



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

CNL-14-053

April 8, 2014

10 CFR 50.4

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

Watts Bar Nuclear Plant, Unit 1
Facility Operating License No. NPF-90
NRC Docket No. 50-390

Subject: **Notification of the Number of Tritium Producing Burnable Absorber Rods for the Operating Cycle 13 Reactor Core**

Reference: NRC Letter to TVA, "Watts Bar Nuclear Plant, Unit 1 - Issuance of Amendment Regarding the Maximum Number of Tritium Producing Burnable Assembly Rods in the Reactor Core (TAC No. MD9396)," dated May 4, 2009 (ADAMS Accession Number ML090920506)

The purpose of this letter is to inform the Nuclear Regulatory Commission (NRC) of the number of Tritium Producing Burnable Absorber Rods (TPBARs) that TVA plans to irradiate in the Watts Bar Nuclear Plant, (WBN), Unit 1 reactor core during Operating Cycle 13. Unit 1 is currently in a planned refueling outage and expects to begin Cycle 13 operation in May 2014.

Tennessee Valley Authority plans to irradiate 704 TPBARs in WBN, Unit 1 during Operating Cycle 13 as allowed by the current WBN, Unit 1 Technical Specifications (TS). The NRC authorized WBN, Unit 1 to place a maximum of 704 TPBARs into the reactor in the Safety Evaluation dated May 4, 2009 (Reference) associated with TS Amendment 77. The plan to irradiate 704 TPBARs during Cycle 13 has been evaluated with regard to tritium permeation into the reactor coolant system. In conducting the analysis, TVA considered recent WBN, Unit 1 operating experience with TPBARs and TVA concluded that Unit 1 can be operated in compliance with regulatory requirements and in conformance with its licensing basis with regard to tritium permeation with the specified number of TPBARs during Operating Cycle 13. The enclosure to this letter provides a summary of the Pacific Northwest National Laboratory (PNNL) evaluation performed for operation with 704 TPBARs.

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This letter contains no new regulatory commitments. Please address any questions regarding this letter to Mr. Edward D. Schrull at 423-751-3850.

Respectfully,

J. W. Shea

Vice President, Nuclear Licensing

A handwritten signature in cursive script, appearing to read "Eugene W. Poling". To the right of the signature, the letters "FOR" are handwritten.

Enclosure: Evaluation of Margin Associated with 704 TPBARs in Cycle 13

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant, Unit 1
NRC Project Manager - Watts Bar Nuclear Plant, Unit 1
Director, Division of Radiological Health - Tennessee State Department of Environment
and Conservation

ENCLOSURE

TENNESSEE VALLEY AUTHORITY WATTS BAR NUCLEAR PLANT UNIT 1

Notification of the Number of Tritium Producing Burnable Absorber Rods for the Operating Cycle 13 Reactor Core Evaluation of Margin Associated with 704 TPBARs in Cycle 13

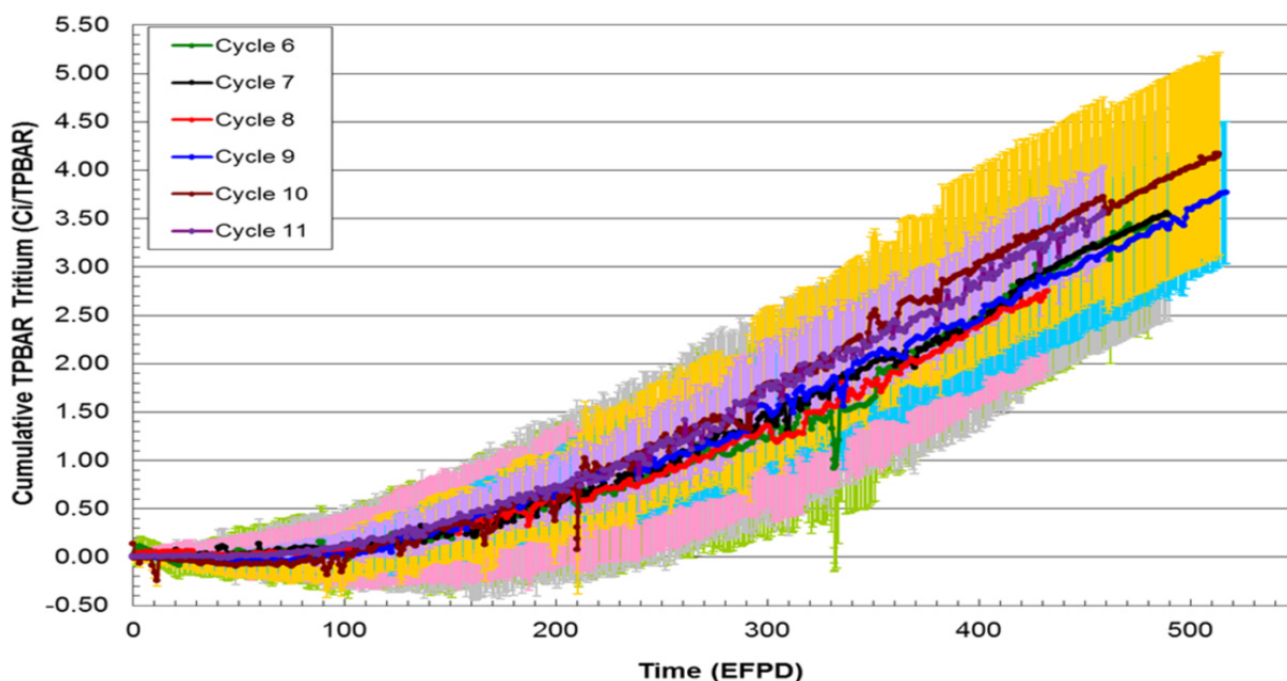
Introduction

Pacific Northwest National Laboratory (PNNL) has evaluated the margin against exceeding current tritium release metrics for irradiation of 704 Tritium Producing Burnable Absorber Rods (TPBARs) in Cycle 13 of Watts Bar Nuclear Power Plant (WBN), Unit 1. Specifically, these limits include a maximum release of 2,304 Curies (Ci)/year to the Reactor Coolant System (RCS) from TPBARs (i.e., the TPBAR release metric) and a release of 3,170 Ci/year to the RCS from all tritium sources (i.e., the total release metric). This evaluation was conducted using a calculation methodology that has been developed by PNNL and documented in a Tritium Technology Program (TTP) design analysis (Reference 1). Key findings from this evaluation are discussed in the following paragraphs.

Similar Performance in Estimated TPBAR Release for All Cycles from Both Designs

Using the calculation methodology discussed above, estimated TPBAR performance appears to be similar, considering uncertainties, in all cycles as shown in the figure below. These results indicate that future TPBAR performance is supported by prior TPBAR irradiation cycles. Because Cycle 11 is statistically the best complete cycle with the smallest uncertainty and the most recent data, this evaluation assumes the TPBAR release in Cycle 13 will be the same as the TPBAR release in Cycle 11. As of January 31, 2014, Cycle 12 was at 451 Effective Full Power Days (EFPD) and performance to date is statistically consistent with previous cycles. Projections also indicate that the nominal Cycle 12 releases will likely be less than Cycle 11.

Comparison of TPBAR Tritium Releases in Cycles 6-11 (Reference 2)



Best Estimate Projections for 704 TPBARs in WBN, Unit 1, Cycle 13

An appropriate way to obtain a quantitative sense for the margin that exists is to analyze a projection for annual tritium releases and take into account the actual projected cycle schedules. Based on the latest information PNNL has received (i.e., as of March 14, 2014), Cycle 13 is assumed to begin in May 2014 and end in September 2015. Assuming a breaker-to-breaker run (i.e. no shutdowns or power setbacks), this would result in a 485 EFPD cycle, at a nominal power of 99.5%. That power level is chosen as an average of actual data from the previous cycles. PNNL also assumed that 704 TPBARs will be irradiated in Cycle 14, beginning October 2015. However, different TPBAR loadings in Cycle 14 have a very small effect on this analysis, because TPBARs do not permeate much for the first couple of months of the cycle. This TPBAR irradiation schedule and cycle length, along with the estimated TPBAR release from Cycle 11, allows for a best estimate calculation for tritium releases in calendar years 2014 and 2015.

RCS Tritium Release Projections

The data in the table below shows that calendar year 2015 (CY2015) will be bounding for both RCS tritium release metrics. In CY2015, the estimate shows that there is a 298 Ci (13%) margin on the TPBAR RCS release metric and a 317 Ci (10%) margin on the total RCS release metric. Therefore, the greatest risk to the Tennessee Valley Authority (TVA) for these RCS metrics is poor TPBAR performance where the tritium release is high enough to exceed the TPBAR RCS permeation metric in CY2015.

Tritium RCS Release Projections with 704 TPBARs in Cycle 13
for Currently Scheduled Operation Dates

Year	TPBAR Tritium Contribution	Total RCS Tritium
Current Release Metrics	2,304 Ci	3,170 Ci
2014	1,225 Ci	2,237 Ci
Margin	1,079 Ci (47%)	933 Ci (29%)
2015	2,006 Ci	2,853 Ci
Margin	298 Ci (13%)	317 Ci (10%)

TPBAR performance is monitored by the TVA Fuel Reliability Assessment (FRA) Program. The FRA Program establishes performance metrics with two action levels based on tritium concentration in the RCS. Exceeding the lower action level performance metrics would require more frequent tritium sampling to monitor, verify, and trend the tritium levels. Exceeding the higher action level performance metrics would require taking actions to minimize the onsite and offsite radiological effects resulting from the abnormal tritium levels.

Conclusions

PNNL has concluded that established nominal TPBAR performance supports the irradiation of 704 TPBARs in WBN, Unit 1 Cycle 13.

References

1. TTP-1-3045 Rev. 1 - TPBAR Tritium Release Calculation Methodology; Pacific Northwest National Laboratory, Richland WA.
2. TTP-1-3063 Rev. 0 - WBN-1 Cycle 11 TPBAR Tritium Release, Deduced From Analysis of RCS Data; Pacific Northwest National Laboratory, Richland WA.