



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
WASHINGTON, D.C. 20555-0001

May 14, 2013

Mr. Joseph W. Shea  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR STATION, UNIT 1 – REQUEST FOR ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT REQUEST TO UPDATED FINAL SAFETY ANALYSIS REPORT CHANGES ASSOCIATED WITH HYDROLOGIC ANALYSIS FROM BALANCE-OF-PLANT BRANCH (TAC NO. ME9130)**

Dear Mr. Shea:

By letter dated July 19, 2012, you submitted an application for license amendment to revise the Updated Final Safety Analysis Report (UFSAR) to adopt a revised hydrologic analysis for Watts Bar Nuclear Plant (WBN) Unit 1. These changes to the WBN Unit 1 UFSAR incorporated updates previously submitted in support of the initial licensing of WBN Unit 2 as well as more recently discovered input information. You also supplemented this request by another letter dated March 1, 2013.

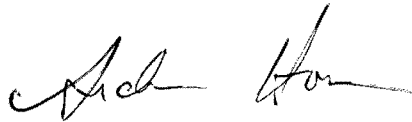
The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is addressed in the enclosure to this letter. The proposed questions were discussed with your staff on March 13, 2013, and April 12, 2013. Your staff confirmed that these questions did not include proprietary or security-related information and agreed to provide a response within 30 days from the date of this request for additional information (RAI).

J. Shea

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The NRC staff considers that timely responses to RAIs help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. If circumstances result in the need to revise the requested response date, please contact me at (301) 415-8480 or via e-mail [Andrew.Hon@nrc.gov](mailto:Andrew.Hon@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Hon", written in a cursive style.

Andrew Hon, Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure:

Request for Additional Information

cc w/encl: Distribution via ListServ

REQUEST FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST TO  
UPDATED FINAL SAFETY ANALYSIS REPORT CHANGES  
ASSOCIATED WITH HYDROLOGIC ANALYSIS  
TENNESSEE VALLEY AUTHORITY  
WATTS BAR NUCLEAR PLANT, UNIT 1  
DOCKET NO. 50-390

By letter dated July 19, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML122360173), the Tennessee Valley Authority (TVA), submitted a license amendment request to revise the Watts Bar Nuclear Plant (WBN), Unit 1 Updated Final Safety Analysis Report (UFSAR) to reflect the results from new hydrologic analysis. These proposed changes are consistent with the latest approved hydrology calculations. The proposed changes in the updated hydrologic analysis include updated input information, and updates to methodology that include the use of the U.S. Army Corps of Engineers Hydrologic Modeling System and River Analysis System software. By a letter dated March 1, 2013 (ADAMS Accession No. ML13067A393), TVA supplemented the submittal with additional information. In order to complete its review of the above documents, the U.S. Nuclear Regulatory Commission staff requests the following additional information originating from our Balance-of-Plant Branch (SBPB):

**RAI-1**

Section 2.4, "Hydrological Engineering" under 2.1 "Proposed Changes" states that adding information regarding coincident wind wave activity results in up to an additional 2.5 feet (ft) for determining the Design Basis Flood (DBF) elevations. *Flood Design Considerations*, under Section 2.1 states, in part, that this change proposes to update coincident wind wave activity that results in up to an additional 2.5 ft for determining the DBF elevations.

However, the existing WBN Unit 1 UFSAR marked-up text provided to show the proposed changes states, under Sections 2.4, "Hydrologic Engineering" and 2.4.2.2, "Flood Design Consideration," that coincident wind wave activity results in wind waves of up to 2.2 ft (crest to trough).

Please clarify what is the actual coincident wind wave activity for determining the DBF elevations.

Enclosure

## **RAI-2**

Section 2.4.14, "Flooding Protection Requirements" Under Section 3.0, "Technical Evaluation" states in part that the Essential Raw Cooling Water strainers and support equipment are located on elevation 722.0 ft of the Intake Pumping Station (IPS), connected to elevation 741.0 ft via stairwells and doors W001 and W002 at elevation 741.0 ft. These doors both have 0.5 ft concrete berms at the opening to elevation 741.0 ft and as a result of the proposed change, a compensatory measure of staged sandbags to be constructed into a berm at any time prior to or during the event of a Stage I flood warning has been implemented. These sandbags will be constructed into a berm at least 12 inches in height to prevent water intrusion to elevation 722.0 ft.

Please provide additional information to provide assurance that this compensatory measure will prevent water intrusion to elevation 722.0 ft.

- a) Is this compensatory measure already in place?
- b) If constructed during the event of a Stage 1 flood warning, where will the sandbags be pre-staged?
- c) How long will it take to construct this berm of at least 12 inches in height?
- d) Will this operation interfere with any other activities during the Stage 1 flood warning preparations?
- e) Will this action be specified in a controlled procedure?

## **RAI-3**

Section 2.4.14, "Flooding Protection Requirements" under Section 3.0, "Technical Evaluation" states, in part, that temporary compensatory measures are in place to ensure adequate flood protection and permanent plant modifications are planned to restore or gain additional margin between the revised DBF elevations and limiting safety-related Systems, Structures, and Components (SSCs) in the Auxiliary Building. Specifically, a limiting safety-related component required to be available during a plant flood affected by the increase in DBF elevations is the Thermal Barrier Booster (TBB) Pump Motors.

- a) The temporary flood protection barrier for the TBB pump motors will provide approximately 0.8 ft of margin above the DBF surge level. Please provide justification to provide assurance that this margin will be adequate for flood protection.
- b) Please provided a diagram of temporary flood protection barriers for TBB pump motors.
- c) What other limiting safety-related SSCs required to be available during a plant flood are in the Auxiliary Building? What compensatory measures are planned for these limiting safety-related SSCs, if any?

**RAI-4**

Section 3.3, "Margins" states that the Spent Fuel Pit Cooling Pump (SFPCP) motors have a reduced new margin of approximately 0.7 ft between the DBF surge level and the base of the motors and that a permanent plant modification will provide additional flood protection margin with respect to the DBF level.

- a) Where and at what elevation are the SFPCP motors located and what is the DBF surge level at this location?
- b) What is the desired flood protection margin with respect to the DBF level?

**RAI-5**

In Section 2.4.1 "hydrological Description," under "Flood Design Considerations" states that the change proposed increases the DBF including wind wave run up during the Probable Maximum Flood to elevation 741.6 ft, which is 0.4 ft below the Diesel Generator Building operating floor elevation of 742.0 ft.

Section 2.4.14, "Flooding Protection Requirements," states that to restore margin for the TBB pump motors, a temporary flood protection barrier has been designed to be installed around the TBB pump motors. This barrier encompasses the TBB pump motors providing approximately 0.8 ft of margin above the DBF surge level.

Section 3.3, "Margins," states, in part, that the SFPCP Motors have a reduced new margin of approximately 0.7 ft between the DBF surge level and the base of the motors and TVA committed to installing a permanent plant modification to provide additional flood protection margin with respect to the DBF level for the WBN, Unit 1 SFPCP Motors by March 31, 2013 (ADAMS Accession No. ML12171A053).

- a) The SFPCP motors have a margin of 0.7 ft and the licensee committed to provide additional flood protection margin. However, the diesel generator building has a margin below 0.7 ft, (specifically 0.4 ft), and the TBB pump motor has a new margin slightly above 0.7 ft, (specifically 0.8 ft), and no other actions are planned to increase the flood protection for these components. Please explain the criteria to determine how much flood protection margin is adequate for each limiting safety-related component required to be available during a plant flood event.

**RAI-6**

Section 2.4.14, "Flooding Protection Requirements" under Section 3.0, "Technical Evaluation" states that the critical elevation of flood-sensitive equipment located on elevation 722.0 ft is approximately 18 inches above the floor elevation. However, Section 3.3, "Margins" states that the critical elevation of flood-sensitive equipment located on elevation 722.0 ft is approximately 7 ft above the floor elevation.

Please explain the nature of the discrepancy between these two elevations noted for the flood-sensitive equipment in the IPS structure.

#### **RAI-7**

Enclosure 1 of the March 1, 2013, supplement, under "Detailed Description and Technical Evaluation" states that transient analyses were performed for the loss of Main Control Room (MCR) and Shutdown Board (SDBR) heating ventilation and air condition (HVAC) in wintertime conditions to determine the maximum temperatures achieved and temperature profiles for the MCR and SDBR, as well as for the auxiliary control room, auxiliary instrument rooms, and the battery board rooms. The MCR HVAC transient analysis was run to determine the steady-state temperature in the MCR with a 50-percent reduction in lighting load applied. The MCR temperature under these conditions was used as an input boundary condition to the SDBR transient analysis since these areas share a common boundary and MCR cooling is lost in this scenario.

Enclosure 1 of the original application dated July 19, 2012, under "Probable Maximum Precipitation" states that there are two basic storm situations that have the potential to produce a maximum flood at WBN. These two situations are a sequence of storms during the month of March.

- a) Please explain why the transient analyses were performed for the loss of MCR and SDBR HVAC during wintertime as opposed to spring (sequence of March storms) or summertime (higher outside temperatures).
- b) Are the maximum temperatures for the SDBRs, MCR, auxiliary control room, auxiliary instrument rooms and battery board room higher/lower or the same, during any of the other seasons of the year?

#### **RAI-8**

Enclosure 1 of the March 1, 2013, supplement under "Detailed Description and Technical Evaluation" states TVA is implementing plant modifications to provide a flood barrier around each of the MCR and SDBR chilled water circulating pumps and motors, and to protect the affected MCR and SDBR Chiller ancillary equipment from water intrusion, to provide flood protection up to the DBF level of 739.7 ft, ensuring they are able to perform as designed during and after a DBF event. These plant modifications will be installed by March 31, 2013.

Please provide diagram(s) for the planned plant modification to provide flood barrier around the MCR and SDBR chilled water circulating pumps and motors, and to protect the affected MCR and SDBR Chiller ancillary equipment from water intrusion.

#### **RAI-9**

Enclosure 1 of the March 1, 2013, supplement under "Detailed Description and Technical Evaluation" states that each flood barrier around the respective chilled water circulating pump is a static structure rigidly attached to the concrete pump foundation that will resist the hydrostatic forces generated during a DBF event. ... The pumps are still accessible for maintenance.

It further states that access for maintenance on or replacement of the chilled water circulating pump motors will require removal and reinstallation of the associated flood barrier. Installation

of the flood barriers will require additional Operator actions to be performed during Stage I and Stage II flood warning preparations in accordance with approved plant procedures.

- a) Please clarify if the flood barrier will have to be removed in its entirety during maintenance, replacement, and installation of the submersible pump.
- b) Will the flood barrier need to be removed for maintenance or replacement of the drain line manual valve?
- c) What is the timeframe for removal and re-installation of the flood barrier during these activities?

#### **RAI-10**

Enclosure 1 of the March 1, 2013, supplement, under "Detailed Description and Technical Evaluation" states that to provide additional assurance that the chilled water circulating pumps and associated motors are protected against flood waters during a DBF event, a portable submersible pump will be installed inside the flood barrier during Stage I flood warning preparations in accordance with approved plant procedures.

It further states that Operations and Maintenance Departments will be impacted due to changes in Stage I and Stage II flood mode warning preparation procedures and activities requiring closure of the drain valves on the pump enclosures, installation of the portable sump pumps inside the enclosures and routing of electrical extension cords to a power source available during a DBF event. These actions have been evaluated, and determined to be capable of being performed along with existing flood mode operations in the required completion time.

- a) Where will the submersible pumps and electrical extension cords be pre-staged?
- b) How long and how many operators will it take to perform these actions during Stage I?

#### **RAI-11**

Enclosure 1 of the March 1, 2013, supplement, under "Detailed Description and Technical Evaluation" states that other plant modifications to the affected MCR and SDBR Chiller ancillary equipment will be implemented by March 31, 2013, to ensure flood protection up to the DBF level of 739.7 ft. These modifications to the MCR and SDBR Chiller ancillary equipment provide protection from water intrusion for the specified electrical components.

This supplement also states that to provide additional assurance that the MCR and SDBR Chillers ancillary equipment is protected against flood waters during a DBF event, additional measures to prevent water intrusion for these components will be completed during Stage I flood warning preparations in accordance with approved plant procedures.

Please provide description, and diagrams if available, of these additional plant modifications planned to provide protection from intrusion to the specified electrical components and additional measures to prevent water intrusion to these components.

J. Shea

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Sincerely,

*/RA/*

Andrew Hon, Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-390

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**ADAMS Accession No.: ML13127A168**

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