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March 31, 1980

Docket No. 50-348

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Mr. A. Schwencer

Re: APCo Letter to NRC, Dated 8/30/79

Dear Mr. Schwencer:

Enclosed is a summary of the heat transfer calculations that were used to justify the two inches of reference leg insulation associated with the subject change. This information was requested by the NRC in a telephone confere.ce on February 26, 1980, between Mr. T. N. Epps, APCo and Mr. Ed Reeves, NRC.

Should you have any questions, please advise.

Yours truly,

F. L. Clayton, Jr.

FLC/TNE:aw

Enclosure

cc: Mr. G. F. Trowbridge
Mr. R. A. Thomas

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ENCLOSURE

SUMMARY OF HEAT TRANSFER CALCULATIONS

A calculation was performed to determine the amount of heatup an insulated reference leg would experience subjected to an adverse environment following a postulated high energy line break. Sufficient insulation was added to minimize the amount of instrument error as a result of this heatup. The steam generator secondary side water level serves a function of reactor trip, as does the containment high pressure trip.

The TAP-A computer code was used to model the reference leg with varying thickness of insulation. This code performs a two dimensional heat transfer calculation through a cylindrical model of the insulated reference leg. The model consists of composite layers of conducting slabs in the direction of the shortest heat transfer path from the equipment surface to the internal point where the heatup is of concern. This model then provides the thermal response of the reference leg when exposed to the adverse environment. TEMP-MAT was the insulating material used with the following thermophysical properties:

$$K = 0.33 \text{ BTU/hr Ft}^2 \ {}^{o}\text{F}$$

$$P = 11. \ \text{lb}_m/\text{ft}^3$$

$$C_p = 0.18 \text{ BTU/lb}_m \ {}^{o}\text{F}$$

The adverse environment of interest is that which exists inside of containment which these lines may be subjected to prior to the actuation of the containment high pressure trip. By using this criterion as the limiting condition, the lines will see the highest atmospheric temperature which will exist during the interval that the trip function is needed from this instrumentation. This is based on the highest containment temperatures existing prior to the occurrence of the high pressure trip based on a spectrum of steam line breaks for the Farley station.

From this break spectrum, the highest temperature was 238^{o}F. In order to envelope various transients of different containment heatup rates the boundary condition was assumed to be a constant 245^{o}F for a period of 5 minutes since this is the time period during which we need the reactor trip function. With this boundary condition and a conservatively high surface heat transfer coefficient of 1000 BTU/Hr $Ft^{2}\,{}^{o}F$ the reference leg heatup can be calculated. Assuming 2" thickness of insulation is in place, the water in the reference leg will heat up less than 1^{o}F during the 5 minute period of interest.

In order to avoid heatup of the lines during normal operation, a distance of 18 inches was left uninsulated just downline of the condensate pot to dissipate the heat under steady state conditions. This uninsulated length will also be exposed to the adverse environment and will be a contributor to the total instrument error. The total error resulting from the heatup of both the insulated and uninsulated regions subject to the adverse environment during the initial period following an accident is less than 2%.