

## **NRR-PMDAPem Resource**

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**From:** Schaaf, Robert  
**Sent:** Thursday, October 29, 2015 1:08 PM  
**To:** Szabo, Clinton William; Gordon Arent  
**Cc:** Dion, Jeanne  
**Subject:** Request for Additional Information - Watts Bar Unit 1 TPBARs (MF6050)  
**Attachments:** TPBAR - SNPB RAIs.pdf

Gentlemen,

By letter dated March 31, 2015 (ADAMS Accession No. ML15098A446), the Tennessee Valley Authority (TVA) submitted an application for a license amendment to revise the Watts Bar Nuclear Plant (WBN) Unit 1 Technical Specifications (TS) to increase the maximum number of tritium producing burnable absorber rods and to delete outdated information related to the tritium production program at WBN Unit 1. These changes would revise TS 4.2.1, "Fuel Assemblies," TS 3.5.1, "Accumulators," Surveillance Requirement (SR) 3.5.1.4, and TS 3.5.4, "Refueling Water Storage Tank," SR 3.5.4. TVA supplemented this request with letters dated May 27 and June 15, 2015 (ADAMS Accession Nos. ML15147A611 and ML15169B117, respectively).

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is attached to this e-mail. Draft questions were provided to your staff on October 15, 2015, for clarification of the requests. TVA has agreed to provide a response to this information request by November 30, 2015.

Please contact me if you have any questions regarding with this request.

Regards,  
Bob

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**From:** Schaaf, Robert

**Created By:** Robert.Schaaf@nrc.gov

**Recipients:**

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**REQUEST FOR ADDITIONAL INFORMATION**  
**TENNESSEE VALLEY AUTHORITY FOR**  
**WATTS BAR NUCLEAR PLANT, UNIT 1**  
**PROPOSED CHANGES TO INCREASE THE MAXIMUM NUMBER OF TRITIUM**  
**PRODUCING**  
**BURNABLE ABSORBER RODS PER CYCLE**  
**DOCKET NUMBER 50-390 (TAC NO. MF6050)**

By letter dated March 31, 2015, the Tennessee Valley Authority (TVA) submitted an application for license amendment to revise the Technical Specifications to increase the maximum number of tritium producing burnable absorber rods and to delete outdated information related to the tritium production program at Watts Bar Nuclear Plant (WBN) Unit 1 (ADAMS Accession No. ML15098A446). These changes would revise TS 4.2.1, "Fuel Assemblies", TS 3.5.1 Accumulators," Surveillance Requirement (SR) 3.5.1.4, TS 3.5.4, "Refueling Water Storage Tank," and SR 3.5.4. TVA supplemented this request with letters dated in May and June 2015 (ADAMS Accession Nos. ML15147A611 and ML15169B117).

The Nuclear Regulatory Commission staff has reviewed the application and has determined that additional information is required to complete the review.

1. TVA is requesting an increase of the maximum number of Tritium Producing Burnable Absorber Rods (TPBARs) that can be irradiated per cycle from 704 to 1,792.
  - (a) Provide a loading pattern of the Watts Bar Nuclear Plant (WBN) Unit 1 indicating the location of the TPBARs, integral fuel burnable absorber (IFBA) rods and describe their impact on core reactivity and the power distribution shape during a typical cycle of operation.
  - (b) Provide a detailed description of the impact of the increase in TPBAR loading in WBN Unit 1 on the enrichment of U-235 for the fresh fuel loading at WBN Unit 1 by providing a comparison between a reference plant without TPBARs and a Tritium Producing Core (TPC) plant various enrichment zones.
2. Provide an evaluation of the impact of the TPBARs at WBN Unit 1 in comparison to these parameters for a reference core on the following parameters:
  - (a) Nuclear enthalpy hot rise factor ( $F_{\Delta H}^N$ )
  - (b) Total peaking factor ( $F_Q^T$ )
  - (c) Axial power distributions at Beginning of Life (BOL) and End-of-life (EOL)
  - (d) Reactivity coefficients such as moderator temperature (MTC) and Doppler temperature (DTC) and the total power coefficients.
  - (e) Control rod worths and shutdown margin.

**ENCLOSURE**

3. TVA is requesting an increase of the maximum number of TPBARs that can be irradiated per cycle from 704 to 1,792. Please explain how the proposed increase in TPBARs impacts the following fuel design parameters and describe the methodologies used:
  - (a) Rod internal pressure as a function of fission gas release (FGR)
  - (b) Cladding stress
  - (c) Cladding strain
  - (d) Cladding oxidation and hydriding
  - (e) Fuel temperature
  - (f) Cladding fatigue
  - (g) Fuel rod axial growth
  - (h) Clad flattening
  - (i) Clad creep
  
4. Westinghouse document LTR-NRC-12-18 states that fuel thermal conductivity degradation (TCD) with burnup has an effect on safety parameters; fuel rod stored energy, fuel rod centerline temperature, and Doppler power coefficient. Provide a summary of the impact of the increase in the maximum number of TPBARs in WBN Unit 1 on the above safety parameters and any others due to the lack of explicit treatment of TCD in the safety analysis. Also extend your summary to any other fuel performance parameters that may be affected due to the lack of TCD.