



1101 Market Street, Chattanooga, Tennessee 37402

CNL-16-030

February 22, 2016

10 CFR 50.90

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

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

Subject: **Application to Revise Technical Specification 4.2.1, "Fuel Assemblies" (WBN-TS-15-03) (TAC No. MF6050) - Supplement to Response to NRC Request for Additional Information - Radiation Protection and Consequence Branch**

- Reference:
1. Letter from TVA to NRC, CNL-15-001, "Application to Revise Technical Specification 4.2.1, 'Fuel Assemblies,' (WBN-TS-15-03)," dated March 31, 2015 (ML15098A446)
  2. Letter from TVA to NRC, CNL-15-077, "Correction to Application to Revise Technical Specification 4.2.1, 'Fuel Assemblies' (WBN-TS-15-03)," dated April 28, 2015 (ML15124A334)
  3. Letter from NRC to TVA, "Watts Bar Nuclear Plant, Unit 1 - Supplemental Information Needed for Acceptance of Requested Licensing Action Regarding Application to Increase Tritium Producing Absorbing Rods (TAC NO. MF6050)," dated May 14, 2015 (ML15127A250)
  4. Letter from TVA to NRC, CNL-15-092, "Response to NRC Request to Supplement the Application to Revise Technical Specification 4.2.1, 'Fuel Assemblies' (WBN-TS-15-03)," dated May 27, 2015 (ML15147A611)
  5. Letter from TVA to NRC, CNL-15-093, "Response to NRC Request to Supplement Application to Revise Technical Specification 4.2.1, 'Fuel Assemblies' (WBN-TS-15-03) - Radiological Protection and Radiological Consequences," dated June 15, 2015 (ML15167A359)

6. Letter from TVA to NRC, CNL-15-172, "Application to Revise Technical Specification 4.2.1, 'Fuel Assemblies' (WBN-TS-15-03) (TAC No. MF6050) - Response to NRC Request for Additional Information - Reactor Systems Branch," dated September 14, 2015 (ML15258A204)
7. Electronic Mail from Jeanne Dion (NRC) to Thomas A. Hess (TVA) and Clinton Szabo (TVA), "TPBAR RAIs Part 3b- ARCB," dated October 2, 2015
8. Letter from TVA to NRC, CNL-15-216, "Application to Revise Technical Specification 4.2.1, 'Fuel Assemblies' (WBN-TS-15-03) (TAC No. MF6050) - Response to NRC Request for Additional Information - Radiation Protection and Consequence Branch," dated December 22, 2015 (ML15356A831)

By letter dated March 31, 2015 (Reference 1), Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) to revise Watts Bar Nuclear Plant (WBN), Unit 1 Technical Specification (TS) 4.2.1, "Fuel Assemblies," to increase the maximum number of Tritium Producing Burnable Absorber Rods (TPBARs) that can be irradiated per cycle from 704 to 1,792. The proposed change also revises TS 3.5.1, "Accumulators," Surveillance Requirement (SR) 3.5.1.4 and TS 3.5.4, "Refueling Water Storage Tank (RWST)," SR 3.5.4.3 to delete outdated information related to the Tritium Production Program. TVA provided a correction letter on April 28, 2015 (Reference 2).

By letter dated May 14, 2015 (Reference 3), the Nuclear Regulatory Commission (NRC) requested that TVA provide additional information to supplement the LAR. TVA provided the requested supplemental information in TVA letters dated May 27, 2015, and June 15, 2015 (References 4 and 5, respectively).

By electronic mail dated October 2, 2015 (Reference 7), the NRC requested that TVA provide additional information to support the NRC review of the LAR. TVA provided a response to the NRC Request for Additional Information (RAI) by letter dated December 22, 2015 (Reference 8).

During the public meeting with the NRC on February 5, 2016, TVA informed the NRC that it would revise the response to Radiation Protection and Consequences Branch (ARCB) RAI 1.b submitted by the Reference 8 letter to address several additional comments. Enclosure 1 to this letter provides the revised response to ARCB RAI 1.b.

There is one regulatory commitment associated with the response to ARCB RAI 1.b that is revised by this submittal. Enclosure 2 provides a complete updated commitment list that supersedes the previous commitment lists provided in the Reference 1, Reference 6, and Reference 8 letters.

U. S. Nuclear Regulatory Commission  
CNL-16-030  
Page 3  
February 22, 2016

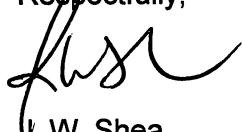
Consistent with the standards set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.92(c), TVA has determined that the additional information, as provided in this letter, does not affect the no significant hazards consideration associated with the proposed application previously provided in Reference 1.

Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the enclosures to the Tennessee Department of Environment and Conservation.

Please address any questions regarding this request to Mr. Edward D. Schroll at (423) 751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 22nd day of February 2016.

Respectfully,



J. W. Shea  
Vice President, Nuclear Licensing

- Enclosure:
1. Tennessee Valley Authority, Watts Bar Nuclear Plant, Unit 1, Supplement to Response to NRC Request for Additional Information
  2. Watts Bar Nuclear Plant, Unit 1 Tritium Producing Burnable Absorber Rods License Amendment Request Regulatory Commitment List, Revision 3

Enclosures  
cc (Enclosures):

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

## ENCLOSURE 1

### TENNESSEE VALLEY AUTHORITY WATTS BAR NUCLEAR PLANT UNIT 1

#### Tennessee Valley Authority, Watts Bar Nuclear Plant, Unit 1, Supplement to Response to NRC Request for Additional Information

By letter dated December 22, 2015, TVA responded to Radiation Protection and Consequence Branch (ARCB) Request for Additional Information (RAI) 1.b. During a public meeting with the NRC on February 5, 2016, TVA informed the NRC that it would revise the response to ARCB RAI 1.b to correct a typographical error in the next-to-last sentence of the first paragraph and would provide a revised RCI-137, "Radiation Protection Tritium Control Program," Table 3.1, "Tritium Action Levels," to address additional NRC comments. The below revised response supersedes the previous TVA response to ARCB RAI 1.b in its entirety. The changes from the previous response are shown with a revision bar in the right margin.

#### **ARCB RAI 1**

Supplement dated June 2015, Enclosure 1, Page 2 of 9, indicates that the radiation protection tritium control program is based in part on Regulatory guide 8.32, "Criteria for Establishing a Tritium Bioassay Program," and DOE-HDBK-1079-94, "Primer on Tritium Safe Handling Practices."

- b. Regulatory Guide 8.32 stipulates that bioassay for tritium (H-3) be provided for individuals that work around 10 kg or more of open reactor coolant with H-3 concentrations above .01 Ci/Kg. Provide a basis for why this is not an action statement in the table on page 3 of 9.

#### **Revised TVA Response**

TVA will revise RCI-137, "Radiation Protection Tritium Control Program," Table 3.1, "Tritium Action Levels," to incorporate the 0.01 Curies/kilogram (Ci/kg) (i.e., 10  $\mu$ Ci/g) criteria from NRC Regulatory Guide (RG) 8.32, "Criteria for Establishing a Tritium Bioassay Program," prior to increasing the number of TPBARs loaded in the reactor core above the currently allowed 704 TPBARs. The action levels will be specified by RCI-137, Table 3.1 as follows.

TRITIUM ACTION LEVELS					
Process Tritium Concentration (µCi/ml)	DAC, DAC-hrs	Mode of Exposure	Tritium Survey Requirements	Action	Basis for Bioassay (Regulatory guidance and TVA Procedure Requirements)
≥ 0.01	N/A	direct contact	measurement of process water	Urinalysis following skin contact, ingestion, or absorption through cuts or abrasions. Diving requires routine bioassays as specified in Note 1.	US NRC Regulatory Guide 8.32  RCDP-7, Bioassay and Internal Dose Program
≥ 10.0		inhalation	measurement of process water and tritium air samples	Urinalysis following exposure to air in a room whenever employees are exposed to greater than 10 kg of water containing 0.01 Ci/kg or when water containing a total of more than 0.1 Ci of tritium is in contact with air (such as a fuel pool).	US NRC Regulatory Guide 8.32
	≥ 0.3 DAC	inhalation	tritium air samples	Urinalysis recommended, see Note 2	RCDP-7
	≥ 4 DAC-hrs in 7 consecutive days	inhalation	tritium air samples with DAC-hr tracking	Urinalysis	RCDP-7, basis is 10 mrem/week. which is easily detected and verified by bioassay.
<p>Note 1 Underwater diving operations in tritiated water exceeding 0.01 µCi/ml, RCDP-7 Bioassay and Internal Dose Program specifies collection and analysis of urine samples for each diver: (a) prior to the first on-site dive, (b) within 24 hours following the completion of the initial dive, (c) once each week while diving operations are in progress, (d) upon completion of diving operations, and (e) whenever diving suit leakage results in skin contact with tritiated water.</p> <p>Note 2 Work activities where employees are known or may be exposed to tritium atmospheres exceeding 0.3 DAC, the collection and analysis of urine is recommended: (a) pre-job to establish a baseline value, (b) within 24 hours following the completion of the first exposure, (c) weekly to ten days for the duration of the work involving tritium exposure, and (d) upon completion of the work involving tritium exposure.</p>					

The proposed RCI-137, Table 3.1 simplifies the information provided in response to the NRC Request to Supplement E2-1 in TVA letter dated June 15, 2015.

TVA procedure RCI-137 along with TVA procedures NPG-SPP-05.1, "Radiological Controls," and RCDP-7, "Bioassay and Internal Dose Program," provide a graded approach for bioassay based on risk, work, and airborne conditions. TVA's program establishes criteria for performing in vitro bioassay: (1) based on process water concentrations using the guidance in RCI-137, Table 3.1, (2) when an individual worker's exposure is greater than or equal to four Derived Air Concentration (DAC)-hours (hrs) in seven consecutive days, and (3) for skin contamination with tritiated water concentrations exceeding 0.01 µCi/ml. Tritium DAC-hr tracking is initiated whenever a worker is in an airborne area, exposed to concentrations of 0.3 DAC or greater. TVA procedures cover types of bioassay, selection of individuals for bioassay, bioassay collection, sample volume, sample storage, packaging and shipping, detection limits, and internal dose calculation methods. TVA requires a Minimum Detectable Activity (MDA) of less than 1E+04 pCi/L (i.e., 0.01 µCi/L) tritium for urine bioassays. This MDA is less than the detection limit of 0.3 µCi/L specified in ANSI N13.14 and for most

conditions (e.g., bioassay obtained within two weeks of exposure) will achieve detection of an intake resulting in a committed effective dose equivalent less than 1 mrem. The frequency of bioassays is determined based on the work, the exposure scenario, and trigger levels as described in RCDP-7. Baseline tritium bioassays are obtained for all divers prior to the first on-site dive. Baseline (pre-job) tritium bioassays are also recommended for work activities where workers are known or may be exposed to tritium atmospheres exceeding the trigger levels of greater than 0.3 DAC. All data (i.e., bioassay, air samples with DAC-hr tracking, and whole body counts) are reviewed and evaluated to arrive at the best estimate of the worker's intake and Committed Effective Dose Equivalent (CEDE) for each radionuclide. In some cases, a single bioassay is enough to evaluate the exposure; in other cases, multiple bioassays are obtained for work in tritium airborne conditions that may continue for days or weeks.

Sample collection guidance in RCDP-7 for tritium includes collecting urine samples no sooner than two hours following the tritium exposure event to allow the activity to equilibrate, and no later than 72 hours following an acute exposure if possible. The first voiding of the bladder following the exposure is not used for the urinalysis. Sample collection instructions are provided to the worker with the bioassay container. This guidance in RCDP-7 is consistent with the guidance from RG 8.32.

## ENCLOSURE 2

### TENNESSEE VALLEY AUTHORITY WATTS BAR NUCLEAR PLANT UNIT 1

#### Watts Bar Nuclear Plant, Unit 1 Tritium Producing Burnable Absorber Rods License Amendment Request Regulatory Commitment List, Revision 3

This Enclosure provides the Watts Bar Nuclear Plant (WBN), Unit 1 Tritium Producing Burnable Absorber Rods (TPBARs) License Amendment Request (LAR) updated List of Regulatory Commitments. Changes to the list described in Enclosure 1 to this letter are indicated by a revision bar in the right-hand margin. The updated List of Regulatory Commitments provided in this Enclosure supersedes any previous WBN, Unit 1 TPBAR LAR List of Regulatory Commitments.

1. TVA will replace the containment isolation thermal relief check valves on the Watts Bar, Unit 1 supply lines to the containment for the Component Cooling Water System and Essential Raw Cooling Water System with simple relief valves and will replace one Watts Bar, Unit 1 Component Cooling Water System return line thermal relief check valve (1-CKV-70-698) with a simple relief check valve prior to increasing the number of TPBARs loaded in the reactor core above 704.
2. TVA will replace the WBN, Unit 1 upper compartment cooler cooling coils with fully qualified cooling coils to ensure ERCW System integrity during design basis events prior to increasing the number of TPBARs loaded in the reactor core above 704.
3. TVA will revise RCI-137, "Radiation Production Tritium Control Program," Table 3.1, "Tritium Action Levels," to incorporate the 0.01 Curies/kilogram (Ci/kg) (i.e., 10  $\mu$ Ci/g) criteria from NRC Regulatory Guide (RG) 8.32, "Criteria for Establishing a Tritium Bioassay Program," prior to increasing the number of TPBARs loaded in the reactor core above the currently allowed 704 TPBARs. The action levels will be specified by RCI-137, Table 3.1 as follows.

TRITIUM ACTION LEVELS					
Process Tritium Concentration ( $\mu$ Ci/ml)	DAC, DAC-hrs	Mode of Exposure	Tritium Survey Requirements	Action	Basis for Bioassay (Regulatory guidance and TVA Procedure Requirements)
$\geq 0.01$	N/A	direct contact	measurement of process water	Urinalysis following skin contact, ingestion, or absorption through cuts or abrasions. Diving requires routine bioassays as specified in Note 1.	US NRC Regulatory Guide 8.32  RCDP-7, Bioassay and Internal Dose Program
$\geq 10.0$		inhalation	measurement of process water and tritium air samples	Urinalysis following exposure to air in a room whenever employees are exposed to greater than 10 kg of water containing 0.01 Ci/kg or when water containing a total of more than 0.1 Ci of	US NRC Regulatory Guide 8.32

				tritium is in contact with air (such as a fuel pool).	
	≥ 0.3 DAC	inhalation	tritium air samples	Urinalysis recommended, see Note 2	RCDP-7
	≥ 4 DAC-hrs in 7 consecutive days	inhalation	tritium air samples with DAC-hr tracking	Urinalysis	RCDP-7, basis is 10 mrem/week. which is easily detected and verified by bioassay.

<sup>Note 1</sup> Underwater diving operations in tritiated water exceeding 0.01 μCi/ml, RCDP-7 Bioassay and Internal Dose Program specifies collection and analysis of urine samples for each diver: (a) prior to the first on-site dive, (b) within 24 hours following the completion of the initial dive, (c) once each week while diving operations are in progress, (d) upon completion of diving operations, and (e) whenever diving suit leakage results in skin contact with tritiated water.

<sup>Note 2</sup> Work activities where employees are known or may be exposed to tritium atmospheres exceeding 0.3 DAC, the collection and analysis of urine is recommended: (a) pre-job to establish a baseline value, (b) within 24 hours following the completion of the first exposure, (c) weekly to ten days for the duration of the work involving tritium exposure, and (d) upon completion of the work involving tritium exposure.