August 9, 2010

Mr. Ashok S. Bhatnagar
Senior Vice President
Nuclear Generation Development
and Construction
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSEE'S FINAL SAFETY ANALYSIS REPORT AMENDMENT RELATED TO ELECTRICAL ENGINEERING SYSTEMS (TAC NO. ME2731)

Dear Mr. Bhatnagar:

By letters dated November 24, 2009, and January 11, 2010 (ADAMS Accession Nos. ML093370275 and ML100191426), the Tennessee Valley Authority (TVA) submitted Final Safety Analysis Report (FSAR) Amendments 95 and 97 for Watts Bar Nuclear Plant (WBN), Unit 2. The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided by the TVA in FSAR Amendments 95 and 97, respectively.

In an effort to complete the NRC staff review, enclosed is a request for additional information (RAI) regarding electrical engineering systems for the FSAR Section 8 and Section 9.2.1. The NRC staff's RAI seeks information on WBN Unit 2 as it relates to dual operation of the facility.

A response is required within 30 days of receipt of this letter.

If you should have any questions, please contact me at 301-415-2048.

Sincerely,

/RA PMilano for/

Justin C. Poole, Project Manager
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure: RAI

cc w/encl: Distribution via Listserv

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RidsNrrDeEeeb Resource
RidsNrrPMWattsBar2 Resource

ADAMS Accession No. ML101870682 *via memo dated July 2, 2010

OFFICE	LPWB/PM	LPWB/LA	EEEB/BC	OGC/NLO	LPWB/BC
NAME	JPoole/PMilano for	BClayton	RMathew*	DRoth nlo	SCampbell
DATE	07/30/10	07/30/10	07/02/10	07/29/10	08 / 09 /10

OFFICIAL AGENCY RECORD

REQUEST FOR ADDITIONAL INFROMATION

WATTS BAR NUCLEAR PLANT, UNIT 2

FINAL SAFETY ANALYSIS REPORT AMENDMENTS 95, 96, and 97

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-391

The Nuclear Regulatory Commission (NRC) staff is reviewing Amendment Nos. 95 and 97 to the Watts Bar Nuclear Plant Unit 2 (WBN 2) Final Safety Analysis Report (FSAR) as they relate to Chapter 8. In order to complete this review and prepare the supplement safety evaluation input with regard to General Design Criteria (GDC) 2, 4, 5 and 17, the NRC staff requests additional information from the licensee as described below:

1. Essential Raw Cooling Water (ERCW): FSAR Section 9.2.1.3 states "ERCW system has eight pumps (four pumps per train). However, minimum combined safety requirements for one 'accident' unit and one 'non–accident' unit, or two 'non-accident' units, are met by only two pumps on the same plant train. Sufficient redundancy, separation and independence of piping and components are provided to ensure that cooling is maintained to vital loads at all times despite the occurrence of a random single failure."

   Clarify the statement "two pumps on the same plant train" as related to the total number of pumps required for safe shutdown of both units. If the total number of pumps required for safe shutdown of two units is "two on the same train," then provide information on how adequate separation (electrical and physical) is maintained between each pump and the associated power/control circuits for safe shutdown of both units following a plant fire.

2. FSAR Section 8.3.1 describes sharing of the AC Distribution Systems and Standby Power Supplies. For compliance with GDC 5, the following statement is made in FSAR Amendment 95:

   "Therefore, there are electric motors powered by the onsite distribution system of one unit that drive safety-related machinery (i.e., essential raw cooling water pumps, component cooling system pumps) required for safe shutdown of the other unit. For example, the ERCW system is arranged in two headers (trains) each serving certain components in each unit (see Section 9.2.1.2). There are eight ERCW pumps arranged electrically so that two pumps are fed from each shutdown board (1A-A, 1B-B, 2A-A, 2B-B). Only one pump per board can be automatically loaded on a DGU at any one time. The pumps supplied from the 'A' boards pump into the 'A' train header and likewise the 'B' pumps."

   Assuming that the operability of an ERCW pump will be dependent on operability of corresponding available power source(s) (power and control power), provide details on the minimum number of power supplies (emergency diesel generators) and corresponding ERCW pump/isolation valve combination required to be operable at all times to ensure that safe shutdown can be achieved on the unit with an accident and the non-accident unit assuming a simultaneous, worst-case single failure (including false or

spurious accident signal) on each unit. Provide the same level of details for the component cooling system pump combination.

3. FSAR Section 8.1.5.3 documents compliance with Regulatory Guides (RGs) and Institute of Electrical and Electronics Engineers (IEEE) Standards. For compliance with RG 1.81 Rev. 1, the FSAR states "Some plant common loads are supplied from Unit 1, channels I and II and other plant common loads are supplied from Unit 2. In no case does the sharing inhibit the safe shutdown of one unit while the other unit is experiencing an accident. All shared systems are sized to carry all credible combinations of normal and accident loads."

   Provide details on common loads supplied from each unit including the specific power sources.

4. FSAR Section 8.2.1.8 describes Conformance with Standards. For compliance with GDC 17, this section states "The non-1E control power circuits from the vital battery boards to 6.9-kV common switchgear C and D have redundant protection (breaker and fuse) in the event of a failure. Selective coordination exists between the non-1E and Class 1E circuits that are fed from each of the vital battery boards. Thus, failure of all of the non-1E control power circuits on the vital battery boards will not have any effect on the 1E circuits or battery boards."

   For all AC (including 480V) and DC circuits that rely on molded-case circuit breaker (MCCB) combinations or MCCB and fuse combinations or fuse/fuse combination to provide separation between common circuits or safety/nonsafety-related circuits, describe the protective devices/schemes used in each common or non-1-E circuit and provide coordination curves for the devices. Specifically, provide details on the instantaneous region of the protective devices and available fault currents.

5. The FSAR Amendment 95 identifies cable splices in underground cable and low voltage power and control cable installations and penetrations. Position 9 of RG 1.75 states that cable splices in raceways should be prohibited. The NRC staff's prohibition against splices in raceways is centered on the prevention of fires caused by improper splices. Position 9 of RG 1.75 (Rev. 2) states that if cable splices exist, the resulting design should be justified by analysis and that the analyses should be submitted as part of the safety analysis report. The NRC staff's review of the FSAR Amendments 95 and 97 did not find the necessary information for justifying splices in the cables that are being replaced for startup of WBN 2.

   In order to evaluate the use of splices in the new cables in raceways being installed for startup of WBN 2, provide additional information on the analysis/justification for use of splices in accordance with Position 9 of RG 1.75, which demonstrates compliance with the requirements of GDCs 2, 4, and 17.

6. In FSAR Amendment 95, Section 8.3.1.4.2 identifies fire resistance barriers installed between redundant division trays (open and enclosed trays) to maintain separation between them. The effects on cable ampacity due to environmental conditions and cable installation configuration are discussed in Section 8.3.1.4.1. The NRC staff's

review of these two sections did not identify a description of the fire barriers or information on the effects of fire barriers on cable ampacity.

Provide additional information on the type of fire barriers and information on its effect on cable ampacity (derating) for the new cables being installed or replaced for startup of WBN 2.

7. Section 8.3.1.4.3 of the FSAR Amendment 95 (page 8.3-48) states that cables for nonsafety-related functions are not run in conduit used for essential circuits except at terminal equipment where only one conduit entrance is available. Also, FSAR Amendment 95 (page 8.3-49) states that a nonsafety-related cable may be routed with those for essential circuits provided that the cable or any cable in the same circuit has not been subsequently routed onto another tray containing a different division of separation of essential cables.

   Provide a clarification of the above statements since they appear to be contradictory.

8. In the original Safety Evaluation Report (NUREG 0847), the NRC staff concluded that a nonsafety-related cable must be treated as an associated cable if it was routed with essential circuits. An associated cable should only be routed with its associated safety related cables and be separated from other nonsafety-related cables as well as the redundant safety-related cables. Thus, the independence-of redundant cable systems cannot be compromised through the non-safety related cables sharing a common raceway. Any new nonsafety-related cables being installed or replaced for startup of WBN 2 and sharing a raceway with essential circuits should meet the guidelines of positions 4, 6, and 7 of RG 1.75 and Sections 4.5 and 4.6.2 of IEEE Standard 384-1974.

   Provide an analysis of associated circuits for the new cables being installed or replaced for startup of WBN 2 in accordance with Section 4.6.2(1) of IEEE Standard 384-1974. The analysis should demonstrate that electrical faults, caused by failure of the associated cables, will not compromise the independence of redundant safety related cable systems. The analysis should verify that the cable's associated protective device will clear the imposed fault condition (in an acceptable time period) without exceeding the I^2t rating for the cable and without tripping the upstream breaker supplying the safety bus. The analysis should include sample coordination curves of the protective devices for each voltage level to show that a fault in the associated circuit will not result in a loss of the safety bus or the loss of redundant safety related cables.