



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

November 26, 2013

Mr. Mark A. Satorius  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT: INTERIM ACRS REVIEW OF WATTS BAR NUCLEAR UNIT 2 OPERATING  
LICENSE APPLICATION**

Dear Mr. Satorius:

During the 609<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards on November 7-8, 2013, we met with representatives of the NRC staff and the applicant, Tennessee Valley Authority (TVA), to review the current status of the ongoing construction, inspection and licensing activities related to the Watts Bar Nuclear Unit 2 (WBN 2) Operating License (OL) application. This application was submitted on March 4, 2009, and the NRC staff has requested an interim Committee letter to reflect the Committee's review to this point. WBN 2 is the second unit of a dual-unit plant located in Rhea County in southeastern Tennessee, about 45 miles north-northeast of Chattanooga, Tennessee. Each of the two units uses a Westinghouse nuclear steam supply system with a rated core power of 3,411 MWt and has an ice condenser containment with a design pressure of 15 psig.

Our Plant Operations and Fire Protection Subcommittee held its first meeting on March 31, 2009, the same month the OL application was submitted, and it has held eight subsequent meetings on July 28, 2009 (including a visit to the plant site); March 3, October 6, 2010; February 24, July 12, October 5, December 15, 2011; and June 4, 2013. During these meetings we had the benefit of discussions with the NRC and TVA staff. We also had the benefit of the documents referenced.

## **CONCLUSIONS**

1. Our review to date has not identified any issue which we do not expect to be satisfactorily resolved prior to the currently scheduled OL issuance. Specific items for future review are identified in the discussion below.
2. The integration of WBN 2 as the second unit in a dual-unit plant which has operated as a single-unit for almost 20 years will require specific, detailed planning to ensure against creating challenges to Watts Bar Nuclear Unit 1 (WBN 1) operation.

## **BACKGROUND**

As a dual-unit plant design, Watts Bar Nuclear Plant includes a common control room and other shared facilities. WBN 1 received its OL and entered service on February 7, 1996. In response to an October 13, 1999, TVA request, WBN 2 was placed in deferred plant status and its Construction Permit was extended by an NRC order in October 2000. TVA presently expects WBN 2 to be ready to begin operation by the end of 2015.

Due to the approximately 20-year span between completion of Units 1 and 2 of this dual-unit site, the Commission, in Staff Requirements Memorandum (SRM) SECY-07-0096, dated July 25, 2007, approved the staff's recommendations for the licensing and inspection program to be used specifically for WBN 2. The SRM provides as follows:

“The Commission supports a licensing review approach that employs the current licensing basis for Unit 1 as the reference basis for the review and licensing of Unit 2. Further, TVA and the NRC staff should review any exemptions, reliefs, and other actions which were specifically granted for Unit 1 to determine whether the same allowance is appropriate for Unit 2. Significant changes to that licensing approach would be allowed where the existing backfit rule would be met or as necessary to support dual unit operation. The staff should encourage the licensee to adopt updated standards for Unit 2 where it would not significantly detract from design and operational consistency between Units 1 and 2.

There are current generic safety issues at the resolution stage, such as GSI-191 or security issues, that will be much easier to resolve before plant operation. The staff and TVA should, during the licensing period, look for opportunities to resolve such issues where the unirradiated state of Watts Bar 2 makes the issue easier to resolve than at Watts Bar 1.”

We addressed the WBN 1 and 2 OLs in a letter dated August 16, 1982, and the WBN 1 OL in a letter dated November 8, 1995. The WBN 2 OL review by the NRC staff is ongoing and our review is currently expected to be complete in 2014.

In February 2009, the NRC staff issued Supplemental Safety Evaluation Report (SSER) 21, which documented the status of the WBN 2 licensing at that time. SSERs 22 - 26 have been issued subsequently. This interim letter summarizes our review of SSERs 21 - 26.

## **DISCUSSION**

Our review of WBN 2 continues in accordance with provisions of the SRM. Thus, it considers WBN 2 as the second unit in a dual-unit facility which is subject to the current licensing basis of WBN 1. Our review of WBN 2 has focused on the potential for the period of deferral to affect the integration of WBN 2 operation into the dual-unit design. This includes both the validation of compliance of structures, systems and components with the current licensing basis, now applicable to both units, and validation that the processes of startup and initial operation of WBN 2 will not adversely affect continuing operation of WBN 1. The integration of the second unit of a dual-unit plant, where the first unit continues in operation, is not a unique event, but it has not occurred recently. We will review the provisions made by TVA to ensure the safety of the process.

The staff review identified 128 Open Items. We have no comments on the 75 open items in the SSERs which are now closed. There are 53 items still open. Of these, we have requested presentations on the following 7 items as listed in the Watts Bar Unit 2 Action Items Table (Appendix HH) of the SSER 26. Additional items may result from subsequent reviews.

SSER Item No.	Description
(59)	The staff's evaluation of the compatibility of the ESF system materials with containment sprays and core cooling water in the event of a LOCA is incomplete pending resolution of GSI-191 for WBN Unit 2. (SSER 23, Section 6.1.1.4)
(61)	TVA should provide information to the NRC staff to demonstrate that PAD 4.0 can conservatively calculate the fuel temperature and other impacted variables, such as stored energy, given the lack of a fuel thermal conductivity degradation model. (SSER 23, Section 4.2.2)
(63)	TVA should confirm to the NRC staff that testing prior to Unit 2 fuel load has demonstrated that two-way communications is impossible with the Eagle 21 communications interface. (SSER 23, Section 7.2.1.1)
(91)	TVA should update the FSAR with information describing how WBN Unit 2 meets GDC 5, assuming the worst case single failure and a LOOP, as provided in TVA's letter dated April 13, 2011. (SSER 23, Section 9.2.1)
(93)	TVA should confirm to the staff that testing of the Eagle 21 system has sufficiently demonstrated that two-way communication to the ICS is precluded with the described configurations. (SSER 23, Section 7.9.3.2)
(133)	In order to confirm the stability analysis of the sand baskets used by TVA in the WBN Unit 2 licensing basis, TVA will perform either a hydrology analysis without crediting the use of the sand baskets at the Fort Loudoun dam for the seismic dam failure and flood combination, or TVA will perform a seismic test of the sand baskets, as stated in TVA's letter dated April 20, 2011. TVA will report the results of this analysis or test to the NRC by October 31, 2011. (SSER 24, Section 2.4.10)
(134)	TVA should provide to the NRC staff supporting technical justification for the statements in Amendment 104 of FSAR Section 2.4.4.1, "Dam Failure Permutations," page 2.4-32 (in the section "Multiple Failures") that, "Fort Loudoun, Tellico, and Watts Bar have previously been judged not to fail for the OBE (0.09 g). Postulation of Tellico failure in this combination has not been evaluated but is bounded by the SSE failure of Norris, Cherokee, Douglas and Tellico." (SSER 24, Section 2.4.10)

In addition, a presentation should be provided in response to the following additional item. The staff should explain how the feasibility of all operator manual actions taken in response to a fire is evaluated according to the guidance in Regulatory Guide 1.189, Revision 2, "Fire Protection for Nuclear Power Plants." In particular, we want to understand how the timelines and methods

outlined in NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," are used to evaluate times for fire detection, condition diagnosis, personnel assembly, communications and coordination, supervisory direction, transit, and implementation of the required actions, including an assessment of the associated uncertainties and available time margins.

With respect to the provision in the SRM that consideration should be given to opportunities to resolve generic safety issues prior to WBN 2 entering operation, NRC staff and TVA continue to update and review this matter with us, and we have no comments at this time.

WBN 1 will have operated as a single unit for nearly 20 years when WBN 2 is expected to enter service. Because of the dual-unit design, involving a shared control room and numerous shared structures, systems and components, integrating WBN 1 and 2 operations will require detailed and conservative planning and execution. Planning and procedures for this integration should receive a thorough review by NRC staff to ensure that WBN 1 is not adversely affected.

Sincerely,

*/RA/*

J. Sam Armijo  
Chairman

## REFERENCES

1. Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 2 Final Safety Analysis Report (FSAR), Amendments No. 92 through 109.

Below is the list of FSAR Amendments that was submitted as part of the Unit 2 review.

Amendment 92, dated December 18, 2008 (ML090980525)  
Amendment 93, dated April 30, 2009 (ML091400068)  
Amendment 94, dated August 27, 2009 (ML092460758)  
Amendment 95, dated November 24, 2009 (ML093370274)  
Amendment 96, dated December 14, 2009 (ML093570464)  
Amendment 97, dated January 11, 2010 (ML100191426)  
Amendment 98, dated May 7, 2010 (ML101340795)  
Amendment 99, dated May 27, 2010 (ML101610291)  
Amendment 100, dated September 1, 2010 (ML102530216)  
Amendment 101, dated October 29, 2010 (ML103160411)  
Amendment 102, dated December 17, 2010 (ML112210425)  
Amendment 103, dated March 15, 2011 (ML110840665)  
Amendment 104, dated June 3, 2011 (ML111780527)  
Amendment 105, dated August 12, 2011 (ML121700642)  
Amendment 106, dated September 15, 2011 (ML121700412)  
Amendment 107, dated November 17, 2011 (ML121780190)  
Amendment 108, dated March 5, 2012 (ML120830237)  
Amendment 109, dated August 23, 2012 (ML122440027)

2. U.S. Nuclear Regulatory Commission, NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," Supplements (SSER) 21 - 26.

Below is the list of SSERs issued as part of the Unit 2 review.

SSER 21, dated February 28, 2009 (ML090570741)  
SSER 22, dated January 31, 2011 (ML110390197)  
SSER 23, dated June 30, 2011 (ML11206A499)  
SSER 24, dated September 30, 2011 (ML11277A148)  
SSER 25, dated November 30, 2011 (ML12011A024)  
SSER 26, dated June 30, 2013 (ML13205A136)

3. Staff Requirements Memorandum - SECY-07-0096 – Possible Reactivation of Construction and Licensing Activities for the Watts Bar Nuclear Plant Unit 2, dated July 25, 2007 (ML072060688)
4. Regulatory Guide 1.189, Revision 2, "Fire Protection for Nuclear Power Plants," dated October, 2009 (ML092580550)
5. NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," dated October, 2007 (ML073020676)
6. Letter dated August 16, 1982, from Paul Shewmon, ACRS Chairman, to Nunzio J. Palladino, NRC Chairman, Subject: ACRS Report on Watts Bar Nuclear Plant, Units 1 and 2 (ML082320287)
7. Letter dated November 8, 1995, from T. S. Kress, ACRS Chairman, to Shirley Ann Jackson, NRC Chairman, Subject: Application for Operating License for Watts Bar Nuclear Plant Unit 1 (ML073371408)

- 2. U.S. Nuclear Regulatory Commission, NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Unit 2," Supplements (SSER) 21 - 26.

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- 5. NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," dated October, 2007 (ML073020676)
- 6. Letter dated August 16, 1982, from Paul Shewmon, ACRS Chairman, to Nunzio J. Palladino, NRC Chairman, Subject: ACRS Report on Watts Bar Nuclear Plant, Units 1 and 2 (ML082320287)
- 7. Letter dated November 8, 1995, from T. S. Kress, ACRS Chairman, to Shirley Ann Jackson, NRC Chairman, Subject: Application for Operating License for Watts Bar Nuclear Plant Unit 1 (ML073371408)

Accession No: **ML13318A154**

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<b>OFFICE</b>	ACRS	SUNSI Review	ACRS	ACRS	ACRS
<b>NAME</b>	GShukla GSS	GShukla GSS	CSantos GSS for	EMHackett	EMH for JSA
<b>DATE</b>	11/25/2013	11/25/2013	11/25/2013	11/26/13	11/26/13

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