TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

September 11, 1979

Director of Nuclear Reactor Regulation
Attention: Mr. L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rubenstein:

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

Enclosed is the response to the Accident Analysis Branch question (Bypass Leakage) transmitted by your letter to H. G. Parris dated August 10, 1979. This response will be incorporated in Amendment 62 of the Sequoyah Nuclear Plant Final Safety Analysis Report as Question 6.64.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure

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ENCLOSURE

Response to August 10, 1979 Letter - Item 1

6.64 Accident Analysis Branch (312.2)

In order for the staff to evaluate the need to allow an additional 5 minutes of bypass leakage at an increased leak rate of 25% of the total containment leakage through the auxiliary building, the applicant is requested to provide a pressure analysis of the auxiliary building during the first 10 minutes into the accident. The analysis should include a pressure response curve of the auxiliary building atmosphere.

Response: See Revised Section 6.2.3.3.3

4. The method adopted to establish and keep the negative pressure level within this secondary containment enclosure minimizes the time needed to reach the desired pressure level. Initially, the full capacity of the Auxiliary Building Gas Treatment System fans will be utilized for this purpose. After reaching the desired operating level, the system control module allows outside air to enter the air flow network just upstream of the fan at a rate to keep the fans operating at full capacity with the enclosed volume at the desired negative pressure level. In this situation, the amount of air withdrawn from the enclosed volume will be equal to the amount of outside air in-leakage through the Auxiliary Building Secondary Containment Enclosure. 38

5. The negative pressure level selected for the Auxiliary Building Secondary Containment Enclosure is appropriate. A negative pressure of 1/4 inch of water is sufficient to reduce the amount of unprocessed air escaping from this secondary containment enclosure to the atmosphere to insignificant quantities. This negative pressure level is also sufficient to assure that any air leakage between the Auxiliary Building and the Shield Building is from the Auxiliary Building into the Shield Building.

POOR ORIGINAL

6. The train A and train B air cleanup units are sufficiently separated from each other and from other engineered safety feature equipment to eliminate the possibility of a single failure destroying the capability to process Auxiliary Building air prior to its release to the atmosphere. Two concrete walls and a distance of more than 80 feet separate the two trains. Each of these are the only engineered safety feature equipment installed in their respective rooms. The use of separate trains of the Emergency Power System to drive the air cleanup trains is further assurance of proper equipment separation.

The review conducted of the Auxiliary Building Gas Treatment System to determine its conformance with Regulatory Guide 1.52 has shown that this system, designed prior to issuance of the guide, is in good general agreement with these requirements. Details on this compliance with Regulatory Guide 1.52 are given in Table 6.2-24.

A performance analysis to determine the capability of the Auxiliary Building Gas Treatment System to establish and maintain a negative pressure in the Auxiliary Building Secondary Containment Enclosure (ABSCE) was based on the following assumptions:

1. Infiltration into the ABSCE is equal to 6000 cfm at a negative pressure differential of 1/4-inch water gauge. This infiltration rate is conservative since the ABSCE is designed to limit this rate to 4500 cfm.

2. Only one air cleanup unit of the Auxiliary Building Gas Treatment System operates, and it operates at its rated capacity of 9000 cfm.

3. The air cleanup unit fan begins to operate 30 seconds after initiation of the LOCA and reaches full flow in 5 seconds.

4. The initial static pressure inside the ABSCE is assumed to be equal to atmospheric pressure. This is a conservative assumption since the ABSCE is under a negative pressure during normal operation.

5. The wind pressure head equals 1/8-inch water gauge.

6. The initial ABSCE air temperature equals 104°F.

7. Atmospheric temperature and pressure are 97°F and 14.4 psia, respectively.

The performance analysis conducted to verify that the Auxiliary Building Gas Treatment System has the required accident mitigation capabilities has shown that:

1. The system flow rate was sized properly to handle all expected outside air in-leakage at a 1/4 inch of water negative pressure differential. This indicated that the flow rate of 9000 cfm is sufficient to assure an adequate margin above the expected Auxiliary Building Secondary Containment Enclosure in-leakage.

2. The system has the necessary capability to establish and maintain a negative pressure of 1/4-inch water gauge inside the Auxiliary Building Secondary Containment Enclosure within 3 minutes of the occurrence of a LOCA. The building pressure response is shown in Figure 6.2-32.

3. The system contains sufficient air cleanup facilities to keep the contributions to the site boundary and LPZ dosage arising from Auxiliary Building air releases to small fractions of the 10CFR100 guideline values. This part of the analysis is presented and evaluated in Section 15.5 and Appendix 15A.

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6.2.3.3.4 Ice Condenser System

As a result of experimental and analytical efforts by Westinghouse, the ice condenser system has been proven to be an effective passive system for removing elemental iodine from the containment atmosphere and thereby reducing the off-site doses following a Loss of Coolant Accident.

The experimental program and results of the ice condenser system effectiveness in removal of elemental iodine is reported in WCAP-7426, a non-proprietary topical report. The results of these extensive bench scale tests clearly indicated that an ice condenser system containing sodium tetraborate ice could effectively remove elemental iodine from the containment atmosphere.

In order to apply the results of the bench scale experimental program, an analytical model applicable to the plant ice condenser system has been developed from the data of the experimental program.

The purpose of this section is to describe the analytical model and present the results of the ice condenser iodine removal effectiveness analysis.

Analytical Model

Following a LOCA a large volume of steam would discharge into the containment lower compartment. Containment pressure and temperature would rise immediately. At first the increased pressure in the lower compartment would force steam through the ice condenser sections and later recirculation fans would
15 circulate the iodine-air-steam mixture through the ice condenser.

In addition to steam, iodine may be liberated into the containment as gaseous elemental iodine. It is also assumed that a fraction of the iodine in the containment atmosphere exists as methyl iodine which is assumed not removed by the ice condenser.

Elemental iodine, being readily soluble in aqueous solutions will be removed from the air-steam mixture by the ice condenser. Methyl iodide, however, is assumed not to be removed by the ice.

The ice in the ice condenser will contain sodium tetraborate normally referred to as alkaline ice by virtue of the alkalinity of the ice melt.

Data obtained from the experimental program as reported in WCAP-7426 can be classified as (1) alkaline ice (2) acid ice. Since alkaline ice will be used in the ice condenser the iodine removal efficiency from those tests results were correlated.

The theoretical analysis for iodine removal by alkaline ice treats the ice condenser as consisting of two distinct compartments, an ice section and a rain section. Melt, falling from the ice into the sump comprises the rain section (see Figure 6.2-73a). Steam condenses from the air-steam

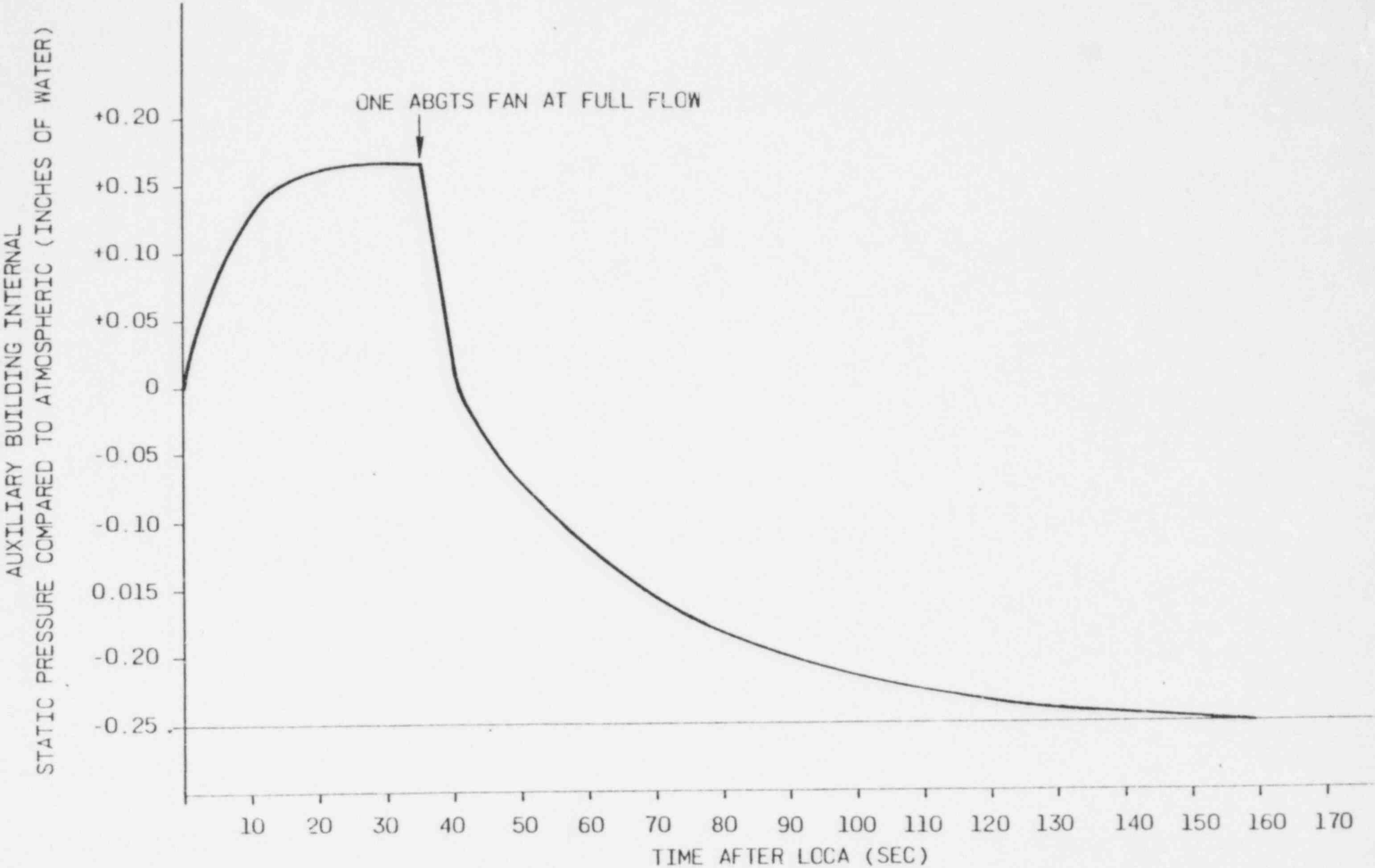

FIGURE 6.2-32 AUXILIARY BUILDING PRESSURE
RESPONSE POST LOCA