



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

November 20, 2012

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 No. NPF-90
NRC Docket No. 50-390

Subject: **Watts Bar Nuclear Plant (WBN) Unit 1 - Application to Modify Technical Specification 4.3.1, "Criticality" (WBN-TS-12-03)**

In accordance with the provisions of 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," the Tennessee Valley Authority (TVA) is submitting a request for an amendment to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant (WBN) Unit 1.

This license amendment request seeks approval to make a change to the WBN Unit 1 Technical Specification (TS) 4.3.1.1.d to resolve an apparent conflict in the requirements for storage of new and spent fuel assemblies in the spent fuel racks between TS 4.3.1.1.d and TS 4.3.1.1.e.2. In addition, a minor editorial change is made to the TS 4.3.1.1.e.3 to correct a typographical error.

The enclosure to this letter provides a description, technical evaluation, regulatory evaluation and environmental consideration of the proposed changes. Attachment 1 of the enclosure provides the existing WBN Unit 1 TS pages marked to show the proposed changes. Attachment 2 of the enclosure provides the existing WBN Unit 1 TS pages retyped to show the proposed changes.

TVA requests that the NRC approve this amendment by November 19, 2013, with implementation within 60 days of issuance.

TVA has determined that there are no significant hazards considerations associated with the proposed changes and that the changes qualify for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

The WBN Plant Operations Review Committee and the WBN Nuclear Safety Review Board have reviewed the proposed changes and determined that operation of WBN in accordance with the proposed changes will not endanger the health and safety of the public.

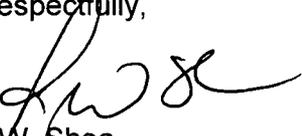
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Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the enclosure to the Tennessee Department of Environment and Conservation.

This submittal does not contain any new regulatory commitments. Please address any questions regarding this request to Terry Cribbe at 423-751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 19th day of November 2012.

Respectfully,



J.W. Shea
Vice President, Nuclear Licensing

Enclosure:

Evaluation of Proposed Changes

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant, Unit 1
NRC Senior Resident Inspector – Watts Bar Nuclear Plant, Unit 2
Director, Division of Radiological Health - Tennessee State Department of Environment
and Conservation

ENCLOSURE

EVALUATION OF PROPOSED CHANGES

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

Subject: Watts Bar Nuclear Plant (WBN) Unit 1 - Application to Modify Technical Specification 4.3.1, "Criticality" (WBN-TS-12-03)

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- 1. Proposed WBN Unit 1 TS Changes (Markups)**
- 2. Proposed WBN Unit 1 TS Changes (Final Typed)**

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EVALUATION OF PROPOSED CHANGES

1.0 SUMMARY DESCRIPTION

The Tennessee Valley Authority (TVA) is submitting a request for an amendment to the Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant (WBN) Unit 1. This license amendment request seeks approval to make a change to the WBN Unit 1 Technical Specification (TS) 4.3.1.1.d to resolve an apparent conflict in the requirements for storage of new and spent fuel assemblies in the spent fuel racks between TS 4.3.1.1.d and TS 4.3.1.1.e.2. TS 4.3.1.1.d allows unrestricted storage of new and spent fuel assemblies in the spent fuel racks when initial enrichments are less than or equal to 3.80 weight percent Uranium-235 (U-235). However, TS 4.3.1.1.e.2 restricts storage when using a checkerboard arrangement of 2 new and 2 spent fuel assemblies in the spent fuel racks to spent fuel assemblies with enrichments between 2.55 weight percent U-235 up to 4.95 weight percent U-235 that have obtained a minimum burnup as specified in TS Figure 4.3-4. In addition, a minor editorial change is made to the TS 4.3.1.1.e.3 to correct a typographical error.

Attachment 1 to this enclosure provides the existing WBN Unit 1 TS pages marked up to show the proposed changes. Attachment 2 provides the proposed replacement WBN Unit 1 TS final typed pages.

2.0 DETAILED DESCRIPTION

2.1 Proposed Changes

TS 4.3.1.1.d allows unrestricted storage of new and spent fuel assemblies in the spent fuel racks when initial enrichments are less than or equal to 3.80 weight percent U-235.

TS 4.3.1.1.e allows one of four restrictive arrangements for storage of new and spent fuel assemblies in the spent fuel racks when initial enrichments are greater than 3.80 weight percent U-235 and less than a maximum of 5 weight percent U-235 (nominally 4.95 ± 0.05 weight percent U-235).

TS 4.3.1.1.e.2 permits new and spent fuel assemblies to be stored in a checkerboard arrangement of 2 new and 2 spent fuel assemblies provided that the burnup of each spent fuel assembly is in the acceptable domain identified in TS Figure 4.3-4 (i.e., each spent fuel assembly has accumulated a minimum burnup based on initial enrichment).

TS Figure 4.3-4 specifies minimum spent fuel assembly burnup limits for storing spent fuel assemblies in the spent fuel racks in a checkerboard pattern arrangement of 2 new and 2 spent fuel assemblies for initial spent fuel assembly enrichments between 2.55 weight percent U-235 up to 4.95 weight percent U-235.

Currently TS 4.3.1.1.d states:

“Fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage.”

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To clarify the allowance for unrestricted storage of new and spent fuel assemblies in TS 4.3.1.1.d versus the restrictions for storing spent fuel assemblies in TS 4.3.1.1.e.2, a change is proposed to revise TS 4.3.1.1.d to state:

“New and spent fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage, except for spent fuel assemblies when stored in a checkerboard arrangement with new fuel assemblies as specified in 4.3.1.1.e.2.”

Currently TS 4.3.1.1.e.3 states:

“New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material).”

In addition, TS 4.3.1.1.e.3 is editorially revised to add a closing parenthesis to state:

“New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material).”

2.2 Need for Proposed Changes

During review of the WBN Unit 2 proposed TS 4.3.1, the NRC identified that clarification of the requirements of WBN Unit 2 proposed TS 4.3.1.1.d, TS 4.3.1.1.e, TS 4.3.1.1.e.2 and TS Figure 4.3-4, was required to resolve an apparent conflict in the requirements for storage of new and spent fuel assemblies in the spent fuel racks between TS 4.3.1.1.d and TS 4.3.1.1.e.2. TVA initiated Problem Evaluation Report (PER) 465826 to address this issue, and identified that the need for clarification of the requirements also existed for the WBN Unit 1 TS since the requirements were nearly identical to those of the WBN Unit 2 proposed TS.

The apparent conflict involves TS 4.3.1.1.d, which allows unrestricted storage of new and spent fuel assemblies with initial enrichments less than or equal to 3.80 weight percent U-235 in the spent fuel racks. However, TS 4.3.1.1.e.2 states that new and spent fuel assemblies may be stored in a checkerboard arrangement of two new and two spent fuel assemblies, but only provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in TS Figure 4.3-4. TS Figure 4.3-4 requires some amount of burnup for the spent fuel assemblies down to an initial enrichment of approximately 2.55 weight percent U-235 and up to a maximum initial enrichment of 4.95 weight percent U-235. Therefore, storage of spent fuel assemblies with initial enrichments between 2.55 and 3.80 weight percent U-235 in a checkerboard arrangement of two new and two spent fuel assemblies is not “unrestricted” as stated in TS 4.3.1.1.d, even though the restrictive requirements of TS 4.3.1.1.e.2 would override the apparently less restrictive allowance of TS 4.3.1.1.d for the spent fuel assemblies.

The proposed changes to the WBN Unit 1 TS will resolve this apparent conflict as identified in PER 465826. Furthermore, a minor editorial change to TS 4.3.1.1.e.3 is made to correct a typographical error.

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3.0 TECHNICAL EVALUATION

Currently, TS 4.3.1.1.d allows unrestricted storage of new and spent fuel assemblies in the spent fuel racks with initial enrichments less than or equal to 3.80 weight percent U-235, and TS 4.3.1.1.e including subsections provides restrictions on storage of new and spent fuel assemblies in the spent fuel racks for various arrangements with initial enrichments greater than 3.80 weight percent U-235 and less than a maximum of 5.0 weight percent U-235 (nominally 4.95 ± 0.05 weight percent U-235).

The requirement of TS 4.3.1.1.e.2 allows new and spent fuel assemblies to be stored in the spent fuel racks in a checkerboard arrangement of two new and two spent fuel assemblies, but only provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in TS Figure 4.3-4. TS Figure 4.3-4 requires some amount of burnup for the spent fuel assemblies down to an initial enrichment of approximately 2.55 weight percent U-235 and up to a maximum of 4.95 weight percent U-235.

To resolve the apparent conflict in the requirements for storage of new and spent fuel assemblies in the spent fuel racks between the allowance for unrestricted storage in TS 4.3.1.1.d, and the restrictive arrangement described in TS 4.3.1.1.e.2 and TS Figure 4.3-4, a change to TS 4.3.1.1.d is proposed for improved clarity. Specifically, TS 4.3.1.1.d is revised to replace "Fuel assemblies" with "New and spent fuel assemblies" to clarify that it is intended to apply to both, and to add the qualifying statement "except for spent fuel assemblies when stored in a checkerboard arrangement with new fuel assemblies as specified in 4.3.1.1.e.2" to clarify that for storing spent fuel assemblies with initial enrichments greater than 2.55 weight percent and less than or equal to 3.80 weight percent U-235 in a checkerboard arrangement with new assemblies, the more restrictive burnup requirements in TS Figure 4.3-4 apply to the spent fuel assemblies.

This change is administrative, and does not change the technical requirements for storage of fuel assemblies in the spent fuel racks in a checkerboard arrangement of two new and two spent fuel assemblies.

A change to TS 4.3.1.1.e.3 is proposed to add a closing parenthesis to correct a typographical error. This change is also administrative.

The proposed changes to WBN Unit 1 TS 4.3.1, "Criticality," clarify the requirements for storage of new and spent fuel assemblies in a checkerboard arrangement. These proposed changes are administrative, and do not impact the design or use of the existing spent fuel racks. As such, there is no impact on the criticality analysis, or any other safety analysis, for the WBN spent fuel racks.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements and Criteria

10 CFR 50, Appendix A, General Design Criteria (GDC) 62, "Prevention of Criticality in Fuel Storage and Handling," requires the prevention of criticality by physical systems or processes, preferably by use of geometrically safe configurations.

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10 CFR 50.68 specifies requirements for the prevention of criticality accidents and mitigating the radiological consequences of a criticality accident.

In addition to regulatory requirements, acceptable guidance for meeting the requirements for GDC 62 is included in American National Standards Institute (ANSI)/American Nuclear Society (ANS) 57.1, ANSI/ANS 57.2, and ANSI/ANS 57.3, which relate to the prevention of criticality accidents in fuel storage and handling.

The requirements of the proposed TS 4.3.1 changes conform to the above regulatory requirements and guidance.

The requirements for storage of new and spent fuel assemblies in the spent fuel racks as described in this license amendment request, and as presented in the proposed revision of the WBN Unit 1 TS, contains substantiated sufficient information pertaining to the prevention of criticality by ensuring that a subcritical array is maintained. The requirements for storage of new and spent fuel assemblies in the spent fuel racks meet the requirements of 10 CFR 50.68.

4.2 Precedent

TVA did not identify any applicable regulatory precedent regarding the changes proposed by TVA in this license amendment request.

4.3 Significant Hazards Consideration

The proposed changes modify WBN Unit 1 TS 4.3.1 to resolve an apparent conflict in the requirements for storage of new and spent fuel assemblies in the spent fuel racks between TS 4.3.1.1.d and TS 4.3.1.1.e.2. TVA proposes to revise TS 4.3.1.1.d to state: "New and spent fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage, except for spent fuel assemblies when stored in a checkerboard arrangement with new fuel assemblies as specified in 4.3.1.1.e.2." In addition, TS 4.3.1.1.e.3 is editorially revised to add a closing parenthesis to state: "New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material)."

The proposed changes do not alter the technical requirements presented in the WBN Unit 1 TS that describe applicable storage requirements for new and spent fuel assemblies in the spent fuel racks, and are administrative. No physical changes to safety-related systems, structures, or components are required.

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The TVA has concluded that the changes to WBN Unit 1 TS do not involve a significant hazards consideration. TVA's conclusion is based on its evaluation in accordance with 10 CFR 50.91(a)(1) of the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequence of an accident previously evaluated?

Response: No.

The proposed changes to WBN Unit 1 TS 4.3.1, "Criticality," clarify the requirements for storage of new and spent fuel assemblies in a checkerboard arrangement. These proposed changes are administrative, and do not impact the design or use of the existing spent fuel racks. As such, there is no impact on the criticality analysis, or any other safety analysis, for the WBN spent fuel racks. The proposed changes do not 1) require physical changes to plant systems, structures, or components; 2) prevent the safety function of any safety-related system, structure, or component during a design basis event; 3) alter, degrade, or prevent action described or assumed in any accident described in the WBN Unit 1 UFSAR from being performed since the safety-related systems, structures, or components are not modified; 4) alter any assumptions previously made in evaluating radiological consequences; or 5) affect the integrity of any fission product barrier.

Therefore, this proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed changes to WBN Unit 1 TS 4.3.1, "Criticality," clarify the requirements for storage of new and spent fuel assemblies in a checkerboard arrangement. These proposed changes are administrative, and do not impact the design or use of the existing spent fuel racks. The proposed changes do not introduce any new accident causal mechanisms, since no physical changes are being made to the plant, nor do they impact any plant systems that are potential accident initiators.

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

The proposed changes to WBN Unit 1 TS 4.3.1, "Criticality," clarify the requirements for storage of new and spent fuel assemblies in a checkerboard arrangement. These proposed changes are administrative, and do not impact the design or use of the existing spent fuel racks, which continue to be designed to prevent criticality. The

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proposed changes do not alter the permanent plant design, including instrument set points, that is the basis of the assumptions contained in the safety analyses.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

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EVALUATION OF PROPOSED CHANGES

ATTACHMENT 1

Proposed WBN Unit 1 TS Changes (Markups)

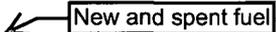
4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks (shown in Figure 4.3-1) are designed and shall be maintained with:

- a. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent;
- b. $k_{\text{eff}} \leq 0.95$ if fully flooded with unborated water, which, includes an allowance for uncertainties as described in Sections 4.3.2.7 and 9.1 of the FSAR;
- c. Distances between fuel assemblies are a nominal 10.375 inch center-to-center spacing in the twenty-four flux trap rack modules.

d.  Fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage.

, except for spent fuel assemblies when stored in a checkerboard arrangement with new fuel assemblies as specified in 4.3.1.1.e.2

e. Fuel assemblies with initial enrichments greater than 3.80 weight percent and less than a maximum of 5 percent enrichment (nominally 4.95 ± 0.05 percent) may be stored in the spent fuel racks in one of four arrangements with specific limits as identified below:

- 1. Spent fuel assemblies may be stored in the racks without further restrictions provided the burnup of each assembly is in the acceptable domain identified in Figure 4.3-3, depending upon the specified initial enrichment.
- 2. New and spent fuel assemblies may be stored in a checkerboard arrangement of 2 new and 2 spent assemblies, provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in Figure 4.3-4.
- 3. New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material.



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ATTACHMENT 2

Proposed WBN Unit 1 TS Changes (Final Typed)

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EVALUATION OF PROPOSED CHANGES

ATTACHMENT 2

Proposed WBN Unit 1 TS Changes (Final Typed)

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks (shown in Figure 4.3-1) are designed and shall be maintained with:

- a. Fuel assemblies having a maximum U-235 enrichment of 5.0 weight percent;
- b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which, includes an allowance for uncertainties as described in Sections 4.3.2.7 and 9.1 of the FSAR;
- c. Distances between fuel assemblies are a nominal 10.375 inch center-to-center spacing in the twenty-four flux trap rack modules.
- d. New and spent fuel assemblies with enrichments less than or equal to 3.80 weight percent U-235 are allowed unrestricted storage, except for spent fuel assemblies when stored in a checkerboard arrangement with new fuel assemblies as specified in 4.3.1.1.e.2.
- e. Fuel assemblies with initial enrichments greater than 3.80 weight percent and less than a maximum of 5 percent enrichment (nominally 4.95 ± 0.05 percent) may be stored in the spent fuel racks in one of four arrangements with specific limits as identified below:
 1. Spent fuel assemblies may be stored in the racks without further restrictions provided the burnup of each assembly is in the acceptable domain identified in Figure 4.3-3, depending upon the specified initial enrichment.
 2. New and spent fuel assemblies may be stored in a checkerboard arrangement of 2 new and 2 spent assemblies, provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in Figure 4.3-4.
 3. New fuel assemblies may be stored in 4-cell arrays with 1 of the 4 cells remaining empty of fuel (i.e. containing only water or water with up to 75 percent by volume of non-fuel bearing material).

(continued)

NSRB SUMMARY SHEET

Document Name: Watts Bar Nuclear Plant (WBN) Unit 1 Application to Modify Technical Specification 4.3.1, "Criticality" (WBN TS-12-03)
Document Number & Proposed Revision Number: WBN-TS-12-03
Proposed Effective Date: 11/08/2012
Summary of Changes Proposed: <p>This license amendment request seeks approval to make a change to the WBN Unit 1 Technical Specification (TS) 4.3.1.1.d to resolve an apparent conflict in the requirements for storage of new and spent fuel assemblies in the spent fuel racks between TS 4.3.1.1.d and TS 4.3.1.1.e.2. TS 4.3.1.1.d allows unrestricted storage of new and spent fuel assemblies in the spent fuel racks when initial enrichments are less than or equal to 3.80 weight percent Uranium-235 (U-235). However, TS 4.3.1.1.e.2 restricts storage when using a checkerboard arrangement of 2 new and 2 spent fuel assemblies in the spent fuel racks to spent fuel assemblies with enrichments between 2.55 weight percent U-235 up to 4.95 weight percent U-235 that have obtained a minimum burnup as specified in TS Figure 4.3-4. In addition, a minor editorial change is made to the TS 4.3.1.1.e.3 to correct a typographical error.</p>
Reason for Proposed Changes: <p>During review of the WBN Unit 2 proposed TS 4.3.1, the NRC identified that clarification of the requirements of WBN Unit 2 proposed TS 4.3.1.1.d, TS 4.3.1.1.e, TS 4.3.1.1.e.2 and TS Figure 4.3-4, was required to resolve an apparent conflict in the requirements for storage of new and spent fuel assemblies in the spent fuel racks between TS 4.3.1.1.d and TS 4.3.1.1.e.2. TVA initiated Problem Evaluation Report (PER) 465826 to address this issue, and identified that the need for clarification of the requirements also existed for the WBN Unit 1 TS since the requirements were nearly identical to those of the WBN Unit 2 proposed TS. The apparent conflict involves TS 4.3.1.1.d, which allows unrestricted storage of new and spent fuel assemblies with initial enrichments less than or equal to 3.80 weight percent U 235 in the spent fuel racks. However, TS 4.3.1.1.e.2 states that new and spent fuel assemblies may be stored in a checkerboard arrangement of two new and two spent fuel assemblies, but only provided that each spent fuel assembly has accumulated a minimum burnup in the acceptable domain identified in TS Figure 4.3-4. TS Figure 4.3-4 requires some amount of burnup for the spent fuel assemblies down to an initial enrichment of approximately 2.55 weight percent U-235 and up to a maximum initial enrichment of 4.95 weight percent U-235. Therefore, storage of spent fuel assemblies with initial enrichments between 2.55 and 3.80 weight percent U-235 in a</p>