GPU NUCLEAR

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U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Response to Request for Additional Information -
Core Reload Methodology

In response to NRC questions raised during discussions on September 25, 1996, GPU Nuclear is providing the following information.

The safety analysis for the postulated main steam line break (MSLB) accident in the Final Safety Analysis Report (FSAR) assumes that water from the cold legs homogeneously mixes in the lower plenum before entering the core region. Plant test data documented in EPRI NP-3545, "Thermal Mixing in the Lower Plenum and Core of a PWR," dated May 1984, indicated that mixing of the cold leg water in the lower plenum was less than that assumed in the FSAR analysis. Babcock & Wilcox's (B&W) evaluation of this issue was addressed in B&W letter GPUN-89-133, dated May 30, 1989. This evaluation considered possible impacts on reactivity feedback coefficients, peaking factors, location of the hot channel, stuck rod peaking, boron worth and shutdown margin.

GPU Nuclear intends to perform reload analysis using the RETRAN-02 code, and based on the above-referenced plant test data which is applicable to TMI-1, a reduced vessel mixing assumption will be conservatively utilized. The amount of the thermal mixing in the reactor vessel can be quantified by the ratio of the difference of the loop temperature of the hot legs to the difference in the loop temperature in the cold legs.

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This is represented by:

$$\text{Ratio} = \frac{T_{H_A} - T_{H_B}}{T_{C_A} - T_{C_B}} = \frac{\text{Loop A hot leg temperature} - \text{Loop B hot leg temperature}}{\text{Loop A cold leg temperature} - \text{Loop B cold leg temperature}}$$

When T_{H_A} is equal to T_{H_B} the above ratio will be equal to zero. This would mean total mixing has occurred in the reactor vessel. Conversely, when the difference T_{H_A} - T_{H_B} is equal to T_{C_A} - T_{C_B}, the above ratio would be 1.0. This implies no mixing in the reactor vessel. The tests show this ratio to be between 0.4 and 0.5 (a ratio of 0.4 implies 60% mixing, while 0.5 implies 50% mixing). The TMI-1 RETRAN model will conservatively incorporate a reactor vessel mixing ratio of 0.5 based on the above test data.

If any additional information is required, please contact Mr. David J. Distel, GPU Nuclear Regulatory Affairs at (201) 316-7955.

Sincerely,

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DJD/jr

cc: Administrator, Region I
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