TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

August 8, 1980

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer
Light Water Reactors Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Schwencer:

In the Matter of the Application of) Docket Nos. 50-327
Tennessee Valley Authority) 50-328

In response to Dr. Okrent's request at the July 11, 1980, ACRS meeting on the Sequoyah Nuclear Plant, we have provided him with the enclosed information regarding expected post-LOCA offsite radiation doses using the vented/filtered containment concept.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L M Mills by

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure

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RESPONSE TO DR. OKRENT'S QUESTION ON POST-LOCA OFFSITE DOSES USING THE VENTED/FILTERED CONTAINMENT CONCEPT

During TVA's recent study of potential hydrogen control measures following degraded core events, the vented/filtered containment concept was evaluated. To support this evaluation, an estimate was made of the offsite dose following a hypothetical reactor accident that required containment venting. The assumptions and methods used in this calculation are outlined below.

The estimate was based on a previously performed licensing calculation that is documented in the Sequoyah Nuclear Plant FSAR, Section 15.5.3, for the dose at the low population zone (LPZ) boundary following a loss-of-coolant accident (LOCA). The standard licensing assumptions were made for the original calculation and are documented in the FSAR. These include releasing the entire core inventory of noble gases into the containment, allowing 0.25 percent/day leakage from the containment, minimal holdup times before release, taking credit for radioactive decay, using site-specific atmospheric dilution factors (X/Q) and a 4800m distance to the LPZ boundary.

The estimated dose due to the containment vent release was based on the FSAR calculation with necessary modifications for elevated release at higher rates as follows:

$$DOSE_{Vent} = Dose_{FSAR} \times \frac{X/Q_{VENT}}{X/Q_{FSAR}} \times \frac{RELEASE_{VENT}}{RELEASE_{FSAR}}$$

where $DOSE_{FSAR}$, X/Q_{FSAR}, and $RELEASE_{FSAR}$ were taken from the original calculation. The value used for X/Q_{Vent} was obtained from Safety Guide 25, Figure 3, based on a 50m stack and a distance from the release point of 5,000m. The value used for $RELEASE_{Vent}$ was based on the fraction of the containment noble gas activity vented during the accident. No filtration of the noble gases was considered; however, any dose contribution from iodine was neglected. Representative vent rates, durations, and timing were estimated for Sequoyah Nuclear Plant using plant-specific output from the Battelle Columbus MARCH meltdown code that included steam and noncondensible gas generation rates predicted for a small LOCA (S_2D) event. The resulting vent rates were 470,000 cfm for 30 seconds, 470,000 cfm for 100 seconds two hours later, and 10,000 cfm for the next six hours. The initial release occurs as a result of rapid burning of the burst of hydrogen generated when the molten core drops into the reactor cavity. The second and continuing releases occur as a result of rapid steam and noncondensible gas production during the subsequent attack of the cavity concrete.

Gamma and beta doses for each of the releases were calculated and summed to yield a single dose of 896 rem at the LPZ boundary during the first eight hours after the accident.