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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Three Mile Island, Unit 1 (TMI Unit 1)
Operating License No. DPR- 50
Docket No. 50-289
Additional Information – License Amendment Request No. 311 – Reactor Coolant System Pressure-Temperature Safety Limits

References:

1) BAW-10156-A, Rev. 1, "LYNXT Core Transient Thermal-Hydraulic Program", B&W Fuel Company, Lynchburg, Virginia, August 1993.

2) BAW-1829, "Thermal-Hydraulic Crossflow Applications," Babcock & Wilcox, Lynchburg, Virginia, April 1984.

3) BAW-10179P-A, Rev. 3, Safety Criteria and Methodology for Acceptable Cycle Reload Analyses", Framatome Cogema Fuels, October 1999.

4) Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 223 to Facility Operating License No. DPR-77 and Amendment No. 214 to Facility Operating License No. DPR-79, Tennessee Valley Authority, Sequoyah Nuclear Plant, Units 1 and 2, April 21, 1997.

This letter provides additional information as discussed with NRC staff on September 5, 2001, regarding TMI Unit 1 License Amendment Request No. 311 submitted for NRC review on May 31, 2001. This additional information addresses the basis for the proposed 105.5% required reactor coolant system (RCS) flow rate specified to offset potential mixed core penalty for TMI Unit 1 Cycle 14 and provides additional detail regarding the Framatome ANP mixed core methodology utilized in the DNB analyses supporting the RCS pressure-temperature core safety limits.

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The thermal-hydraulic DNB evaluation performed by Framatome ANP to determine the pressure-temperature safety limits utilized the LYNXT code [1] and the crossflow applications techniques [2], in conjunction with the safety criteria and methodology defined in Reference [3]. Since the TMI Unit 1 Cycle 14 core will contain fresh fuel with slightly different hydraulic resistance associated with the change to the fuel assembly lower end fittings, a detailed mixed core evaluation was performed. The mixed core methodology employed for TMI Unit 1 Cycle 14 was consistent with the methodology previously reviewed and approved by the Nuclear Regulatory Commission [4] for a more severe condition where Framatome ANP's fuel design was to reside in cores with two types of Westinghouse resident fuel designs in the Sequoyah units. This same methodology has also been used for the Framatome fuel batch transitions from Westinghouse fuel at the McGuire units, Catawba units, and the Trojan unit.

A primary objective of the methodology is to model the core, assuming various core configurations and plant operating conditions, to bound the potential mixed core DNBR penalty. This involves the assumption of the power limiting pin, or hot pin, residing in fuel design "A" for one configuration, and residing in fuel design "B" for a second configuration, and so on. This technique can also allow the DNB record of analysis to remain applicable in the event of core configuration changes occurring prior to plant startup. Obviously, such core configuration changes would be reviewed against the record of analysis to verify the analysis remains bounding and applicable.

For the TMI Unit 1 Cycle 14 core reload licensing analyses, Framatome ANP determined the core pressure-temperature safety limits assuming a full core of Mark-B10 fuel assemblies and a RCS flow rate assumption of 102% of design flow (102% of 352,000 gpm). These limits represent pressure-temperature conditions for a minimum DNBR of 1.18 (BWC CHF correlation) and are presented in TMI Unit 1 Technical Specification Figure 2.1-3 for all three RC pump operating modes and in TMI Unit 1 Technical Specification Figure 2.1-1 for the limiting four pump operating condition. Framatome ANP determined that mixed core penalties are typically offset by tightened peaking limits for limiting fuel designs or the application of reserved DNBR margin above the CHF correlation design limit. An even more conservative technique would be to apply a global accommodation such as a core power reduction or elevation of the minimum RCS flow rate criterion that offsets DNBR penalty associated with potential mixed core configurations. Both of these global accommodations preserve DNB margin not just for the limiting fuel design but for all fuel designs in the core. For TMI Unit 1 Cycle 14 AmerGen elected to utilize the more conservative global accommodation of elevating the minimum RCS flow rate criterion by basing the mixed core analyses on an assumed RCS flow rate of 105.5% of design flow (105.5% of 352,000 gpm).

The selection of a DNB mixed core flow rate criterion 105.5% for Cycle 14 was based on the fact that TMI Unit 1 was comfortable in imposing this elevated flow rate as the minimum RCS flow rate criterion and that the flow rate change, in terms of DNBR change, would adequately offset the bounding mixed core DNBR penalty. Therefore, all the pressure-temperature safety limits, as well as steady state peaking limits (see section 6.6 of [3]), were re-examined with LYNXT using the conservative mixed core configurations with an elevated RCS flow rate of 105.5% of design

flow. All minimum DNBR predictions for these conditions were >1.18 (BWC), thereby, demonstrating that the elevated RCS flow rate assumption more than offset the mixed core DNBR impact. In the same manner, Framatome ANP also examined the mixed core DNBR impact on the limiting DNB transient and associated transient initial condition peaking limits (see section 6.6 of [3]) and demonstrated that the offsetting affect was adequate. Therefore, the DNBR predictions defined in the record of analysis for TMI Unit 1 Cycle 14, using the assumptions of a full Mark-B10 core and an RCS flow rate of 102% of design flow, conservatively bound the DNBR predictions associated with mixed core configurations using an elevated RCS flow rate criterion of 105.5% of design flow.

The measures taken by Framatome for examining the TMI Unit 1 Cycle 14 mixed core configuration are consistent with those used earlier for Sequoyah [4] and assure the DNBR predictions established for TMI Unit 1 are bounding and applicable. These actions in conjunction with the imposed elevated minimum RCS flow rate criterion of 105.5% of design flow rate for TMI Unit 1 provide adequate protection for mixed core DNBR impacts.

This additional information does not affect the conclusions of the previously submitted no significant hazards consideration or environmental consideration evaluations supporting this license amendment request.

There are no new regulatory commitments established by this submittal. If any additional information is needed, please contact David J. Distel at (610) 765-5517.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

09-14-01
Executed On

Michael P. Gallagher
Director, Licensing & Regulatory Affairs
Mid Atlantic Regional Operating Group

MPG/djd

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File No. 01040