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August 3, 1983
5211-83-222

Office of Nuclear Reactor Regulation
Attn: J. F. Stolz, Chief
Operating Reactor Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
TMI-1 Steam Generator Repair Status Update

In our phone conversation of July 25, 1983 on additional steam generator work performed since March 1983, we discussed the acceptability of tubes which had lost preload. Per your request, this letter is to supply you with supplemental information in this area in advance of the revision of the Topical Report 008.

GPUN examined the effects of changing preload with respect to the limiting transient and accident loads on the tube. The maximum compressive load under FSAR accident conditions is a 620 lbs load associated with a feedwater line break. The approximately 775 lb generic design basis compressive load associated with a 100°F/hr heat-up proves to be the limiting case. We understand that B&W generic calculations assume a preload of not more than 100 lbs tension. Thus, for a tube with no preload, 875 lbs is the maximum compressive design basis load expected under normal, transient or accident conditions. However, measurement of the gap left at the seal weld following relief of preload confirms up to 280 lbs of preload may have been lost in some peripheral tubes at TMI-1. For conservatism, an evaluation was performed of the ability of a tube to withstand 1025 lbs of compressive load. This is a conservatively large loading since actual heat-ups are conducted at rates well below 100°F/hr and the 1025 lb load value is considered conservative for a 100°F/hr heat-up transient.

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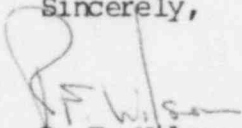
Buckling is not expected to occur under this load. Tube bowing is limited by the small clearances of the tube support plate holes. Further, the applied load is secondary in nature; it is caused by thermal differential expansion. As the tube begins to bow under the loading, the magnitude of the load is reduced. Thus, a non-preloaded tube will not be overstressed by the transient load conditions.

GPUN has also examined the magnitude of lateral displacement to be expected in a tube loaded compressively to 1025 lbs. The magnitude of the lateral displacement in the 16th span of the tube will be the largest since that span is longest, but all of the spans will contribute in relieving the load. Displacement magnitude will also be dependent in part on the initial curvature of the tube. Lateral displacement is nominally less than the dimensions of the gap between tubes, so no interaction among tubes, even under transient conditions, is expected as a result of the loss of preload. However, even if tubes were to contact each other, no problem is expected. During a heatup transient, flow rates are very low and the time duration is relatively short; no significant tube vibration or wear would be expected.

GPUN has also considered the effects of the change in preload on the natural vibration frequency of a tube. A non-preloaded tube is expected to have a natural frequency about 15% lower than one preloaded. The effect of this frequency reduction is considered small. EPRI has reported that other operating plant steam generators have variations in tube frequencies of as much as about 10 to 20% within a single steam generator. In addition, test data reported by EPRI shows that another OTSG plant now operating has tube frequencies about 15% lower than those of the tubes at TMI-2. If, as expected, the TMI-1 tubes have approximately the same preload as those at TMI-2, then the tubes at the other plant mentioned above have about the same frequency and therefore, essentially the same preload as the unloaded TMI-1 tubes. Accordingly, no problem is expected at TMI-1 due to non-preloaded tubes.

Based on the above described evaluations, GPUN has concluded that the relief of preload in some of the steam generator tubes does not render them unacceptable for continued use. Thus, the conclusions of Topical Report 008, Rev. 2 are unaffected, and the evaluation concluding that there are no significant hazards associated with the return to service of the steam generators remains unchanged.

Sincerely,



R. F. Wilson

Vice President-Technical Functions

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ccs: H. Silver
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