PUBLIC
SERVICE
INDIANA

P. O. Box 190
New Washington, Indiana 47162

May 13, 1980

Mr. James G. Keppler, Director
U. S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Docket Nos.: STN 50-546
STN 50-547
Construction Permit Nos.:
CPPR - 170
CPPR - 171

Marble Hill Nuclear Generating Station
Units 1 and 2

Dear Mr. Keppler:

On February 22, 1980, Mr. S. J. Brewer of Public Service Company of Indiana, Inc. (PSI) notified your office of a potentially reportable item as required by 10CFR 50.55(e). Westinghouse had identified a potential problem in meeting the PSAR basis secondary cooling flow rate due to main feedwater line rupture, with a concurrent failure of the steam generator blowdown isolation valve in another loop.

PSI has evaluated this scenario for Marble Hill Units 1 and 2. The result of this accident analysis is given in the attachment. This analysis shows that for the Marble Hill design with both auxiliary feedwater pumps operating, a total of 560 gallons per minute (gpm) can be delivered to both intact steam generators which exceeds the minimum acceptable flow rate of 459 gpm.

Therefore, this situation will not affect adversely the safety of operations of the plant and does not meet the reportability requirements under 10CFR 50.55(e). If you have any questions on this item, please feel free to contact me.

Sincerely,

S. W. Shields
Senior Vice President
Nuclear Division

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cc: Director of Inspection and Enforcement
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FEED LINE BREAK ANALYSIS CONCURRENT

WITH STEAM GENERATOR BLOWDOWN

ISOLATION VALVE FAILURE

1. Scenario

During a main feed line rupture the steam generator blowdown isolation valve (SGBIV) fails to close automatically (assumed single failure). The resulting flow through the valve will decrease the net cooling flow to the intact steam generators. If the blowdown piping downstream of the SGBIV's fail due to a high energy line break (HELB) effect, the net cooling flow could further be reduced.

2. Assumptions

a. Main feedwater line break occurs between the steam generator nozzle and the feed line check valve.

b. SGBIV sticks open in wide open position with only atmospheric pressure downstream. No pipe is assumed downstream of valve.

c. Auxiliary feedwater added to the steam generator that has the steam generator blowdown isolation valve stuck open flows directly through the steam generator and out through the valve. No credit is taken for heat removal from that steam generator and critical flow results through the SGBIV's.

d. The Safety Category I portion of the blowdown line will not sustain a break as a result of the main feedwater line break because the main feedwater lines are restrained for pipe whip both inside containment and in the main steam and feedwater valve rooms.

e. Both auxiliary feedwater pumps (one motor driven and one diesel driven) provide flow to the four steam generators.

f. Other assumptions are the same as those of the Feedwater System Pipe Break Analysis in Section 15.2.8 of the Marble Hill FSAR.

3. Marble Hill Units 1 and 2 Specific Accident Consequences

The Marble Hill Units 1 and 2 steam generator blowdown system design includes the provision to control blowdown flow from each steam generator independent of other steam generators. The two blowdown lines from each steam generator are combined outside the containment into a single line. These lines terminate in a separate header for each unit in the auxiliary building. The blowdown lines from each of the steam generators have one air operated valve capable of automatic closure and two manual shutoff valves located in the Safety Category I main steam and feedwater valve

room immediately adjacent to the containment. A blowdown rate of 15 gallons per minute per steam generator is maintained during normal operating conditions. In the case of primary to secondary leakage, the blowdown rate from the non-leaking steam generators can remain at approximately 15 gallons per minute, while the blowdown rate from the leaking steam generator may be increased to the design rate of 90 gallons per minute. The blowdown piping and valves from the steam generator to the outermost containment isolation valves, capable of automatic closure during all modes of normal reactor operation, are Safety Category I and Quality Group B. The SGBIV's are designed to fail closed on loss of air or power. A hand switch is provided in the main control room for opening or closing the valves if desired by the operator. In addition, a flow rate controller is provided on the radwaste panel.

The accident consequences have been analyzed and calculations performed to determine the minimum flow rate to two intact steam generators during a main feed line rupture concurrent with a failure of the SGBIV in another loop. The calculational procedure involves establishing the head loss or system characteristic curves for each of the four auxiliary feedwater branches, from the auxiliary feedwater pumps to the steam generators, and plotting these on a Head versus Flow (H/Q) diagram. A typical diagram is attached for reference. The diagram shows each parallel branch curve, the auxiliary feedwater pump test curve and the total system characteristic curve. The operating point where the pump curve crosses the total system curve establishes the total flow and head during steady state conditions. This steady state condition was determined to occur when the auxiliary feedwater flow rate into the steam generator undergoing the blowdown equaled the critical flow out the stuck open blowdown isolation valve. In order to determine the steam generator backpressure required to establish the steady state condition, an iteration was performed starting with the minimum acceptable flow rate to two steam generators of 459 gpm (229.5 gpm per auxiliary feedwater pump). At this initial assumed condition the flow rate into the steam generator was found to be greater than the critical flow out the SGBIV, and hence steam generator water level and backpressure will increase. This increase in backpressure causes flow to increase out the SGBIV and to decrease into the steam generator, thus tending toward steady state conditions. The iteration is continued until a steam generator backpressure is found that causes auxiliary feedwater flow in, to equal blowdown flow out of the steam generator. At this point a flow rate of 140 gpm per pump is delivered to each intact steam generator for a total of 560 gpm to both intact steam generators. Since this exceeds the minimum acceptable flow rate of 459 gpm to the intact steam generators and pump runout is not achieved, the system will perform its intended safety function as required.