Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

May 19, 2011

10 CFR 51.50
10 CFR 51.92

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: Watts Bar Nuclear Plant (WBN) Unit 2 - Intake Pumping Station Water Velocity – Response to Request for Additional Information

References:
1. TVA letter to NRC dated February 15, 2008, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Final Supplemental Environmental Impact Statement for the Completion and Operation of Unit 2"
2. TVA letter to NRC dated April 29, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Intake Pumping Station Water Velocity – Response to Request for Additional Information"

This letter responds to a staff request for additional information (RAI) regarding the Intake Pumping Station Flow Rates used for environmental reviews. This RAI was discussed during a public meeting between the NRC and TVA on May 11, 2011.

Enclosure 1 provides the response to the RAI.

There are no new commitments made in this letter. If you have any questions, please contact Bill Crouch at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 19th day of May, 2011.

Respectfully,

David Stinson
Watts Bar Unit 2 Vice President

Enclosure 1: Response to IPS Water Velocity RAI

D030
NRR

cc (Enclosure):

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ENCLOSURE 1

Response to Intake Pumping Station Water Velocity RAI

Tennessee Valley Authority – Watts Bar Nuclear Plant - Unit 2, Docket No. 50-391

Question:

At a meeting with the NRC on May 11, 2011, the NRC staff reviewing the impingement report had a number of basic questions concerning the physical configuration of the Watts Bar Nuclear Plant Intake Pumping Station (IPS) and pump alignment and operation.

Response:

Eight Essential Raw Cooling Water (ERCW) pumps and seven Raw Cooling Water (RCW) pumps are located at and take suction from the IPS. ERCW serves safety-related loads such as Residual Heat Removal and Component Cooling System heat exchangers. RCW supplies non-safety loads such as cooling units of normal building ventilation systems and turbine oil cooling. Many of the loads for both ERCW and RCW are systems that are shared between both units. These loads have to be supplied whether a single unit or both units are in operation. Spent Fuel Pool heat removal and building ventilation heat loads are examples of shared loads.

The ERCW system is safety-related and is required to have two independent trains to meet single failure requirements. The IPS as a consequence has two physically separated independent bays. The four train A ERCW pumps are located in one bay and the four train B ERCW pumps are located in the other bay. The RCW pumps are not safety-related, but they are divided between the two bays to even the flow load. There are four RCW pumps located in one bay and three located in the other bay. The RCW pumps are physically separated from the ERCW pumps but share common suction paths from the river through the traveling screens. The IPS has four entrance openings at the river, four intake channels that are always submerged, four traveling screen wells, and four traveling screens. These features are evenly divided between the two bays. This arrangement is shown in Figure 1. Figure 2 shows an elevation schematic. The figures are provided to aid in understanding the arrangement. They are not intended to reflect the detailed physical configuration of the IPS.

Each entrance opening is 7.33 feet (ft) wide. Each intake channel has a rectangular cross section with a width of 5.17 ft and a height of 17.5 ft. The bottom elevation of the channel is 652 mean sea level (msl) and the top of the channel is at 669.5 msl. Each channel empties into a well that includes a traveling screen. The bottom elevation of the well is 652 msl and the top of the well is above the normal maximum lake level. Each well is 5.17 ft wide. Each traveling screen is four ft wide. The height of the water column through the well and through the traveling screen varies with the lake level. The minimum summer pool elevation is 681 msl and the minimum winter pool elevation is 677 msl. The minimum seasonal pool elevations were used for calculating the velocities through the traveling screen. The specific height values used were 29 ft for the summer and 25 ft for the winter. Since there are two flow paths into each bay, the flow area per bay is twice the width times the height for each path. The area through the traveling screen is also multiplied by a factor from the manufacturer to account for the effective flow area. This value is 0.503 for the WBN screens. The velocity in the wells was not calculated but would be the velocity of the intake channel multiplied by the ratio of 17.5 ft/29 ft for the summer and 17.5/25 for the winter.

Typical summertime operation for two units would have two ERCW pumps and three RCW pumps operating per bay. If temperatures were high or due to maintenance alignments, four RCW pumps in one bay could be in operation resulting in a flow rate of 73 cfs. This was the

configuration chosen for determining velocities. The resulting velocities were 0.62 fps through the screens, 0.17 fps at the IPS entrance, and 0.4 fps in the intake channels. The flow through the other bay would be 61 cfs, giving a total IPS intake flow of 134 cfs. Thus choosing the bay with more pumps operating will produce higher velocities. A typical summertime operation for a single unit would have two ERCW pumps and two RCW pumps operating per bay. The total ERCW flow would be lower than would exist for two-unit operation. Because it is physically possible, although unlikely, that all four RCW pumps could be running on one bay; it can be assumed that the velocities for the four RCW pump bay for two-unit operation also apply to single unit operation.

The normal system alignment for winter operation would be two ERCW pumps and two RCW pumps per bay. The ERCW flow rate is less than would be required during summer operation. Similar to single unit operation, all four RCW pumps on one bay could be in operation with none operating in the other bay. This configuration results in a flow rate of 68 cfs through the four RCW pump bay with resulting velocities of 0.67 fps through the traveling screens, 0.18 fps at the IPS entrance, and 0.37 fps in the intake channel. For this alignment, the flow rate in the other bay would be 45 cfs resulting in a total IPS intake flow of 113 cfs. The values discussed in the preceding paragraphs were taken from the reference.

Reference:

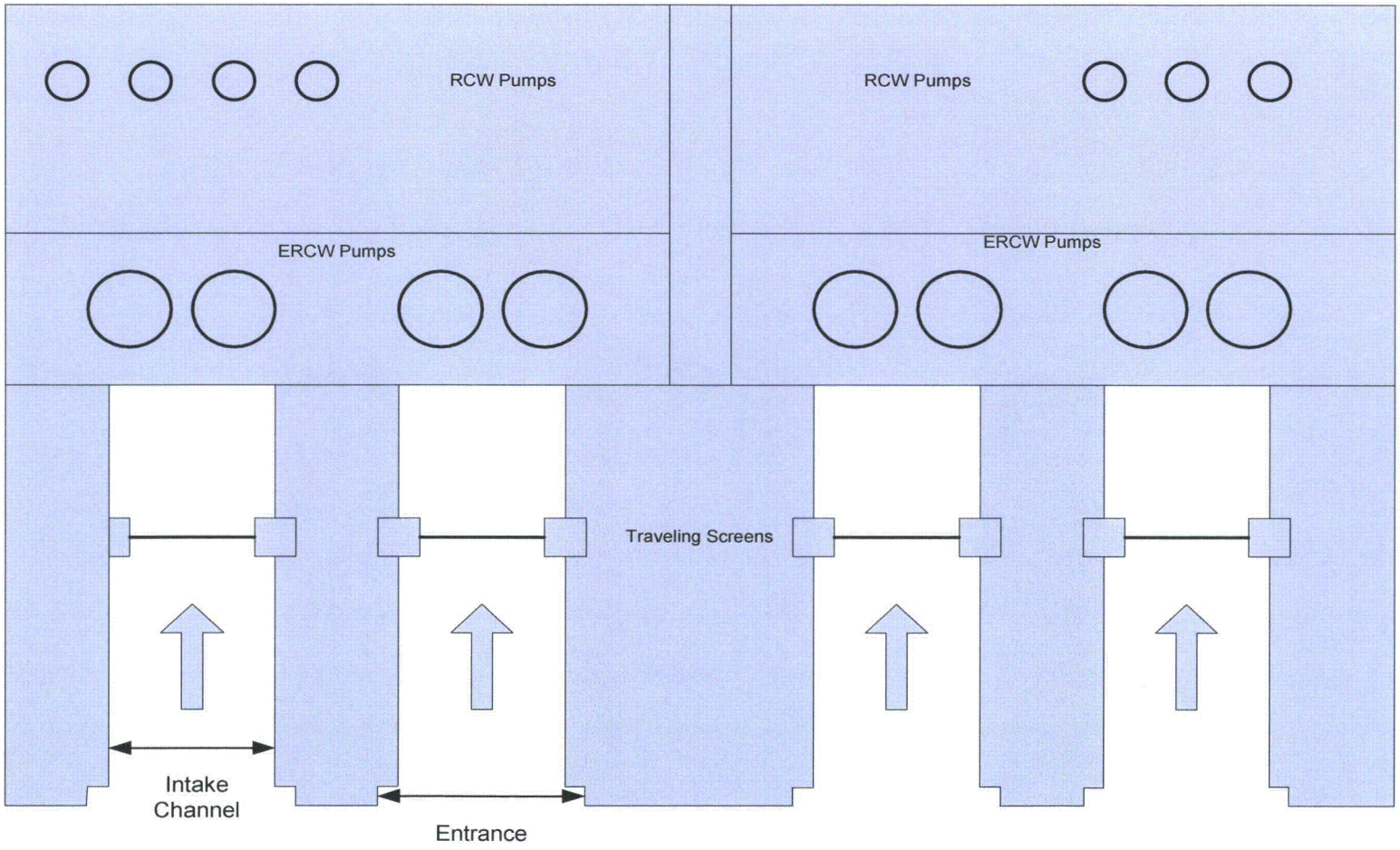
TVA Calculation EPMRCP052992, R2, "Sizing of Traveling Water Screen"

ENCLOSURE 1

Response to IPS Water Velocity RAI

Tennessee Valley Authority - Watts Bar Nuclear Plant - Unit 2, Docket No. 50-391

IPS Plan View Schematic



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IPS Elevation Schematic