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December 9, 1983
5211-83-349

Office of Nuclear Reactor Regulation
Attn: J. F. Stolz, Chief
Operating Reactors Branch No. 4
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
EFW Flow Test

In our letter of March 22, 1983, GPUN committed to perform a flow test to confirm that one motor driven EFW pump can deliver 450 gpm to two intact OTSGs with the pump recirculation line open (simulating rupture in the non seismic Category 1 portion of the line). During recent EFW functional testing, with the plant in cold shutdown flow from one motor driven EFW pump to one intact OTSG with the pump recirculation line closed was measured. Test data was then extrapolated to hot conditions with flow to two OTSGs and the recirculation line open. This extrapolation indicated that an EFW flow of 400 gpm is achievable.

In our March 22, 1983, letter we had committed to do this testing during "hot functional" testing of TMI-1. We perceived that this confirmatory testing needed to be done before taking the plant critical. In this mode (plant at cold shutdown or at hot standby due to RC Pump Heat) a "hot" test with the steam generators pressurized was not considered feasible due to concerns over rapid cooldown. The flow rate of the EFW System during a full flow test of one pump was greatly in excess of the flow necessary to remove the heat due to four (4) RC pumps (heat input by one (1) RC pump is removed by about 25 GPM EFW flow). For these reasons, performance of the EFW system had to be extrapolated from "cold" test data.

Based on this result, GPUN has reviewed the assumption and calculations which provided our basis summarized in our response of March 22, 1983 and revised our calculations to determine the minimum flow necessary under Small Break LOCA and Loss of Feedwater events following a seismic event with a 20 minute delay in EFW flow delivery. A summary of the assumptions and results for both events is provided below:

For Small Break LOCA

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Assumptions

All assumptions are in accordance with the B&W analysis, "Evaluation of Transient Behavior and Small Reactor Coolant System Breaks in the 177 Fuel Assembly Plant:", Section 6, by Babcock & Wilcox dated May 7, 1979, except as follows:

- a. Only one (1) EFW pump (motor driven) is assumed to be available.
- b. 350 GPM EFW is delivered to the OTSGs after a 20 minute delay.
- c. EFW pump recirculation line is broken in the non-seismic portion.
- d. Reactor at 102% of 2535 MW_t at start of event.
- e. High Pressure Injection (HPI) is unavailable in the first 20 minutes. Automatic initiation subsequently occurs when the 1600 psig ESFAS set point is reached (this is the TMI-1 set point). The set point is reached as a result of the RCS being depressurized by EFW cooling.

Results

The results indicate no change in conclusions from the B&W analysis including:

- No core uncover.
- No Power Operated Relief Valve (PORV) lift, and the pressurizer does not go solid.

Therefore, with a 350 GPM EFW flow rate, following a 20 minute delay, the plant can be safely shutdown with the available inventory as identified in Item No. 1 of our letter of February 4, 1983 (5211-83-040).

For Loss of Feedwater (LOFW)Assumptions

- a. Only one (1) EFW Pump (motor driven) available.
- b. 350 GPM EFW delivered to the OTSGs after a 20 minute delay.
- c. EFW pump recirculation line broken in the non-seismic portion.
- d. Reactor at 102% of 2535 MW_t at start of event.
- e. HPI automatic initiation at 1600 psig; initiation occurs about 68 minutes after the start of the event.
- f. Reactor Coolant Pump Heat not included.

Results

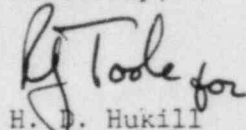
- No core uncover.
- PORV lifts 9 minutes after start of event.
- Pressurizer goes solid 15 minutes after start of event.
- With 350 GPM EFW flow rate, following a 20 minute delay, the plant can be safely shutdown with the water inventory (155,000 gal.) identified in a letter to the NRC dated February 4, 1983.

It should be noted that these analyses for LOCA and LOFW are conservative in that no credit is taken for the following TMI-1 system features and procedural requirements:

- Operator starting the EFW pumps on loss of main feedwater
- EFW actuation on Loss of Feedwater or trip of four (4) Reactor Coolant Pumps.
- Manual HPI actuation on loss of all feedwater.

With the above, we conclude that TMI-1 can be safely shutdown following a small break LOCA or LOFW event with an EFW flow rate of 350 GPM subject to a 20 minute delay in delivery of EFW to the steam generators. Therefore, the total achievable flow of 400 GPM delivered by one (1) motor driven pump to feed both intact OTSGs with pump recirculation line open is adequate for safe plant shutdown. We consider our March 22 commitment to perform a flow test to be completed, and this issue to be closed.

Sincerely,


H. D. Hukill
Director, TMI-1

HDH:LWH:RAS:vjf

cc: R. Conte
J. Van Vliet