



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-18-061

May 31, 2018

10 CFR 50.54(f)

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

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License Nos. NPF-90 and NPF-96
NRC Docket Nos. 50-390 and 50-391

Subject: **Tennessee Valley Authority Watts Bar Nuclear Plant Response to NRC Request for Supplemental Information Related to Generic Letter 2016-01, "Monitoring of Neutron-Absorbing Materials in Spent Fuel Pools" (CAC Nos. MF9407, MF9408; EPID L-2016-LRC-0001)**

- References:
1. NRC Generic Letter 2016-01, "Monitoring of Neutron-Absorbing Materials in Spent Fuel Pools," dated April 7, 2016, (ML16097A169)
 2. "Tennessee Valley Authority (TVA) Revised Response to NRC Generic Letter 2016 01, 'Monitoring of Neutron-Absorbing Materials in Spent Fuel Pools,'" dated December 19, 2016, (ML16354B569)
 3. NRC Letter to Those on the Attached List - "Generic Letter 2016-01, 'Monitoring of Neutron-Absorbing Materials in Spent Fuel Pools' -Request for Supplemental Information (CAC Nos. MF9406, MF9407, MF9408, MF9412, MF9413, MF9418, MF9419, MF9421, MF9422, AND MF9451; EPID L-2016-LRC-0001)", dated December 18, 2017 (ML17304B153)
 4. "Application to Revise Watts Bar Unit 2 Technical Specification 4.2.1, 'Fuel Assemblies,' and Watts Bar Units 1 and 2 Technical Specifications Related to Fuel Storage (WBN-TS-17-028)," dated December 20, 2017 (ML17354B282)

On April 7, 2016, the NRC issued Reference 1 to all power reactor licensees except those that have permanently ceased operation with all power reactor fuel removed from on-site spent fuel pool storage. On December 19, 2016, TVA submitted Reference 2 in response to Generic Letter (GL) 2016-01 for Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants.

The purpose of this letter is to provide the Supplemental Information requested in Reference 3.

U.S. Nuclear Regulatory Commission
CNL-18-061
Page 2
May 31, 2018


Enclosure 1 to this letter contains TVA's response to the requested information for Watts Bar Nuclear Plant (WBN).

Please note that this response is based on the current condition at WBN, which does not include a neutron absorber monitoring program. However, on December 20, 2017, TVA submitted Reference 4, to amend the licenses for WBN Units 1 and 2. As noted in that amendment request, if the change is approved, TVA will implement a Neutron Absorber Monitoring Program following the NRC- approved guidance in NEI 16-03-A, "Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools," at WBN.

This letter contains no new regulatory commitments. Please contact Chris Riedl at 423-751-3835, if you have any questions concerning this response.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 31st day of May 2018.

Respectfully,

 Digitally signed by J.
W. Shea
Date: 2018.05.31
15:40:41 -04'00'

Joe W. Shea
Vice President, Nuclear Regulatory Affairs & Support Services

Enclosure:

Watts Bar Nuclear Plant, Units 1, and 2, Supplemental Information in Response to Generic Letter 2016-01

cc (Enclosures):

NRR Director - NRC Headquarters
NRC Regional Administrator - Region II
NRC Project Manager - Watts Bar Nuclear Plant
NRC Senior Resident Inspector - Watts Bar Nuclear Plant

CNL-18-061

ENCLOSURE

WATTS BAR NUCLEAR PLANT

UNITS 1 and 2

**SUPPLEMENTAL INFORMATION IN
RESPONSE TO GENERIC LETTER 2016-01**

**Watts Bar Nuclear Plant
Units 1 and 2
Supplemental Information in
Response to Generic Letter 2016-01**

NRC Generic Boral-RAI-1

Title 10 of the Code of Federal Regulations (10 CFR) Section 50.68, "Criticality accident requirements," and 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 62, "Prevention of criticality in fuel storage and handling," provide the requirements for licensees with regard to maintaining subcriticality in the spent fuel pool (SFP). For licensees that utilize neutron absorbing materials (NAM) in the SFP, the boron-10 (^{10}B) areal density (AD) of the NAM must be known so that the assumption for the ^{10}B minimum AD in the SFP nuclear criticality safety (NCS) analysis of record (AOR) is supported. In order for the NRC staff to verify the requirements of 10 CFR 50.68 and GDC 62 are met, the staff needs to ensure that licensees are taking appropriate action to confirm that the ^{10}B AD of their NAM can reasonably be expected to remain above the minimum assumed in the SFP NCS AOR. In addition, the condition of the NAM must be considered in the SFP NCS AOR. In order to verify whether or not the requirements of 10 CFR 50.68 and GDC 62 will continue to be met, the staff needs to verify that the potential reactivity changes due to degradation or physical changes to the NAM are accounted for in the SFP NCS AOR. This includes any changes that would affect the neutron spectrum for the SFP in addition to any loss of neutron attenuation capability.

Industry operating experience, as described in Information Notice (IN) 2009-26, "Degradation of Neutron Absorbing Materials in the Spent Fuel Pool," dated October 28, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092440545), and IN 1983-29, "Fuel Binding Caused by Fuel Rack Deformation," dated May 6, 1983 (ADAMS Accession No. ML14043A291), has demonstrated that certain manufacturing processes and plant conditions (dose, chemistry, length of time installed, and installation configuration) have resulted in material deformation as a result of blisters or bulging associated with Boral.

Watts Bar Nuclear Plant (WBN) does not have a site-specific monitoring program, and consequently, is relying on general industry operating experience as a surrogate for the condition of the Boral installed in the SFP.

NRC RAI-1.a

Please describe whether industry operating experience bounds the condition of the Boral at WBN, thereby ensuring that any degradation or deformation that may affect the Boral at WBN is identified.

WBN Response to RAI-1.a

Through its Nuclear Safety Culture, procedures, and processes, WBN systematically and effectively collects, evaluates, and implements relevant internal and external operating experience (OE) in a timely manner. Issues emerging from the use of Boral in the spent fuel racks are monitored through the TVA Nuclear OE Program and Corrective Action Program.

As indicated in the original Generic Letter response for WBN, the site will continue to monitor industry OE related to Boral, which includes ongoing participation in the EPRI Neutron Absorber Users Group (NAUG) and its related programs (e.g., industrywide learning aging management). Industry-wide, to date there have been no indications of a loss of Boral material of a nature that diminished the neutron-absorbing capability of the Boral (EPRI Report 1021052, "Overview of BORAL[®] Performance Based Upon Surveillance Coupon Measurements"). WBN follows the EPRI Water Chemistry Control Program and there have been no indications of a loss of Boral neutron-absorbing capabilities at a plant following the guidelines. In addition, to date there are no plant-specific operating conditions or rack attributes that would merit concern that the WBN spent fuel racks or SFP environment are not bounded by the industry-wide OE. Finally, EPRI Report 3002013119, "Evaluation of the Impact of Neutron Absorber Material Blistering and Pitting on Spent Fuel Pool Reactivity," documents that observed or foreseen degradation or deformation of the Boral has an insignificant impact on SFP criticality. The industry OE aligns with the WBN licensing basis.

The NAUG, through EPRI, is currently developing an industrywide program/database to aid in monitoring indications of potential Boral degradation and deformation. Over 70,000 water chemistry data points have been collected to date, from over 30 SFPs, for this program. Surveillance data from 100 coupons across 20 SFPs has also been collected to date. The program, supported by EPRI NAUG and industry participants, is described in EPRI document 3002013122, "Roadmap for the Industrywide Learning Aging Management Program (i-LAMP) For Neutron Absorber Materials in Spent Fuel Pools," and includes insights and feedback received from numerous communications with the NRC. Relevant issues emerging from this industry effort will be monitored through the TVA OE Program and Corrective Action Program.

NRC RAI-1.b

In addition, discuss the criticality impact due to relevant material deformation identified in general industry operating experience, and whether it can be accommodated by the NCS AOR for WBN without exceeding NRC subcriticality requirements.

WBN Response to RAI-1.b

To date, the industry OE has revealed no instances of an impact on SFP criticality due to observed Boral deformation (e.g. blistering) or degradation (e.g. pitting). The NAUG, through EPRI, has recently completed a study (EPRI Report 3002013119) which analyzes the criticality impact of blisters and pits on Boral. Simulations were performed for varying enrichment, burnup, areal density values, at unborated conditions (0 ppm), which is conservative for PWRs such as WBN. The study results demonstrate that pitting and blistering, on a scale much larger than any that has been observed in the industry OE, has an insignificant impact on SFP criticality. Therefore the SFP criticality safety analysis of record remains applicable.