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May 23, 1986
ST-HL-AE-1667
File No.: G9.17

Mr. Vincent S. Noonan, Project Director
PWR Project Directorate #5
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
MSIV Closure Logic; Q440.57N

Reference: 1. Letter ST-HL-AE-1265 dated 5/31/85; M. R. Wisenburg to G. W. Knighton

2. Letter ST-HL-AE-1589 dated 1/23/86; M. R. Wisenburg to V. S. Noonan

Dear Mr. Noonan:

In NRC Question 440.57N, your staff requested that South Texas Project (STP) justify main steam isolation valve (MSIV) closure logic which, at that time, called for automatic MSIV closure upon safety injection (SI) actuation. Our response was transmitted in Reference 1 and was recently incorporated in the FSAR (Amendment 53).

Subsequent to providing the response in Reference 1, HL&P has determined that the MSIV closure logic should be modified to be consistent with other Westinghouse plants. This decision was transmitted to your staff in Reference 2 in response to NRC question 440.80N.

When the design change is completed, HL&P will revise the FSAR as necessary to ensure that it accurately reflects the MSIV closure logic. Attached, however, is a revised response to question 440.57N which supersedes the response forwarded in FSAR Amendment 53.

If you should have any questions on this matter, please contact Mr. M. E. Powell at (713) 993-1328.

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

JSP/yd

Attachment: Revised response to Q440.57N;
Copy of response to Q440.80N

Ll/NRC/wa

A001
1/1

cc:

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Question 440.57N

In Amendment 43, Figure 15.0-9 and the information in Sections 15.1.4 and 15.1.5, and the revised response to Question 440.01 (Amendment 44) all indicate that the MSIVs are closed on any SI signal. Amendment 44 indicates that this includes SI actuation on low RCS pressure. The previous FSAR version indicated that the MSIV would close on high containment pressure or evidence of steam line break, which is typical of most Westinghouse plants. Closure of the intact steam generator MSIVs on any SI signal would prevent utilization of condenser steam dump in the event of steam generator tube rupture (SGTR) or a small break LOCA when offsite power is available. This would probably result in slower mitigation of the accident and increase the offsite dose. The Westinghouse Emergency Response Guidelines (ERGs) which have been approved by NRC take credit for condenser steam dump when it is available. Therefore, please justify this design change on the basis of increased safety.

Response

The automatic closure of the main steam isolation valves (MSIVs) on a safety injection (SI) signal is not expected to have any adverse impact on the mitigation or recovery from a steam generator tube rupture (SGTR) or small break Loss-of-Coolant Accident (LOCA). The Emergency Response Guideline (ERG) for SGTR recovery requires that the operator isolate the ruptured steam generator (SG) from the intact SGs prior to the initial cooldown of the Reactor Coolant System (RCS). This isolation step is accomplished by either closing the MSIV for the ruptured SG or the MSIVs for the intact SGs. If the MSIVs are automatically closed on an SI signal, the operator will not have to perform this step. If the condenser is not available, as assumed in the design basis analysis, the RCS cooldown can be accomplished by using the power-operated relief valves (PORVs) on the intact SGs, and the MSIVs would not have to be opened. If the condenser is available, the MSIVs or bypass valves for the intact SGs would have to be opened to permit steam dump to the condenser. However, the time required for opening the MSIVs would be offset by the time saved by not having to perform the isolation step initially. Thus, it is concluded that the automatic closure of the MSIVs on an SI signal would not adversely affect the SGTR recovery actions.

For a small break LOCA, steam dump is utilized for the RCS cooldown in the post-LOCA cooldown ERG. If the condenser is available, the MSIVs can be opened to permit steam dump to the condenser for the RCS cooldown, or alternatively, the cooldown can be performed using the SG PORVs. Since the time required to perform the post-LOCA cooldown is not critical to the recovery operation, the time required to open the MSIVs would not adversely affect the recovery.

Since the ERGs were developed for a reference plant which does not have automatic closure of the MSIVs on an SI signal, the changes required to accommodate this design feature will be incorporated in the conversion of the ERGs to plant specific Emergency Operating Procedures (EOPs) for STP.

Response (Continued)

In addition, the non-LOCA events of Chapter 15 are not adversely impacted by automatic closure of the MSIVs on an SI signal. For the credible steamline break event (Section 15.1.4), the SI initiated MSIV closure results in earlier steamline isolation than with the logic typical of most Westinghouse plants. Therefore, a less severe transient would result. For the credible steamline break analysis of the STP FSAR, reactor trip is assumed to occur immediately. The primary side depressurizes to the low pressurizer pressure SI setpoint. This initiates SI and causes the feedwater isolation valves to close and the main feedwater pumps to trip. In the STP FSAR analysis, as would be required with analyses for logic typical of most Westinghouse plants, credit is not taken for steamline isolation (MSIV closure) at this point. The MSIV closure is assumed to occur later at the low steam line pressure setpoint. The current STP FSAR analysis meets all the applicable acceptance criteria. The STP isolation of the steamline (MSIV closure) following low pressurizer pressure SI provides earlier mitigation of the event than that of logic typical and most Westinghouse plants. 53

For the hypothetical steamline break (Section 15.1.5), the low steam line pressure signal would initiate SI/MSIV closure for STP and, in the logic of most Westinghouse plants, would initiate both MSIV closure and SI. For this transient there would be no differences in the current STP FSAR analysis.

A spurious SI signal and subsequent MSIV closure would result in a Loss of Load/Turbine Trip event. As discussed in Section 15.5.1, introduction of borated water into the reactor coolant system following a spurious SI signal is not a credible event. This event, if there was no immediate reactor trip due to the SI signal, would be bounded by the Turbine Trip of Section 15.2.3 which assumes a late reactor trip on an OTΔT or high pressurizer pressure signal following turbine trip. Because the immediate reactor trip due to the SI signal mitigates the transient earlier, it is not as severe as that analyzed in Section 15.2.3.

Although the above is technically adequate, in our letter of January 23, 1986 from M.R. Wisenburg to V.S. Noonan (NRC), ST-HL-AE-1584, HL&P committed, in response to NRC Q440.80, to modify the MSIV closure logic consistent with other Westinghouse plants.

SOUTH TEXAS PROJECT
REQUEST FOR ADDITIONAL INFORMATION

440.80N a. In Question 440.57N the staff requested information regarding the effect of the STP design for MSIV closure on mitigation of steam generator tube rupture (SGTR) or small break LOCA. It is our understanding that the MSIVs would automatically close on low RCS pressure SI actuation, while the Westinghouse emergency response guidelines (ERGs) are based on use of the condenser for steam dump when it is available and thus assume that the MSIVs for intact SGs remain open. Your response indicated that for this type of event the MSIVs would be reopened, and that the time required for reopening the MSIVs would be offset by the time it takes to isolate a ruptured SG in the event of SGTR. You concluded that automatic closure of the MSIVs on any SI signal would not adversely affect recovery. We do not concur with this conclusion for the reason discussed below.

In our conference call of December 3, 1985, on this subject, you stated that several operations are required prior to reopening the MSIVs, including SI reset and equalization of MSIV upstream and downstream pressures. First, it is not clear that SI Reset would be possible at the times when MSIV opening is necessary. Second, it is not clear whether the STP emergency operating procedures (EOPs) for SGTR and small break LOCA mitigation reflect these additional steps for re-establishment of steam dump to the condenser, and whether this will be part of operator training, including simulator runs. It is not clear that this mode of plant operation is consistent with our approval of the generic Westinghouse ERGs. Please address the above concerns.

b. Please provide detailed information on the effect of STP design for MSIV closure on the frequency of challenges to the MSIVs, steam generator safety valves (SVs) and atmospheric dump valves (ADVs). Consider the possible effect of more frequent challenges on the reliability of these valves. For SVs consider previous operating incidents during which a SV was actuated and then did not reseat properly, thus causing excessive steam leakage (e.g., Ginna SGTR event). Can the number of lifetime design cycles for these components be exceeded as a result of this design? Your response should consider operating history during various modes of operation, including testing and spurious actuations.

c. The evaluations currently conducted by the Westinghouse Owners Group (WOG) to address SGTR accident mitigation do not assume closure of the MSIVs on SI signal. The operator action times assumed in these analyses are based on typical MSIV closure actuation systems, which are not the same as for STP. Thus, it is not apparent that these analyses are representative of the STP plant. Therefore, unless it can be demonstrated that the WOG analyses clearly apply to STP, provide the results of plant specific analyses that address the spectrum of SGTR concerns being addressed by the WOG. These include but are not limited to, the required time to stop the primary-to-secondary break flow and the time margin to overfill.

Response to Question 440.80

The Main Steamline Isolation Valve (MSIV) closure logic will be modified to be consistent with that of other Westinghouse plants. The MSIV closure on manual and high steam pressure rate signals will be maintained. The MSIV closure on a safety injection signal will be modified to MSIV closure only on a Hi 2 containment pressure signal and, from the excessive cooldown protection logic, on a low steamline pressure signal and on a low-low Tcold signal.