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VICE PRESIDENT
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July 21, 1988

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Response to Request for Additional Information - Generic Letter 86-06
(TACS 49674 and 49675)

REFERENCES:

(a) Letter from Mr. S. A. McNeil (NRC) to Mr. J. A. Tiernan (BG&E), dated February 24, 1988, Request for Additional Information - Generic Letter 86-06

(b) Letter from Mr. J. A. Tiernan (BG&E) to NRC Document Control Desk, dated March 21, 1988, same subject

(c) Letter from Mr. J. A. Tiernan (BG&E) to NRC Document Control Desk, dated May 12, 1988, Response to Request for Additional Information - Generic Letter 86-06

Gentlemen:

As requested in Reference (a), we are providing additional information concerning instrument uncertainties and pressure setpoints for tripping the reactor coolant pumps during various accident scenarios. The responses to Questions 1-3 are attached. We requested an extension to the time allowed for a response (Reference b) and are providing this information in accordance with that extension request. The response to Question 4 was provided in Reference (c).

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Should you have any further questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

JAT/PSF/dlm

Attachment

cc: D. A. Brune, Esquire
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ATTACHMENT

The Baltimore Gas and Electric (BG&E) trip two-leave two Reactor Coolant Pump (RCP) criteria were selected to maintain the conservatism of the Combustion Engineering (CE) generic setpoints while accounting for instrument uncertainties. The BG&E setpoint for tripping the first two RCPs after a reactor trip is 1725 psia. This is based on the 1300 psia CE generic value (CEN-268), plus a 423 psia maximum instrument uncertainty (see Question 1). The second two RCPs are tripped when there are positive indications of a Loss-of-Coolant-Accident (LOCA) and pressure has dropped below 1300 psia. The BG&E plant-specific criteria for trip two-leave two ensures that all four RCPs are tripped for a LOCA within the time allowed in the generic analysis (CEN-268), and that at least two pumps are kept operating for non-LOCAs.

Response to NRC Question 1:

Question:

> The licensee's description of the instrumentation uncertainties for loop PT-105 differs from material presented in previous letters. The licensee needs to describe the basis for determining the 212 and 423 psia uncertainties for loop PT-105. Also, the licensee needs to describe how the five-minute switch point was determined.

Response:

The uncertainty estimates are based upon instrument errors calculated in accordance with the guidelines provided in the draft standard ISA/dS67.04-1986-1. This standard permits the algebraic combination of dependent uncertainties and combination of independent, random uncertainties by the square root of the sum of their squares. Input to these calculations was derived from vendor test data and/or published specifications for each device analyzed.

The "switch point" at five minutes into the accident was determined by the use of test data for the pressure transmitter provided by the vendor (ITT-Barton). Two sets of data were provided to describe the performance of the transmitter during a design basis accident (DBA): One for the first five minutes into the DBA and the other for all conditions postulated five minutes or more after the initiation of the DBA. The uncertainties associated with this device are the controlling factors for the final uncertainty at the indicator.

Response to NRC Question 2:

Question:

> The generic responses to questions 48-55 describe the major assumptions used in the CE analyses. The licensee needs to review these assumptions and verify that they are valid for Calvert Cliffs. The licensee's response can be presented as a corresponding list of plant specific values, noting areas of conservatism. Any

plant specific values that are less conservative than the generic analyses must be justified.

Response:

Review of the Generic Assumptions -

1. 4.3% Core Power

   The analysis was performed for the 2700 MWt reference plant and 4.3% core power represents maximum decay heat input for the LOCA analysis. This assumption is valid for Calvert Cliffs.

2. RCP Heat of 20 MWt

   The pump heat of all four RCPs assumed for calorimetric calculations at Calvert Cliffs is 18.8 MWt. The 20 MWt value used by CE conservatively adds additional energy to the primary system and is therefore conservative for a LOCA.

3. SG Overall H = 300 BTU/hr-ft^2-^{o}F

   This conservative value is well below the CE value of 500 to 600 BTU/hr-ft^2-^{o}F for a CCNPP Steam Generator (CEN-268).

4. Heat Transfer Area for Only One Steam Generator Used

   This assumption conservatively reduces heat transfer area below the 17% reduction demonstrated in CEN-114.

5. Highest Safety Relief Valve (SRV) Setpoint Used

   The generic analysis used in SRV setpoint of 1050 psia. At Calvert Cliffs, the SRVs begin to lift before the pressure reaches 1010 psia. Therefore, the generic analysis is conservative.

6. Flow From One High Pressure Safety Injection (HPSI) Used

   The HPSI flow characteristics given in CEN-268, Supplement 1-P, Rev. 1-P, are conservative licensing values and are valid for the Calvert Cliffs plant.

Response to NRC Question 3

Question 3a:

Verify that the generic assessment of each transient is valid for Calvert Cliffs, i.e., the time at which the Calvert Cliffs pumps are tripped (1725 psia setpoint

plus 212 psia uncertainty for the first five minutes of a transient) is not significantly different from the time when the pumps are tripped for the generic case.

Response:

Each CEN-268, Chapter 5 transient calculation is evaluated for applicability to the Calvert Cliffs trip two-leave two strategy.

1. 0.1 ft^2 Small Break LOCA

   The generic setpoint (1300 psia) is reached at 36 seconds. The BG&E nominal setpoint (1725 psia) is reached at about 20 seconds. The setpoint plus uncertainty (1937 psia) is reached at about 10 seconds. The BG&E specific case is conservatively bounded by the generic analysis as an earlier RCP trip results in less flow out of the break.

2. Inadvertent Open PORV

   This case was selected to show that even for a very small LOCA, all four RCPs would be tripped. For the generic case, reactor trip is at 130 seconds with RCP trip at 200 seconds. The BG&E setpoint for RCP trip (1725 psia) would be reached at about 133 seconds. In the generic case, the second two pumps would be tripped immediately after the first two - a "trip four" condition. For the BG&E strategy, the second two pumps would also be tripped at about 200 seconds. For both the generic and site specific scenarios, all four RCPs would be tripped by 200 seconds. The impact of the BG&E strategy on this scenario is minimal.

   When instrument uncertainty (1937 psia) is considered, the reactor trip would occur at about 87 seconds and the first pair of RCPs would be tripped at 90 seconds. The second pair would be tripped just after Reactor Coolant System pressure reached 1512 psia, at about 157 seconds. Less primary system inventory would be lost prior to the time of reactor trip for this sequence; hence, it is less challenging than the nominal setpoint case.

3. Steam Generator Tube Rupture (SGTR)

   For a SGTR, the concern is a loss of the pressurizer spray supplied by the RCPs. For small tube ruptures in which primary leakage is less than make up capacity, pressure control is not lost and a diagnosis of the event would be made on secondary activity levels, consequently, no RCPs would be tripped. For the design basis double-ended SGTR, the primary system leakage exceeds charging capacity and the pressurizer empties. Immediately following reactor trip, the first two RCPs are tripped (at 710 seconds for the BG&E case versus 725 seconds for the generic case). The pressure condition for tripping the second two RCPs is also met, but the activity levels on the secondary side should lead the operators to diagnose a SGTR and to leave the second two pumps operating. The effect, if any, of tripping the first two RCPs 15 seconds earlier than the generic analysis, is to favorably reduce both the flow through the break and the heat transfer to the secondary.

4. Steam Line Break

The 1725 psia RCP trip setpoint is reached at about 12 seconds versus 24 seconds for the generic recommendation. The setpoint plus uncertainty (1937 psia) is reached at about nine seconds. Earlier RCP trip reduces loop flow and decreases heat transfer to the secondary, retarding the cooldown. The lower and somewhat warmer core flow reduces the potential for a re-criticality event. The second two pumps would not be tripped because of the unstable Steam Generator parameters, indicating a secondary side event.

5. Increased Heat Removal Transients

The generic analysis of an inadvertent increase in turbine power, from no load to full power, calculated a reactor trip at 16.5 seconds and no RCP trip. For BG&E, one set of RCPs would be tripped when the 1725 psia setpoint is reached at about 80 seconds. As in the generic case, neither pressure nor subcooling will drop to the setpoint for tripping the second pair of RCPs. The tripping of one pair of RCPs will slightly decrease the rate of primary cooldown, but will otherwise have no affect.

6. Other Transients

The other transients considered in CEN-268 were letdown line breaks, no charging and maximum letdown, and full main spray malfunction events. Timely operator action (CE estimates at least 30 minutes available) would prevent automatic reactor trip for each of these events. But if no operator action is considered, and the reactor trips, then one pair of RCPs would be tripped at Calvert Cliffs approximately the same time as in the generic analyses. The second pair of RCPs would also be tripped for the letdown line break (a small LOCA) and case of no charging and maximum letdown. In general, the first pair of RCPs are tripped slightly earlier at Calvert Cliffs than in the generic evaluations, but the second pair are tripped at about the same time. The consequences of the earlier tripping of the first pair of pumps is insignificant for these events.

Question 3b:

If the Calvert Cliffs assessment in Question 3a leads to different results than the generic report (e.g., trip all four pumps at Calvert Cliffs instead of tripping two and leaving two pumps running), then describe the basis for acceptance.

Response:

The Calvert Cliffs assessment as described in response to Question 3a has determined that the trip strategy used by BG&E is the same as that used by the CE generic analysis. Some of the trip times differ from those determined by CE, however, the different trip times have been shown to be conservative.