



Metropolitan Edison Company
Post Office Box 542
Reading Pennsylvania 19640
215 929-3601

Writer's Direct Dial Number

August 17, 1979
GQL 1074

TMI-2 Support
Attn: John T. Collins, Deputy Director
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

Three Mile Island Nuclear Station Unit 2 (TMI-2)
License No. DPR-73
Docket No. 50-320
Natural Circulation Stability

In response to your questions posed in your memo of July 26, 1979 concerning Loss of Natural Circulation, the following reply is given:

QUESTION 1 Confirm in writing that the cyclic cooling mode, if it is to be relied upon, is safe. The effect of rapid transfer of water in the Reactor Coolant System, thermal cycling of components (OTSG, Vessel, etc.) and Reactor Coolant System pressure control (considering solid operation) should be addressed. Further, this evaluation should consider the length of time this mode of operation will be utilized.

RESPONSE It is expected that stable natural circulation will continue until the A loop ΔT reaches 3-4 degrees F (i.e., September - October 1979). At that time, loop operation will be characterized by the following:

- a. Periodic Natural Circulation on "A" loop with ΔT 3-5 degrees F.
- b. Periodic "burps" of the "B" loop triggering an oscillation in the "A" loop temperatures (both T_H and T_C). These oscillations may become divergent and may result in stopping of "A" loop flow.
- c. If "A" loop flow stops - the following will occur:
 - 1) T_H and T_C will be relatively constant
 - 2) Reactor Coolant System pressure will increase
 - 3) Incore thermocouple temperatures will increase

571024

7909180273
7909180273

- d. After some period of increasing Reactor Coolant System pressure and incore thermocouple temperature, the "A" loop will begin to flow. This restoration of flow will be slow compared to the present "burps" in the "B" loop.

It is also expected that the stagnant period will not be very long since the cooling effect of steaming on "A" is large compared to the environmental heat loss from "B" (which currently results in water movement every 4 to 6 days). It is anticipated that the period of stagnant operation to be on the order of hours or most likely may simply be an oscillation of flow with ΔT varying between 2-5 degrees F.

Based on this anticipated cyclic behavior, it is felt that the worst case of thermal cycling of components is occurring now during "B" loop "burps." Furthermore, it is felt that the critical component is the OTSG. B&W has performed a conservative analysis of this condition and has determined that the OTSG can withstand at least 10^4 such cycles. Therefore, the cyclic cooling mode of operation should also be acceptable for any reasonably foreseeable future (e.g., years).

Pressure control during this mode of operation is discussed in the response to Question 3.

QUESTION 2

Outline the modes of cooling for long term decay heat removal to be called upon, and at what point they will be used to replace the cyclic Natural Circulation mode via the "A" OTSG. Include the priority for use of these cooling modes.

RESPONSE

It is expected that by the time cyclic operations occur, TMI-2 will have installed a mini-decay heat removal system. This small system will enable heat removal from the Reactor Coolant System without the need for steaming the "A" OTSG or Natural Circulation. This system is the long term mode of decay heat removal and is to be operated up to and during Reactor Coolant System draining, reactor vessel head removal and defueling. The system can replace Natural Circulation cooling any time after it becomes operational.

If the mini-decay heat removal system becomes unavailable for any reason, Met-Ed recommends the following backup modes in the priority shown:

- a. Cyclic Natural Circulation steaming "A" Steam Generator.
- b. Cyclic Natural Circulation steaming "A" and "B" Steam Generators.

- c. Cyclic Natural Circulation using "B" LTC.
- d. LP safety injection and pressurizer venting, if required to allow step (e).
- e. Normal plant safety grade decay heat removal system.

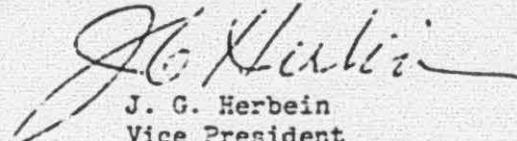
QUESTION 3

Indicate a schedule for revision to those currently active emergency and standard operating procedures (such as EP-34, Loss of Natural Circulation and Z-39, Natural Circulation Operation) that will be necessary as a result of the determined course of action to be followed upon loss of Natural Circulation.

RESPONSE

B&W has already completed recommended changes to EP-34, "Loss of Natural Circulation" and Z-39, "Natural Circulation Operation." These changes cover cyclic Natural Circulation operation. Additionally, B&W has recommended recent changes to Z-63, "Solid Plant Operation." Pressure control under cyclic operation is covered under these recommended changes to EP-34 and Z-63. These B&W changes have been incorporated into procedures and are now in the review and approval chain.

Sincerely,



J. G. Herbein
Vice President
Nuclear Operations

/tab

871026

~~SECRET~~