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

May 20, 2011

10 CFR 50.4

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

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

Subject: **Revised Response to Request for Additional Information Question 3 Regarding Final Safety Analysis Report Section 2.4 (TAC NO. ME3945)**

Reference: Letter from TVA to NRC, "Response to Request for Additional Information Regarding Final Safety Analysis Report Section 2.4 (TAC NO. ME3945)," dated April 20, 2011

By the referenced letter, the Tennessee Valley Authority (TVA) provided response to the Request for Additional Information (RAI) regarding Final Safety Analysis Report (FSAR) Section 2.4. Based on TVA's response, a follow-up phone call between the NRC and TVA was held on May 4, 2011. As a result of the call, a revised response to RAI question 3 was required. Enclosure 1 to this letter provides TVA's revised response to RAI question 3. This response supersedes the response to RAI question 3 submitted in the referenced letter.

Regarding the RAI question 2 response submitted in the referenced letter, TVA agreed to revise FSAR Figure 2.4-72 to show the sand baskets. An FSAR Change Request has been submitted to include this revision in FSAR Amendment 104. A copy of the Figure submitted with the Change Request is provided in Enclosure 2. Note 3 was added to Figure 2.4-72 to describe the sand baskets.

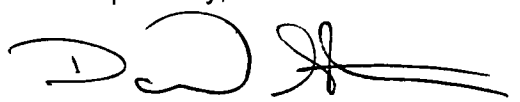
In addition, TVA agreed during the follow-up phone call that completion of the Cherokee and Douglas dams finite element analysis as discussed in RAI response question 2 and the date for permanent modification resolution to address each of the sand basket installations as discussed in RAI response question 4, would be license conditions.

D03D
NRR

There are no new commitments described in this submittal. 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 20th day of May, 2011.

Respectfully,



David Stinson
Watts Bar Unit 2 Vice President

Enclosures:

1. Revised Response to Request for Additional Information Question 3 Regarding Final Safety Analysis Report Section 2.4
2. Revised FSAR Figure 2.4-72

cc (Enclosures):

U.S. Nuclear Regulatory Commission
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ENCLOSURE 1

REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION QUESTION 3 REGARDING FINAL SAFETY ANALYSIS REPORT SECTION 2.4

TENNESSEE VALLEY AUTHORITY
DOCKET NO. 50-391

By letter dated May 7, 2010, Tennessee Valley Authority (TVA) provided Amendment 98 to the Watts Bar Nuclear Plant (WBN), Unit 2, Final Safety Analysis Report (FSAR). In Amendment 98, TVA included information in Section 2.4, "Hydrologic Engineering." In a letter dated January 24, 2011, TVA also provided anticipated changes to FSAR Section 2.4 in advance of FSAR Amendment 103, to facilitate the continuing review by the Nuclear Regulatory Commission (NRC) staff. In the discussion in FSAR Subsection 2.4.3 regarding probable maximum flood (PMF) on streams and rivers, the staff finds that TVA makes no mention that the predicted PMF level is dependent on temporary modification currently in place where sand baskets about 4 feet in height are deployed in the vicinity of four dams (Fort Loudoun, Tellico, Cherokee and Watts Bar). Thus, the NRC staff requests the following additional information in order to continue its review:

3. ***NRC Request:***

Discuss the basis for concluding the structural adequacy of the sand baskets under either scenarios of temporary or long-term deployment. Specifically, address the ability of the sand baskets to withstand debris, erosion and impact loading caused by tornado, hurricane, or large moving objects such as trucks.

TVA Response:

The sand baskets installed on embankments at the Cherokee, Fort Loudoun, Tellico and Watts Bar dams are designed for loading conditions that are consistent with the loading conditions used in the design of the dam concrete structures and embankments at these facilities. For the PMF and the seismic-flood events, the sand baskets are designed for the lateral hydrostatic loads resulting from the peak headwater conditions, the uplift pressure on the base of the baskets and the deadweight of the sand baskets. The sand baskets are shown to be stable against sliding by demonstrating that the frictional resistance at the basket/surface interface multiplied by the vertical forces on the base of the sand basket exceeds the applied lateral hydrostatic forces with a minimum factor of safety of 1.1 in accordance with USACE EM 1110-2-2100 for extreme conditions. Sand baskets are shown to be stable against overturning by demonstrating that the resisting moment provided by the deadweight of the baskets exceeds the overturning moment associated with the lateral hydrostatic forces and the uplift pressure on the base of the sand baskets. For the seismic-flood events evaluated, none of the sand baskets are credited except at Fort Loudoun dam. The Fort Loudoun dam sand baskets are designed for the top-of-embankment horizontal and vertical base accelerations for the seismic event under consideration plus deadweight. For this loading condition, the sand baskets are shown to be stable against sliding by demonstrating that the frictional resistance at the basket/surface interface multiplied by the

basket deadweight minus the vertical seismic load exceeds the horizontal seismic inertia loads with a minimum factor of safety of 1.1 in accordance with USACE EM 1110-2-2100 for extreme conditions. Sand baskets are shown to be stable against overturning by demonstrating the resisting moment provided by the deadweight of the sand baskets exceeds the overturning moments associated with the seismic uplift and horizontal inertia loads. Since the respective reservoir headwaters have not reached the base of the sand baskets at the time of the seismic event, no hydrostatic loads are combined with the seismic loading on the baskets.

As discussed above, stability calculations were performed by TVA for the sand baskets using vendor test data for sliding resistance. The stability analysis demonstrated an acceptable factor of safety in sliding for each installation. Based on sand basket vendor estimation of a design life of between 5 and 7 years, the sand baskets can perform their intended function until decisions are made relative to the long-term solution for preventing embankment overflow.

Vendor (HESCO Concertainers) information regarding the ability of the sand baskets to withstand debris and impact loading was provided in TVAs letter to the NRC dated January 14, 2011, "Response to Hydrology Action Items."

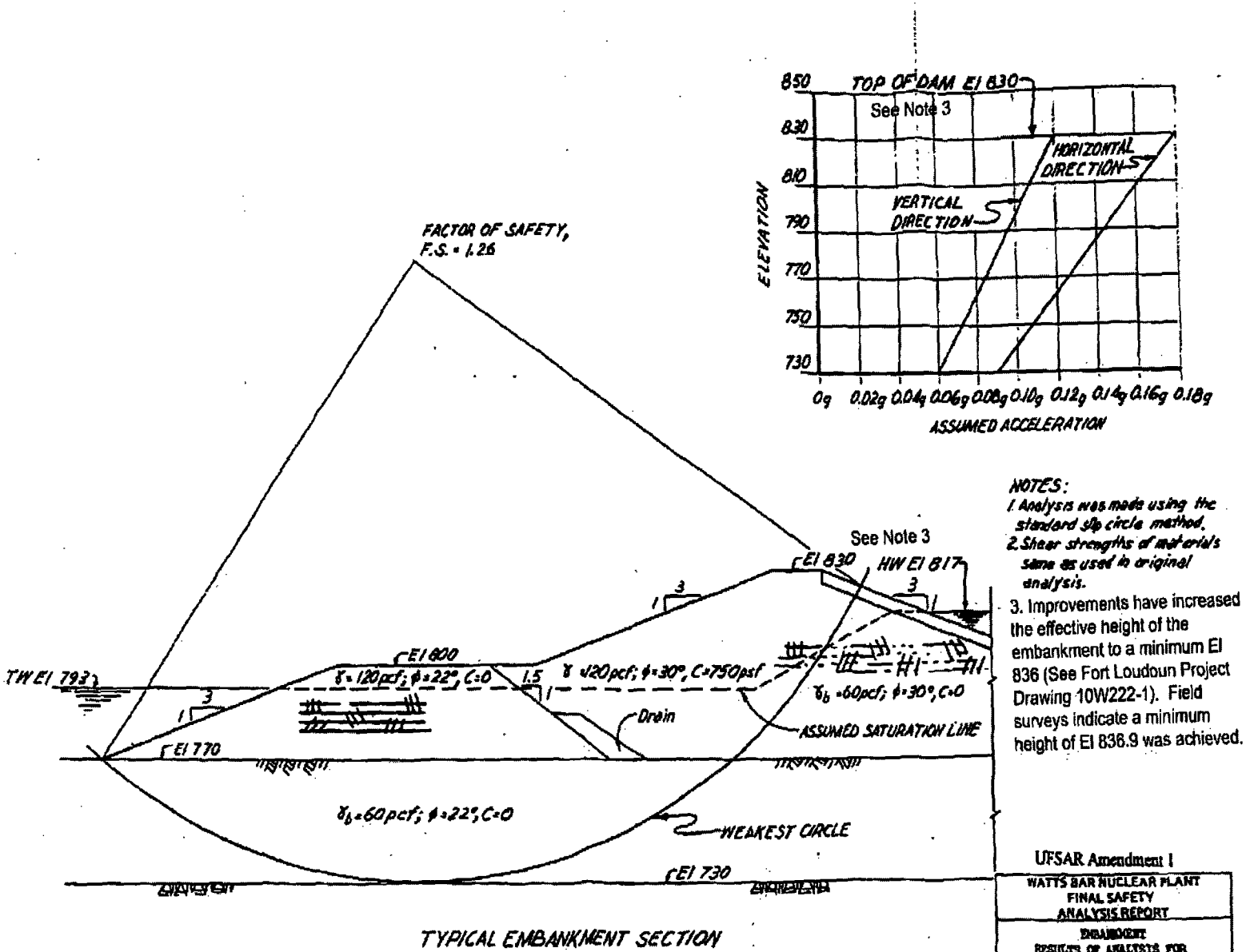
Since water does not overtop the sand baskets under PMF conditions, a large sand basket base erosion mechanism does not exist. Testing performed by the sand basket vendor and reviews of the performance of similar sand baskets in the 2009 Fargo, North Dakota flood did not identify sliding or stability concerns resulting from seepage through the baskets. As described in the response to Question 1, the sand baskets are considered to fail when overtopped during the Norris, Cherokee, Douglas and Tellico seismic-flood failure combination.

Consistent with the design of the dam concrete structures and embankments, impact loading caused by tornado, hurricane or large moving objects, such as trucks, is not evaluated in the sand basket structural adequacy calculations. However, should tornado, hurricane or large moving object (such as a land-based truck) impact cause damage to sand baskets, inspections by TVA personnel within 24 hours after these events would detect the damage, and the appropriate repairs would be implemented. Sand basket impact from larger moving objects (such as trucks) in flood conditions is not considered since the driving water flow through the reservoirs would carry such objects to the discharge points of the reservoirs.

Any general degradation of the sand baskets would be detected during the routine periodic inspection by TVA personnel and would be repaired to vendor specifications.

ENCLOSURE 2

REVISED FSAR FIGURE 2.4-72



NOTES:

1. Analysis was made using the standard slip circle method.
2. Shear strengths of materials same as used in original analysis.
3. Improvements have increased the effective height of the embankment to a minimum El 836 (See Fort Loudoun Project Drawing 10W222-1). Field surveys indicate a minimum height of El 836.9 was achieved.

UFSAR Amendment 1

WATTS BAR NUCLEAR PLANT
FINAL SAFETY ANALYSIS REPORT

EMBANKMENT
RESULTS OF ANALYSIS FOR OPERATING BASIS EARTHQUAKE
Fort Loudoun Dam
Figure 2.4-72