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Regulatory Docket File

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NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

February 18, 1977

Telecopied 2/18/77

Mr Victor Stello, Director
Division of Operating Reactors
U S Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr Stello:

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 263 License No. DPR-22

NRC Inquiry Regarding ECCS Analysis Changes

This letter is written in response to a verbal request from the Monticello NRC Project Manager, Mr Dick Snaider, on February 14, 1977 concerning ECCS analysis changes. We have been in contact with General Electric, the vendor who performed the Monticello ECCS Analysis, and have received the following information.

The aspects of the ECCS model identified on the attached pages have been under review and discussion between General Electric and your staff. Two groups of changes are identified. Of the first group entitled "ECCS Input Changes and Detrimental Model Changes", items a, b, e-i, e-ii, f and g are applicable to the Monticello ECCS analysis filed July 9, 1975. The remaining items are not applicable. The cumulative effect of the applicable changes is that the MAPLHGR limits in the Monticello ECCS analysis and in the current Technical Specifications are conservative by an amount of 2%. The attachment continues to identify "Beneficial Model Improvements" for which an additional margin of conservatism can be expected. Since the current MAPLHGR limits were shown to be conservative in light of the above changes, there was no estimate made of the additional conservative effects of beneficial model improvements to the Monticello ECCS analysis.

After the model changes have been incorporated into an ECCS model which is formally approved in accordance with 10CFR50.46, we will submit an analysis using the revised model. In the interim, operation is supported by the July 9, 1975 evaluation using the currently approved ECCS model and the reevaluation reported above which shows compliance of the existing Technical Specification operating limits with the criteria of 10CFR50.46.

Yours very truly,

L. O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/MHV/ak

cc: J G Keppler
G Charnoff
MPCA
Attn: J W Ferman

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DESCRIPTION OF ECCS REEVALUATION

The attached table contains the results of all emergency core cooling system (ECCS) input and model changes that have been identified and indicates those which are applicable to the plant. These changes have been divided into two groups, and the cumulative effects on maximum planar linear heat generation rate (MAPLHGR) of each group conservatively estimated. The total effect on MAPLHGR has then been determined. The groupings and a description of the individual changes are given below. The references identified following each change description provide further amplification of the change.

1. ECCS Input Changes and Detrimental Model Changes

   a. New Suction Break Area in the SAFE calculation - This item refers to a new recirculation suction line break area if it has changed from previous analyses. (Reference 1)

   b. Vaporization Calculation - The calculation of the steam generation in the REFLOOD code has been made consistent with the approved ECCS evaluation model. In previous analyses, the vapor generation was underestimated which provided a reduced effect on counter current flow limiting (CCFL). A lower value of CCFL gives shorter reflood time and lower values of peak clad temperature (PCT). (Reference 1)

   c. Eliminate Structural Absorption Double Credit - In the original calculation double credit was taken for the effects of structural absorption in the decay heat calculation. (Reference 1)

   d. Credit for Suction Line Friction - The approved ECCS evaluation model allows for reduction of blowdown due to piping friction. In the previous analyses on plants incorporating the low pressure coolant injection system (LPCI) modification, no credit was taken for friction in the recirculation system suction line for the discharge break calculations. (Reference 1)

   e. Others.

      i. Reactor Internals Thermal Characteristics - In the REFLOOD code, the reactor internals are modeled as heat sources which increase steam generation. Since the magnitude of these sources has been revised, there will be an effect on CCFL and reflood time. (Reference 1)

      ii. Bypass Area Adjustment - The bypass area provides a path for core spray flow around as opposed to through the fuel assembly. For a larger bypass area, there is a reduced CCFL effect on spray water entering the bypass region. More precise bypass area calculations have been completed and used for REFLOOD code inputs. (Reference 1)

iii. Discharge Valve Closure Assumption - For LPCI modified plants, the effective pipe break area is dependent on whether or not the discharge valve is assumed to close. It is conservative to assume no valve closure since this maximizes the break area for a discharge break. In previous analyses, it was assumed that the valve closed.

f. Pressure Rule - In the SAFE code, there is a non-conservative spike in pressure when the reflooding flow recovers the bottom of the active fuel. In previous analyses, the calculated pressure before the spike was assumed to remain constant for duration of the event. As a result of discussion with the NRC, it was agreed to use the lower of the SAFE calculated value or constant pressure calculation. (Reference 1)

g. Increased CCFL Differential Pressure - Some experimental evidence exists that the differential pressure in a fuel assembly during periods of CCFL may be higher than previously assumed. This could cause a delay in reflood time. (Reference 5)

2. Beneficial Model Improvements

a. REFLOOD 04 - In the approved ECCS evaluation model (REFLOOD 03) for certain conditions, the steam split between the jet pumps and the fuel was incorrectly calculated. REFLOOD 04 revised this calculation. (Reference 3)

b. Partial Drill - For plants with plugged bypass flow holes and some but not all fuel assembly lower tie plates drilled, no credit has been given for the reflood flow through these holes. The partial drill change to the ECCS model conservatively accounts for this change. (Reference 3)

c. CHASTE 05 - In the approved ECCS evaluation model (CHASTE 04), there is a very conservative treatment of radiation and conduction heat transfer. In CHASTE 05, the heat transfer effects are treated more consistent with the actual phenomena and experimental data. (Reference 4)

REFERENCES

1. "Meeting Summary January 12, 1977 GE Meeting Concerning Effects on Operating BWR's of Input Errors to 'Appendix K' LOCA Analysis".

2. Letter, R E Engel to Victor Stello Jr, "Supplemental Information to Eliminate Significant In-Core Vibrations (NEDE-21156-1)". September 16, 1976.

3. Letter, A J Levine to D F Ross, "BWR ECCS LOCA Evaluation Model", Oct 13, 1976.

4. Letter, A J Levine to D F Ross, "General Electric (GE) Loss of Coolant Accident (LOCA) Analysis Model Revisions-Core Heatup Code CHASTE 05", January 27, 1977.

5. Letter, G G Sherwood to Victor Stello, Jr, "Additional Changes to GE Emergency Core Cooling System Analyses", February 14, 1977.