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400 Chestnut Street Tower II

July 9, 1980

Director of Nuclear Reactor Regulation  
Attention: Mr. A. Schwencer, Chief  
Licensing 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 S. A. Varga's letter to H. G. Parris dated April 21, 1980, enclosed are TVA's responses to your questions on category I masonry walls employed at Sequoyah Nuclear Plant. As discussed in the enclosed response to question 6, TVA is investigating the in-place attachments to the masonry walls to verify compliance with the design requirements. We expect to submit the results of this investigation by October 17, 1980.

If you have any questions, please get in touch with D. L. Lambert at FTS 857-2581.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*L. M. Mills*  
L. M. Mills, Manager  
Nuclear Regulation and Safety

Enclosure

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ENCLOSURE  
SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2  
RESPONSE TO INFORMATION REQUEST  
ON CATEGORY I MASONRY WALLS

TVA has the following responses to the questions transmitted to H. G. Parris by S. A. Varga's letter dated April 21, 1980.

Question

1. Are there any concrete masonry walls being used in any of the Category I structures of your plant?

Response

There are concrete masonry walls in the Category I structures at Sequoyah and they are located as identified below:

Control Building - At floor slab elevations 669, 685, 706, and 732

Auxiliary Building - At floor slab elevations 690, 714, 734, 749, and 759

Diesel Generator Building - At floor slab elevations 722 and 740.5

Question

2. Indicate the loads and load combinations to which the walls were designed to resist. If load factors other than one (1) have been employed, please indicate their magnitudes.

Response

The walls were designed to resist the loads and load combinations as defined by "Design Criteria for Reinforced Concrete Block Walls, "SQN-DC-V-1.1.1 (attachment 1). As indicated by this criteria, no load factors greater than one (1) have been utilized.

Question

3. In addition to complying with the applicable requirements of the SRP Sections 3.5, 3.7 and 3.8, is there any other code, such as the "Uniform Building Code" or the "Building Code Requirements for Concrete Masonry Structures" (proposed by the American Concrete Institute) which was or is being used to guide the design of these walls? Please identify and discuss any exceptions or deviations from the SRP requirements or the aforementioned codes.

#### Response

The structural design of the walls was completed in accordance with the previously referenced criteria (SQN-DC-V-1.1.1). This criteria utilizes a working stress design method with specified allowable stresses for flexure and shear in the concrete block, concrete and reinforcing for each of the load combinations. No other code was utilized in the design of these walls and no exceptions or deviations were taken from the applicable requirements of sections 3.5, 3.7, and 3.8 of the Standard Review Plan.

#### Question

4. Indicate the method that you used to calculate the dynamic forces in masonry walls due to earthquake, i.e., whether it is a code's method such as Uniform Building Code, or a dynamic analysis. Identify the code and its effective date if the code's method has been used. Indicate the input motion if a dynamic analysis has been performed.

#### Response

The dynamic forces acting on the reinforced concrete block walls were determined by classical dynamic analysis techniques as discussed in Introduction to Structural Dynamics by J. M. Biggs. Initially, two boundary condition types and two block sizes were identified as being common to block walls at Sequoyah. Using this data and the live and dead loads of these walls, a family of curves indicating the height versus period relationship were calculated and are shown in figure A of "Design Criteria for Reinforced Concrete Block Walls," SQN-DC-V-1.1.1. Each building containing block walls was seismically analyzed according to section 2.7 of the Sequoyah Final Safety Analysis Report (FSAR), and a report containing acceleration response spectra for the various floor elevations was written for each building. For each wall considered, the period of the wall from figure A and the appropriate response spectra yielded a uniform acceleration that was used to calculate earthquake loads. The calculated dynamic loads were evaluated using the criteria contained in the aforementioned design criteria.

#### Question

5. How were the masonry walls and the piping/equipment supports attached to them designed? Provide enough numerical examples including details of reinforcement and attachments to illustrate the methods and procedures used to analyze and design the walls and the anchors needed for supporting piping/equipment (as applicable).

### Response

The masonry walls were designed for dead load, live load and operational basis and design basis earthquake loads as outlined in attachment 1. A calculation illustrating the design of a typical masonry wall is shown in attachment 2. The details of the walls to include concrete placement in the block cells, reinforcement of the block cells and mortar joints and attachment of the masonry walls to concrete slabs and walls are illustrated in the drawings enumerated below.

The attachments to the masonry walls for the support of the various Category I and safety related equipment and components were designed for dead load and operational basis and design basis earthquake loads. A criteria utilized for the design of a "through-wall" attachment for the support of various components to the masonry walls is shown in attachment 3. Details of some various attachments to the masonry walls are shown in attachment 4.

In accordance with Design Criteria SQN-DC-V-1.1.1, the walls were designed for a live loading of 20 lb/ft<sup>2</sup> on one side of the wall or 10 lb/ft<sup>2</sup> on each side of the wall. This criteria also requires that the spacing of attachments (loadings) to the walls be controlled so that these live loads are not exceeded.

The above criteria assures that the structural capacity of the walls is adequate to support the loadings from the attachments under seismic conditions. TVA is investigating the in-place attachments to the masonry walls to verify compliance with the above design requirements.

### Question

6. Provide plan and elevation views of the plant structures showing the location of all masonry walls for your facility.

### Response

Locations of all masonry walls at Sequoyah Nuclear Plant are shown on the attached construction drawings.