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MINNEAPOLIS, MINNESOTA 55401

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U.S. NUCLEAR REGULATORY COMMISSION
Mail Section

November 1, 1977

Mr Victor Stello, Director
Division of Operating Reactors
c/o Distribution Services Branch, DDC, ADM
U S Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr Stello:

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

Answers to LOCA Analysis Questions

An October 12, 1977 letter from Mr Don K Davis of your organization requested answers to two questions concerning our September 15, 1977 submittal. The questions are repeated below along with their respective answers. The responses make reference to the following document:

Reference: General Electric Company "Analytical Model for Loss-of-Coolant Analysis in Accordance with 10CFR50 Appendix K" NEDO-20566, Vol. II

Question 1 From the August 1975 analysis and from the present analysis, provide tabular MAPLHGR (Maximum Average Planar Linear Heat Generation Rate) values, without rounding off or truncation, to two significant figures to the right of the decimal point (XX.XX) for the following:

8D219 fuel at 30,000 MWD/MTU exposure
8D250 fuel at 15,000 MWD/MTU exposure
8D250 fuel at 20,000 MWD/MTU exposure

If any of the requested MAPLHGR values correspond to a PCT (Peak Clad Temperature) below 2196°F, provide the corresponding PCT.

Response The requested information is given below:

Fuel Type	Exposure MWD/T*	1975 Analysis MAPLHGR kw/ft	1975 Analysis PCT °F	1977 Analysis MAPLHGR kw/ft	1977 Analysis PCT °F
8D219	30000	10.51	2200	10.28	2138
8D250	15000	10.80	2197	10.78	2197
8D250	20000	No value was calculated for this exposure		10.68	2196

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Please note that General Electric provides MAPLHGR's to operating plants which are truncated after the first significant figure following the decimal point. Further, it is recommended that the operating limit be established on the basis of the truncated MAPLHGR.
*The exposure units used here are consistent with both analyses being MWD/STU.

Question 2 Provide a qualitative explanation of hot mode uncovery vs. break size (Figure 6). The explanation should clarify how depressurization rate (in the new model as modified from the previous model) and the current flow limiting phenomenon as applied to the Monticello geometry (by-pass area, vessel size, flow paths through the tower core region into the lower plenum, etc.) combine to cause the most limiting break to be 40% of the DBA (Design Basis Accident). Also , explain why this combination of effects causes a greater increase in PCT for smaller breaks for Monticello than for the lead plant (Quad Cities), where PCT for smaller breaks remains slightly below the DBA PCT.

Response The most limiting break for Monticello was determined to be 40% of the DBA for the following two reasons:

1) The depressurization rate, in the new model as modified from the previous model generally has a greater impact on the smaller breaks than on the larger breaks as the new method results in longer periods of steam generation due to flashing. The increased steam generation calculated then affects the amount of core spray flow to the lower plenum as determined by the counter current flow limiting characteristics of the core or by bypass regions.

2) At some break size smaller than the DBA and generally for all breaks smaller than that, the REFLOOD code uses the small break model (SBM) instead of the large break model (LBM). (The differences in the two models are discussed below.) As there are some differences in the two models, there appears to be an apparent discontinuity in the break spectrum analysis of these breaks. For Monticello, around 40% of the DBA is the break at which SBM is used. This difference in models, combined with the reason discussed in (1) above, combine to make the 40% of the DBA the most limiting break for Monticello.

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The reason the results for Monticello are different from those for the lead plant is the difference in the sensitivity of the results to changes discussed in (1) above, i.e., as the lead plant has more bundles, it has more leakage paths; hence the results are less sensitive to the CCFL phenomena in the core or bypass region and hence the shape of the break spectrum (PCT or time during which hot mode remains uncovered versus break size) is slightly different.

Difference Between REFLOOD Small and Large Break Models

The REFLOOD code automatically uses the small break model for any transient for which there is a water level in the active core region, when the calculation switches from the SAFE code to the REFLOOD Code.

The two most significant differences between the small and large break models are:

a) Use of the Vaporization Correlation: The vaporization of spray water in the core during the period when core sprays are operating is calculated using a bounding correlation. The correlation, as discussed in Reference 1, requires the PCT at time of spray initiation. The LBM correctly uses a constant value where as the SBM conservatively uses a continuously increasing value. This difference generally results in a more conservative calculation of the reflooding time using the small break model.

b) Level and Vaporization Following Bottom Reflooding: The LBM uses an empirically based void fraction of 0.50 for calculating the level and the vaporization below the level. The SBM uses the conservative fuel rod heatup model with a reflooding heat transfer coefficient to calculate the level and the vaporization below the level. This difference generally results in a more conservative calculation of the reflooding time using the SBM.

Yours very truly,

L. O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/MHV/deh

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