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

October 21, 1981

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Ms. Adensam:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

During meetings on July 28-30, 1981 with the NRC Structural Engineering Branch (SEB) TVA was requested to address the following items.

1. Omission of the eccentricity of the trolley on the polar crane as an acceptable assumption in the dynamic analysis

2. A Sequoyah-Watts Bar Nuclear Plant comparison of Category I structures

Enclosed are responses to these concerns.

If you have any questions concerning this matter, please get in touch with D. P. Ormsby at FTS 857-2581.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Sworn to and subscribed before me
this 21st day of October 1981
Paulette H. White
Notary Public
My Commission Expires 9-5-84

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U.S. NUCLEAR REGULATORY COMMISSION

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Enclosure

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ENCLOSURE
WATTS BAR NUCLEAR PLANT
RESPONSES TO NRC STRUCTURAL ENGINEERING BRANCH QUESTIONS

1. TVA has generated a dynamic analysis containing the eccentricity due to the polar crane trolley. Results from this analysis indicate a change of approximately four percent in the dynamic responses. Additionally, we have evaluated the stability of the trolley against overturning for the assumption of zero hook load and have determined that the resulting seismic stresses in the holddown lugs on the trolley are within the allowable specified stresses.

2. Watts Bar Nuclear Plant (WBN) main plant structures were intended to be physically identical to Sequoyah Nuclear Plant (SQN) main plant structures. However, the seismic loads at WBN are somewhat larger than those at SQN because of differences in the shapes of the design spectra and the input ground motions. (Both SQN and WBN are designed for 0.09 g, operating base earthquake, and 0.18 g, safe shutdown earthquake, defined at top of rock.) Because of the larger seismic load and the attempt to duplicate at WBN the SQN structural dimensions, member sizes, etc., the amount of reinforcement in the concrete structures is generally greater at WBN that at SQN. In addition, certain structures (Intake Pumping Station, Discharge Overflow Structure, Standpipe Structure, and ERCW Support Slab) are not physically identical at SQN/WBN.

I. Reactor Building

A. Major Physical Differences

The major physical difference between the WBN and SQN reactor buildings is that the SQN base slab is anchored to bedrock with reinforcing bars and WBN requires no anchorage.

B. Loads and Loading Combinations

1. The load combinations are essentially the same when comparing WBN and SQN reactor building structures. Both structures were required to satisfy the load combinations recommended by the American Concrete Institute (ACI)-American Society of Mechanical Engineers Joint Committee contained in the code (ACI 359) for Concrete Reactor Vessels and Containments.

2. The loads were essentially the same except that the loss of coolant accident design pressures for WBN were a little higher than those for SQN.

C. Design and Analysis Procedures

In most cases the analyses and design methods for WBN were similar to SQN.

II. Auxiliary Control Building

A. Major Physical Differences

1. The auxiliary control building at WBN is comprised of three separate category I structures: auxiliary and control building, the waste packaging area, and the condensate demineralizer waste evaporator building. For SQN, in addition to the structures listed above, the additional equipment building is also a separate category I structure. The additional equipment building is in the same general location as the structure for WBN but is separated from the rest of the auxiliary building by a 2-inch expansion joint filled with fiberglass insulation. The additional equipment building at WBN is an integral part of the auxiliary building.

2. The entrance of the railroad into the auxiliary building is on the unit 1 side for SQN and on the unit 2 side for WBN. This situation creates some physical differences for those category I structures located within that vicinity. The waste packaging area for both plants are opposite hand from one another. Also, the additional equipment buildings are reversed for both plants. That is, the SQN unit 1 structure is the same as the WBN unit 2 structure. Conversely, the SQN unit 2 structure is the same as the WBN unit 1 structure.

3. The waste packaging area structures for SQN and WBN are supported on H-bearing piles and crushed stone backfill, respectively. The structures for both plants have generally the same configuration except the interior walls are opposite hand as compared to each other (item 2).

4. The auxiliary and control buildings for both plants are founded on rock. At SQN the 2-foot thick base slab is anchored into rock to resist hydrostatic uplift pressures under flood conditions. At WBN the auxiliary building portion of the base slab is 7 feet thick while the control bay portion is 5 feet thick. Due to these thicknesses, anchorage into rock is not required to resist hydrostatic uplift pressures.

B. Loads and Loading Combinations

The loads and loading combinations are essentially the same when comparing WBN and SQN category I structures.

C. Design and Analysis Procedures

1. In most instances the designs for WBN were duplicated from SQN. WBN was designed in accordance with ACI 318-71; whereas at SQN the waste packaging area and the condensate demineralizer waste evaporator building were designed in accordance with ACI 318-71 and the auxiliary and control building was designed in accordance with ACI 318-63.

2. The base slab for the waste packaging area at SQN was designed to be supported by a bearing pile foundation. The corresponding base slab for WBN was designed as a slab on an elastic foundation.

III. Main Steam Valve Rooms

A. Major Physical Differences

The structures are basically the same except for two major differences.

1. The east steam valve rooms at SQN are vented by the use of blowout panels in the roof and east walls. The north steam valve rooms at WBN are vented by separate compartments added to the ends of the structures and blowout panels in the roof.

2. The east steam valve rooms at SQN are supported by eight concrete caissons four feet in diameter anchored into rock. The north steam valve rooms at WBN rest on a grillage of reinforced concrete foundation walls supported to rock.

B. Loads and Loading Combinations

The loads and loading combinations are essentially the same for both plants.

C. Design and Analysis Procedures

1. The east steam valve rooms at SQN were originally designed to be supported on spread footings. Due to excessive settlement of the structures, the decision was made to underpin the base slabs of each structure. Large concrete caissons were designed to be socketed into rock and anchored into the existing base slabs.

2. The north steam valve rooms at WBN rest on reinforced concrete walls placed on rock.

IV. Diesel Generator Building

A. Major Physical Difference

The only major physical difference between the diesel generator buildings for both plants is in the configuration of the base slabs. The base slab for the structure of SQN is supported on soil. A concrete apron extending 13 feet from the edge of the structure on each side was used to decrease the bearing pressures on the soil subgrade. The base slab for the structure at WBN is supported on a crushed stone backfill. Due to higher allowable bearing pressures, the concrete apron mentioned above for SQN was not needed for WBN.

B. Loads and Loading Combinations

The loads and loading combinations are identical for the structures at both plants.

C. Design and Analysis Procedures

There were essentially no differences in the design and analysis procedures.

V. Pipe Tunnels

A. Major Physical Differences

The major physical differences are in the concrete thickness. WBN has 24-inch walls and roof with a 36-inch base slab. SQN has 18-inch walls and roof with a 24-inch base slab.

B. Load and Loading Combinations

The major difference in loads is the addition of vertical automobile missile impact at WBN. Loading combinations are essentially the same.

C. Design and Analysis Procedures

WBN was designed in accordance with ACI 318-71, whereas SQN was designed in accordance with ACI 318-63.

VI. Refueling Water Storage Tank

A. Major Physical Differences

The only major physical difference between the SQN and WBN refueling water storage tank foundations is the arrangement of the shear keys. SQN utilizes two perpendicular shear keys 3 feet deep along the centerline of the circular foundation (a 53-foot, 6-inch diameter); WBN utilizes a 6-foot deep shear key located at the outer edge of the circular foundation (a 57-foot, 0-inch diameter) and continuous along the circumference of the foundation.

B. Loads and Loading Combinations

The load combinations are essentially the same when comparing SQN and WBN Refueling Water Storage Tanks.

C. Design and Analysis Procedures

Design and analysis procedures are essentially the same.

VII. 125-Ton Auxiliary Building Crane

A. Major Physical Differences

The main structural members of the trolley are bolted to the end trucks for WBN and welded for SQN.

B. Loads and Loading Combinations

Loads and loading combinations are the same.

C. Design and Analysis Procedures

The crane bridges were designed by TVA using the same procedure for both plants. The remainder of each crane was designed by different vendors using their own procedures, but all results were reviewed by TVA.

VIII. 175-Ton Polar Crane

A. Major Physical Differences

The SQN trolley has four wheels and the main structural members are bolted to the end trucks. The WBN trolley has six wheels, is made of two sections pinned together, and the main structural members are welded to the end trucks.

B. Loads and Loading Combinations

Loads and loading combinations are the same.

C. Design and Analysis Procedures

The crane bridges were designed by TVA using the same procedure for both plants. The remainder of each crane was designed by different vendors using their own procedures, but all results were reviewed by TVA.

IX. ERCW Support Slab, Intake Station, Discharge Overflow Structure, and Standpipe Structures

As discussed above, these structures were not physically duplicated at WBN from SQN. These structures were designed independently, and the FSAR's and Design Criteria should be reviewed for detailed information concerning physical differences, loads and loading combinations, and design analysis procedures.