris

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ACTION NECESSARY ☐NO ACTION NECESSARY ☐CONCURRENCE ☐COMMENT ☐

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FILE CODE:

50-263

DESCRIPTION: (Must Be Unclassified)

Ltr reporting operating difficulties
 on 1-24-72..re..significant variation
 in Core Reactivity Calculation.....

ENCLOSURES:

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AEC PDR

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REMARKS:

U.S. ATOMIC ENERGY COMMISSION

MAIL CONTROL FORM FORM AEC-326S (6-60)

NSP

NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

February 3, 1972

Dr. Peter A Morris, Director
Division of Reactor Licensing
United States Atomic Energy Commission
Washington, D C 20545

Dear Dr. Morris:

MONTICELLO NUCLEAR GENERATING PLANT

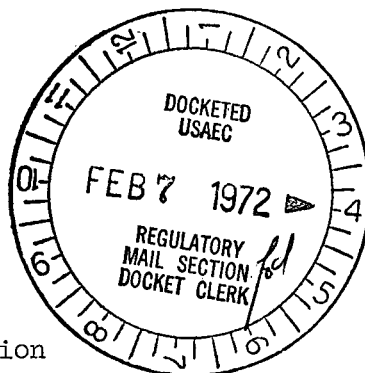
Docket No. 50-263 License No. DPR-22
Reporting of Significant Variation in Core Reactivity Calculation

A condition occurred at the Monticello Nuclear Generating Plant recently which we are reporting to your office in accordance with provisions of Section 6.6.B.1 of Appendix A, Technical Specifications of the Provisional Operating License DPR-22. The Region III Compliance Office has been notified of the occurrence in accordance with Technical Specification 6.6.A.2.

On January 24, 1972, the reactor was being made critical after an extended outage. The reactor became critical after 23 control rods were fully withdrawn. As a supplemental operating procedure, prior to restarts, the critical rod pattern is analyzed in light of the temperature, exposure, and poison fission product inventory at the time of criticality. The 23 rod criticality was not anticipated because during initial criticality, the clean core went critical with 30 rods fully withdrawn and figure 3-3-2 of the FSAR, which has been used in the predicted critical procedure, shows that, with one stuck rod, at no time during the life of the core is the reactivity expected to be greater than that of the clean core. All rods were fully inserted and analysis of the situation commenced.

The reactivity increase observed on January 24, 1972, was felt to be the result of poison curtain depletion. Core average exposure at the time of the occurrence was 1760 MWD/STU; the previous criticals were at low exposures and therefore the effect of curtain depletion was less noticeable.

The situation was analyzed by a number of parallel paths. Data taken during past criticals along with the data point at 1760 MWD/STU were reanalyzed.



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NORTHERN STATES POWER COMPANY

Dr. P A Morris

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February 3, 1972

A curve was fit to the data to show changes in reactivity as a function of exposure. Three independent consultants also performed theoretical calculations to determine changes in reactivity as a function of exposure. General Electric was also asked to review the data supplied for the FSAR. They have found that the computer code used in the initial core design tended to underpredict the degree of flux peaking in the water gaps where the curtains are located. As a result, curtain worth and the effect of curtain depletion on core reactivity was underestimated. The code also predicted too large a negative temperature coefficient. General Electric has recalculated the reactivity of our core with one stuck rod using improved codes and this data is supported by the other independent calculations. A revised FSAR figure 3-3-2 is attached.

A test was conducted to measure the temperature coefficient at the present exposure and this demonstrated that the temperature coefficient is less negative than that which we have been using. Data from past criticals were reanalyzed in light of the measured temperature coefficient to secure more refined data. All calculated and empirical data are consistent in predicting (1) that the core is and should be more reactive at the present time than the cold, clean core and (2) that the core will continue to become more reactive. Best figures show that the peak core k-eff with one stuck rod will be 0.980 at approximately 2500 MWD/STU. A shutdown margin test demonstrated that the margin exceeds that required by Technical Specification 4.3.A.1. The above investigations and use of NSP's recently completed core analysis program should further enhance our predictive capabilities.

A surveillance check for reactivity anomalies has been done regularly at operating power conditions in accordance with Technical Specification 4.3.E. This test uses data supplied by another more recent General Electric computer model. A continuous gain in reactivity has been observed during power operation. Test results at operating power conditions have continuously been well within the acceptance criteria of the Technical Specification; however, comparison of hot operating data to one rod out data would not have revealed that figure 3-3-2 of the FSAR was incorrect.

A Significant Operating Event report with extensive core analysis detail will be available at the site. Division of Compliance representatives have been at the plant and all of this data has been made available to them.

Yours very truly,



L O Mayer, P.E.
Director-Nuclear Support Services

LOM/br

cc: B H Grier

Attachment

Monticello Nuclear Generating Plant
Stuck Rod Margin As A Function Of Exposure (First Cycle)

2/3/72

