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United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Ms. Janis B. Kerrigan, Acting Chief
Licensing Branch 3
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) USNRC Letter, dated July 27, 1982, "Request for Additional Information", F. J. Miraglia to W. C. Tallman

Subject: Response to RAI 440.136; (Reactor Systems Branch)

Dear Ms. Kerrigan:

We have enclosed a response to the subject Request for Additional Information which you forwarded in Reference (b).

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

John DeVincentis

John DeVincentis
Project Manager

JD/dsm

Enclosure

B001

Question 440.136

The recent steam generator tube rupture (SGTR) event at R. E. Ginna Plant and previous SGTR events at other PWRs indicate the need for a more detailed review of the analysis of this accident. Our review of Seabrook FSAR Section 15.6.3 (SGTR) and your response to AEB Question 450.4 on this subject resulted in several questions and a need for the following additional information and clarification.

1. FSAR Section 15.6.3 indicates equalization of primary and secondary pressure 30 minutes after the SGTR event, with consequent termination of steam generator tube leakage. However, Figure 1 of your response to Question 450.4 indicates a minimum primary pressure of 1700 psia at approximately 600 seconds, followed by a rise to 2100 psia at 1800 seconds. Explain this discrepancy and modify your analysis of this event accordingly, including consideration of longer leak times if indicated by these results.

2. Demonstrate that your assumption of secondary relief actuation at 1236 psia (Reference: Table 2 of your response to Question 450.4) is conservative from a radiological standpoint in view of the fact that the set points for the atmospheric dump valve and the lowest safety valve are 1135 psia and 1185 psia, respectively.

3. Clarify whether you have analyzed a case which considers the radiological effects of a SGTR with the highest worth control rod stuck out of the core, with equilibrium iodine concentration, including the effects of any additional fuel failure caused by this event. (Reference: SRP Section 15.6.3, Subsections II (1) & III.7)

4. Discuss whether as a result of possible modification of your analysis, including consideration of longer leak times as discussed in item (1), liquid can enter the main steam lines and what the effects would be on the integrity of the steam piping and supports. Consider both the liquid dead weight and the possibility of water hammer.

5. Table 1 in your response to Question 450.4 (Sequence of Events) does not provide all the information requested. Provide the time of turbine trip and loss of offsite power, the setpoints for system actuations, and operator action times. Clarify the flow termination time for main feedwater, which is indicated at 302 seconds in the table while the text indicates that main feedwater flow is terminated by the safety injection signal which occurs at 555 seconds.

6. In view of the fact that the emergency feedwater turbine drive steam flow cannot be terminated from the control room, provide the results of activity and dose calculations from the turbine steam exhaust for the duration of the tube leak.

Response to Question 440.136

1. Following a steam generator tube failure, operator actions are required to reduce the primary system pressure to a value equal to the faulted steam generator pressure. The general sequence of recovery actions is described in Section 15.6.3. The analysis of this event does not explicitly model these actions since they would reduce radiological releases. Rather, it is assumed that such actions would be completed within 30 minutes.

2. After reactor trip, the secondary system pressure is assumed controlled at the maximum safety valve setpoint pressure plus accumulation. This is consistent with loss of offsite power since normal steam dump would not be available. Although sensitivity studies indicate that the minimum relief valve setpoint results in slightly increased radiological releases, the effect is not significant.

3. The analysis of the steam generator tube failure accident assumes failure of the highest worth control rod. Results of DNB calculations within LOFTRAN indicate that no additional fuel failures would

occur as a result of this event. Hence, the radiological consequences are evaluated assuming equilibrium iodine concentration with no additional fuel failures.

4. Extrapolation of the FSAR results suggest that the faulted steam generator would not fill with water until approximately 78 minutes for the design basis event. Hence, there is sufficient time to complete the recovery sequence before the water level rises into the main steamlines.

5. After reactor trip, normal feedwater flow control is assumed to throttle feedwater flow to control steam generator inventory. Consequently, normal feedwater flow is terminated prior to feedwater isolation following safety injection actuation. Table 440.136-1 provides the sequence of events including loss of offsite power and turbine trip. Required operator actions are assumed to be completed within 30 minutes. System actuation setpoints were provided in Table 450.4-2.

6. The fact that the emergency feedwater turbine drive steam flow cannot be terminated from the control room does not effect the results of activity released and dose calculations as presented in FSAR Section 15.6.3.3. These values were derived based on the conservative assumption that all activity released to the secondary side, during the duration of the Tube rupture, is released to the atmoshphere, independent of secondary side steaming rates or point of release. Appropriate iodine DF's were applied to calculate iodine releases.

TABLE 440.136-1

SEQUENCE OF EVENTS

Event	Time (Seconds)
Tube rupture occurs	0.0
Reactor trip signal	280
Turbine trip	281
Rod motion	282
Loss of offsite power	282
Steam generator safety valve open	287
Main feedwater flow terminated	302
Safety injection signal	555
Safety injection	580
Auxiliary feedwater injection	616
Faulted steam generator isolated	1800