



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

CNL-18-016

March 5, 2018

10 CFR 50.90

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

Watts Bar Nuclear Plant, Unit 2
Facility Operating License No. NPF-96
NRC Docket No. 50-391

**SUBJECT: Watts Bar Nuclear Plant Unit 2 - Application to Revise License
Condition 2.C(4) PAD4TCD (391-WBN-TS-18-03)**

- References:
1. TVA letter to NRC, CNL-15-239, "Watts Bar Nuclear Plant Unit 2 - Application to Revise License Condition 2.C(4) PAD4TCD," dated December 31, 2015 (ML15365A595)
 2. NRC Letter to TVA, "Watts Bar Nuclear Plant Unit 2 - Issuance of Amendment Regarding use of PAD4TCD for the Second Operating Cycle (CAC No. MF7219)," dated July 25, 2016 (ML16174A354)

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (CFR) §50.90, "Application for amendment of license, construction permit, or early site permit," Tennessee Valley Authority (TVA) is submitting for Nuclear Regulatory Commission (NRC) approval, a request for an amendment to Facility Operating License (OL) No. NFP-96 for the Watts Bar Nuclear Plant (WBN) Unit 2.

WBN Unit 2 OL condition 2.C(4) states that the Fuel Rod Performance and Design 4 Thermal Conductivity Degradation (PAD4TCD) computer program may be used to establish core operating limits for WBN Unit 2 Cycles 1 and 2 only and that PAD4TCD may not be used to establish core operating limits for subsequent reload cores.

WBN Unit 2 is currently in Cycle 2; the Cycle 2 refueling outage is scheduled to commence in Spring 2019.

The proposed change revises WBN Unit 2 OL condition 2.C(4) to permit the use of the PAD4TCD computer program to continue to establish core operating limits until the WBN Unit 2 steam generators (SGs) are replaced with SGs equivalent to those in WBN Unit 1. The proposed change to WBN Unit 2 OL condition 2.C(4) to allow the continued use of PAD4TCD to establish core operating limits, until the installation of the WBN Unit 2 replacement SGs (RSGs), reflects the TVA plan for transitioning to PAD 5¹ as part of the full spectrum LOCA (FSLOCA) Evaluation Methodology. TVA plans to submit a separate license amendment request (LAR) for the FSLOCA analysis.

The WBN Unit 2 SGs are currently planned to be replaced during the WBN Unit 2 Cycle 4 refueling outage (U2R4) scheduled for Spring 2022. The actual schedule for installation of the WBN Unit 2 RSGs is dependent on the number of tubes in the existing WBN Unit 2 SGs that need to be plugged. If the installation of the WBN Unit 2 RSGs is delayed beyond U2R4 then PAD4TCD will continue to be used in the WBN Unit 2 LOCA analysis.

The enclosure provides a description and technical evaluation of the proposed change, a regulatory evaluation, and a discussion of environmental considerations. Attachment 1 to the enclosure provides the WBN Unit 2 OL condition 2.C(4) marked-up to show the proposed changes. Attachment 2 to the enclosure provides the WBN Unit 2 OL condition 2.C(4) retyped to show the changes incorporated.

The WBN Plant Operations Review Committee and TVA Nuclear Safety Review Board have reviewed this amendment request and concluded that operation of WBN Unit 2 in accordance with the proposed change will not endanger the health and safety of the public.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosure to the Tennessee State Department of Environment and Conservation.

TVA requests approval of the proposed change to WBN Unit 2 OL condition 2.C(4) within 12 months of the date of this letter with implementation within 30 days of NRC approval.


There are no new regulatory commitments in this submittal. Please address any questions regarding this request to Ed Schrull at 423-751-3850.

¹ WCAP-17642-NP-A, Revision 1, "Westinghouse Performance Analysis and Design Model (PAD5)," November 2017 (ML17338A396 and ML17334A826)

U.S. Nuclear Regulatory Commission
CNL-18-016
Page 3
March 5, 2018

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 5th day of March 2018.

Respectfully,



J. W. Shea
Vice President, Nuclear Regulatory Affairs and Support Services

Enclosure:

Evaluation of Proposed Change

cc (Enclosure):

U.S. Nuclear Regulatory Commission, Region II Administrator
NRC Senior 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

Evaluation of Proposed Change

Subject: **Watts Bar Nuclear Plant Unit 2 - Application to Revise License
Condition 2.C(4) PAD4TCD (391-WBN-TS-18-03)**

CONTENTS

1.0	SUMMARY DESCRIPTION.....	2
2.0	Background information.....	2
3.0	DETAILED DESCRIPTION.....	3
3.1	Current License Condition.....	3
3.2	Proposed License Condition	3
3.3	Reason for the Proposed Change.....	3
4.0	TECHNICAL EVALUATION.....	4
4.1	Watts Bar Unit 2 and TCD.....	4
4.2	LOCA Analysis Inputs	4
4.3	Description of Analysis.....	5
4.4	10 CFR 50.46 Requirements	5
4.5	Results Summary and Conclusion	5
5.0	REGULATORY EVALUATION	6
5.1	Applicable Regulatory Requirements and Criteria.....	6
5.1.1	Regulations.....	6
5.1.2	General Design Criteria	6
5.1.3	Conclusion.....	7
5.2	Precedent	7
5.3	Significant Hazards Consideration	7
5.4	Conclusions	9
6.0	ENVIRONMENTAL CONSIDERATION	9
7.0	REFERENCES.....	9

ATTACHMENTS

1. Proposed License Condition (Mark-Ups) for WBN Unit 2
2. Proposed License Condition (Final Typed) for WBN Unit 2

Enclosure

1.0 SUMMARY DESCRIPTION

Pursuant to Title 10 of the *Code of Federal Regulations* (CFR) §50.90, Tennessee Valley Authority (TVA) is submitting a request for a change to Facility Operating License (OL) No. NPF-96 for Watts Bar Nuclear Plant (WBN) Unit 2.

WBN Unit 2 OL condition 2.C(4) states that the Fuel Rod Performance and Design 4 Thermal Conductivity Degradation (PAD4TCD) computer program may be used to establish core operating limits for WBN Unit 2 Cycles 1 and 2 only and that PAD4TCD may not be used to establish core operating limits for subsequent reload cores.

WBN Unit 2 is currently in Cycle 2; the Cycle 2 refueling outage is scheduled to commence in Spring 2019.

The proposed change revises WBN Unit 2 OL condition 2.C(4) to permit the use of the PAD4TCD computer program to continue to establish core operating limits until the WBN Unit 2 steam generators (SGs) are replaced with SGs equivalent to those in WBN Unit 1.

The WBN Unit 2 SGs are currently planned to be replaced during the WBN Unit 2 Cycle 4 refueling outage (U2R4) scheduled for Spring 2022. The actual schedule for installation of the WBN Unit 2 RSGs is dependent on the number of tubes in the existing WBN Unit 2 SGs that need to be plugged. If the installation of the WBN Unit 2 RSGs is delayed beyond U2R4 then PAD4TCD will continue to be used in the WBN Unit 2 LOCA analysis.

Further background and the basis for the proposed milestone of WBN Unit 2 RSGs for the proposed license condition is provided in Section 2 of this enclosure.

As noted in Section 3.0 of this enclosure, there is no new technical analysis needed to support this request. Therefore, the information in References 1 and 2 remains valid.

The proposed change allows TVA the flexibility to replace the WBN Unit 2 existing SGs at the optimal refueling outage, based on the performance of their tubes. Additionally, the proposed change eliminates the need for TVA and the NRC to process further LARs to change the cycle of operation in WBN Unit 2 OL condition 2.C(4) for the use of PAD4TCD when the technical basis for the acceptability of using PAD4TCD remains unchanged from cycle to cycle.

2.0 BACKGROUND INFORMATION

As noted in References 1 and 2, use of PAD4TCD to establish core operating limits for WBN Unit 2 is currently limited to Cycles 1 and 2. As discussed in Section 4.1 of this enclosure, the LOCA analysis for WBN Unit 2 uses PAD4TCD and is described in Section 15.4.1.1 of the WBN dual-unit Updated FSAR (UFSAR). Furthermore, as noted in Section 4.1 of this enclosure, the Unit 2 LOCA analysis described in the WBN dual-unit UFSAR and Reference 1 remains bounding for current and future plant operating cycles, until replacement of the existing WBN Unit 2 SGs. TVA plans to update the current large break loss of coolant accident (LBLOCA) analysis to use the

Enclosure

newer, NRC-approved fuel performance code PAD 5² as part of the full spectrum LOCA (FSLOCA) Evaluation Methodology. TVA plans to submit a separate license amendment request (LAR) for the FSLOCA analysis. The LBLOCA analysis using PAD 5 is planned to be implemented for WBN Unit 2 upon installation of the RSGs (equivalent to the existing RSGs in WBN Unit 1). Section 1.0 of this enclosure discusses the schedule for the installation of the WBN Unit 2 RSGs. Therefore, the proposed change to WBN Unit 2 OL condition 2.C(4) to allow the continued use of PAD4TCD to establish core operating limits, until the installation of the WBN Unit 2 RSGs, reflects the TVA plan for transitioning to PAD5 and implementation of the FSLOCA methodology.

3.0 DETAILED DESCRIPTION

3.1 CURRENT LICENSE CONDITION

WBN Unit 2 OL condition 2.C(4) states:

“PAD4TCD may be used to establish core operating limits for WBN Unit 2 Cycles 1 and 2 only. PAD4TCD may not be used to establish core operating limits for subsequent reload cores.

3.2 PROPOSED LICENSE CONDITION

WBN Unit 2 OL Condition 2.C(4) is revised as follows:

“PAD4TCD may be used to establish core operating limits until the WBN Unit 2 steam generators are replaced with steam generators equivalent to the existing steam generators at WBN Unit 1”

Attachment 1 to this enclosure provides the WBN Unit 2 OL condition 2.C(4) marked-up to show the proposed changes. Attachment 2 to this enclosure provides the WBN Unit 2 OL condition 2.C(4) retyped to show the changes incorporated.

3.3 REASON FOR THE PROPOSED CHANGE

The proposed change is required to allow start-up and operation of WBN Unit 2 after the U2R2 refueling outage. The core operating limits established by the LOCA analysis are described in the WBN dual-unit Updated Final Safety Analysis Report (UFSAR). Approval of this LAR allows TVA to proceed with confidence in completing a WBN Unit 2 LOCA analysis that does not use PAD4TCD and accounts for RSGs at WBN Unit 2.

² WCAP-17642-NP-A, Revision 1, “Westinghouse Performance Analysis and Design Model (PAD5),” November 2017 (ML17338A396 and ML17334A826)

4.0 TECHNICAL EVALUATION

4.1 WATTS BAR UNIT 2 AND TCD

In Reference 3, TVA submitted the WBN Unit 2 FSAR Amendment 97 with a LOCA analysis using the NRC approved Westinghouse Best-Estimate Loss-of-Coolant Accident (BELOCA) ASTRUM methodology (Reference 4). This methodology uses a fuel thermal performance analysis code, designated PAD 4.0 (Reference 5). PAD 4.0 does not account for fuel TCD that occurs in fuel rods with increasing burnup (References 6, 7 and 8). Explicit modeling of TCD in a fuel performance code results in increased predicted fuel temperatures in fuel with increased or high burnup and can lead to an increase in the predicted peak clad temperature (PCT) for a LOCA.

The WBN Unit 2 LOCA analysis, without explicit consideration of TCD, has margin to the 10 CFR 50.46 acceptance criteria. As shown in Table 15.4-18b of Reference 3, the calculated PCT is 1552°F (as compared to the maximum allowed PCT of 2200°F in 10 CFR 50.46), the calculated maximum local oxidation (MLO) is 1.04% (as compared to the maximum allowed MLO of 17% in 10 CFR 50.46) and the core-wide oxidation (CWO) is 0.0% (as compared to the maximum allowed CWO of 1% in 10 CFR 50.46). However, to address the concerns in References 6, 7 and 8 regarding the effect of TCD on the LOCA analysis, the WBN Unit 2 LOCA analysis was updated to use a fuel thermal performance analysis code that explicitly determines the degradation in fuel thermal conductivity that occurs as fuel burnup increases. This fuel thermal performance analysis code is designated PAD4TCD. The NRC determined that PAD4TCD adequately accounts for TCD as discussed in Section 3.1 of Reference 1 and approved by NRC in Reference 2.

The LOCA analysis for WBN Unit 2 uses PAD4TCD and is described in Section 15.4.1.1 of the WBN dual-unit Updated FSAR (UFSAR). When the effects of TCD are included in the LOCA analysis, the calculated PCT increases to 1766°F, MLO increases to 1.99% and CWO increases to 0.08% as shown in Table 15.4-18b of the WBN dual-unit UFSAR. That is the parameters remain well below the 10 CFR 50.46 acceptance criteria. These results are for higher burnup fuel that has peaking factor limits as shown in WBN dual-unit UFSAR Table 15.4-24. That is, the core design process evaluates each reload core to verify that no fuel rods exceed the peaking limits shown in WBN dual-unit UFSAR Table 15.4-24. The reduced peaking factors for higher burnup fuel are verified to be met in the core design for each operating cycle. Therefore, the Unit 2 LOCA analysis described in the WBN dual-unit UFSAR and Reference 1 remains bounding for current and future plant operating cycles, until replacement of the existing WBN Unit 2 SGs.

4.2 LOCA ANALYSIS INPUTS

As noted in Section 3.2.1 of Reference 1 and approved by NRC in Reference 2, the current LOCA analysis inputs are provided in Tables 15.4-14, 15, 16, 19, 23, and 24, and Figure 15.4-56 of the WBN dual unit UFSAR.

Enclosure

4.3 DESCRIPTION OF ANALYSIS

The current LOCA analysis, which explicitly models TCD using PAD4TCD, demonstrates compliance with the 10 CFR 50.46 acceptance criteria while maintaining a margin of safety to the prescribed limits. The current LOCA analysis considering the effects of TCD is provided in the WBN dual unit UFSAR Section 15.4.1.1.

The current analysis also credited a reduction in power peaking for higher burnup fuel in its second and third cycle of operation. That is, the UFSAR LOCA analysis is applicable for an equilibrium core with fresh fuel, fuel that is in its second cycle of operation and fuel that is in its third cycle of operation.

Accounting for TCD leads to an increase in fuel temperature as the fuel is burned. Accounting for a reduction in power peaking in this fuel leads to a more modest increase in fuel temperature as the fuel is burned. The compensating nature of these phenomena is considered in the UFSAR LOCA analysis in order to appropriately capture the effect of TCD.

The WBN Unit 2 PCT-limiting transient is a double-ended cold leg guillotine break when considering TCD. The peaking factor burndown values are provided in WBN dual-unit UFSAR Table 15.4-24, which is equivalent to Table 1 of Reference 1. Table 2 of Reference 1 provides the WBN Unit 2 best-estimate large-break LOCA analysis considering the effects of thermal conductivity degradation and provides a comparison to the 10 CFR 50.46(b) acceptance criteria. WBN dual unit UFSAR Table 15.4-18b summarizes the results of the LOCA analysis considering the effects of TCD, and the results are equivalent to Table 2 of Reference 1.

Additional information on the WBN dual unit UFSAR LOCA analysis is provided in Section 3.2.2 of Reference 1 and approved by NRC in Reference 2.

4.4 10 CFR 50.46 REQUIREMENTS

The 10 CFR 50.46 requirements are provided in Section 3.2.3.10 of Reference 1.

4.5 RESULTS SUMMARY AND CONCLUSION

The current LOCA analysis explicitly models TCD, using PAD4TCD, and the inherently associated reduction in power peaking for fuel in its second and third cycle of operation (see Table 1 of Reference 1). The UFSAR LOCA analysis shows compliance with the 10 CFR 50.46 acceptance criteria while maintaining a margin of safety to the prescribed limits. Based on the results from the LOCA analysis (see Table 2 of Reference 1), TVA has determined that WBN Unit 2 maintains a margin of safety to the limits prescribed by 10 CFR 50.46.

5.0 REGULATORY EVALUATION

5.1 APPLICABLE REGULATORY REQUIREMENTS AND CRITERIA

5.1.1 Regulations

The proposed change to WBN Unit 2 OL Condition 2.C(4) does not reduce or change the WBN Unit 2's level of compliance with the following applicable regulations and requirements:

- 10 CFR 50.36, "Technical Specifications," requires that the TS include limiting conditions for operation, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met.
- 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," requires that emergency core cooling systems (ECCS) be designed such that analyses show that acceptance criteria such as peak clad temperature, cladding oxidation, hydrogen generation, maintenance of a coolable core geometry, and long-term cooling are met for a range of LOCAs, including the most severe LOCA.
- 10 CFR 50, Appendix K, "ECCS Evaluation Models," provides both high level criteria that must be considered in an ECCS Evaluation Model, or may be used specifically in an Appendix K ECCS Evaluation Model for determining that 10 CFR 50.46 acceptance criteria are met. Appendix K requires, among other considerations, that the initial stored energy in the fuel must be appropriately accounted for.

5.1.2 General Design Criteria

As noted in the WBN dual-unit UFSAR Section 3.1.1, WBN Unit 2 was designed to meet the intent of the "Proposed General Design Criteria for Nuclear Power Plant Construction Permits" published in July 1967. The WBN Unit 2 construction permit was issued in January 1973. The WBN Unit 2 UFSAR, however, addresses the NRC General Design Criteria (GDC) published as Appendix A to 10 CFR 50 in July 1971, including Criterion 4 as amended October 27, 1987.

The WBN UFSAR contains these GDC followed by a discussion of the design features and procedures that meet the intent of the criteria. The relevant GDC is described below.

Criterion 35 - Emergency core cooling

A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

Enclosure

Suitable redundancy in components and features, and suitable interconnections, leak detection, isolation, and containment capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

Conformance with GDC 35 is described in Section 3.1.2.4 of the WBN dual-unit UFSAR.

5.1.3 Conclusion

The proposed change revises WBN Unit 2 OL condition 2.C(4) to permit the continued use of the PAD4TCD computer program to establish core operating limits until the WBN Unit 2 SGs are replaced with SGs equivalent to those in WBN Unit 1. 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) approval of the amendment will not be inimical to the common defense and security or to the health and safety of the public

5.2 PRECEDENT

The proposed license condition change is similar to those approved by the NRC as shown below:

- The NRC issued a license amendment to TVA on July 25, 2016, that revised the WBN Unit 2 OL to permit the use of PAD4TCD for the WBN Unit 2 second operating cycle (Reference 2)
- The NRC issued a license amendment to Florida Power and Light Company on June 15, 2012, that revised the operating licenses for Turkey Point Units 3 and 4 to permit the use of PAD4TCD until the NRC approves a revised generic version of PAD that accounts for TCD (Reference 9).

5.3 SIGNIFICANT HAZARDS CONSIDERATION

The Tennessee Valley Authority (TVA) proposes to amend the Watts Bar Nuclear Plant (WBN) Unit 2 Facility Operating License (OL) No. NPF-96 for WBN Unit 2. The current WBN Unit 2 OL condition 2.C(4) states that the Fuel Rod Performance and Design 4 Thermal Conductivity Degradation (PAD4TCD) computer program may be used to establish core operating limits for WBN Unit 2 Cycles 1 and 2 only and that PAD4TCD may not be used to establish core operating limits for subsequent reload cores. WBN Unit 2 is currently in Cycle 2; the Cycle 2 refueling outage (U2R2) is scheduled to commence in Spring 2019.

The proposed change amends OL condition 2.C(4) to permit the continued use of the PAD4TCD computer program to establish core operating limits until the WBN Unit 2 steam generators (SGs) are replaced with SGs equivalent to those in WBN Unit 1.

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below.

Enclosure

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

Response: No.

The Emergency Core Cooling System (ECCS) response to a large break LOCA as described in the WBN Unit 2 dual-unit Updated Final Safety Analysis Report (UFSAR) Section 15.4.1 incorporated an explicit evaluation of the effects of TCD. The UFSAR evaluation considered fuel burn-up values that represent multi-cycle cores where the effects of TCD would be more evident. These analyses showed that the criteria specified in Title 10 of the *Code of Federal Regulations* (CFR) §50.46 are met. The core design process evaluates each reload core to verify that no fuel rods exceed the peaking limits shown in the WBN dual-unit UFSAR Table 15.4-24. This ensures that the LOCA analysis in the WBN Unit 2 dual-unit UFSAR remains bounding for future operating cycles.

The change to WBN Unit 2 OL Condition 2.C(4) does not change the safety analysis or any plant feature or design. Thus, it is concluded that a significant increase in the consequences of an accident previously evaluated will not occur as a result of the proposed change.

Therefore, the proposed change 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 change does not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed change to WBN Unit 2 OL condition 2.C(4) does not change or modify the plant design, introduce any new modes of plant operation, change or modify the design of the ECCS, or change or modify the accident analyses presented in the UFSAR.

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

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

Response: No.

The LOCA safety analysis for WBN Unit 2 as described in the UFSAR explicitly accounts for the effect of TCD. The results of this analysis has established that WBN Unit 2 can operate safely in the unlikely event that a design basis LOCA event occurs, there are large margins to the regulatory limits when explicitly accounting for TCD. This proposed change to OL condition 2.C(4) does not change this analysis or its conclusions. Thus, the proposed change does not result in a significant reduction in the margin of safety.

Based on the above, TVA concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

Enclosure

5.4 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.

6.0 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. 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.

7.0 REFERENCES

1. TVA letter to NRC, CNL-15-239, "Watts Bar Nuclear Plant Unit 2 - Application to Revise License Condition 2.C(4) PAD4TCD," dated December 31, 2015 (ML15365A595)
2. NRC Letter to TVA, "Watts Bar Nuclear Plant Unit 2 - Issuance of Amendment Regarding use of PAD4TCD for the Second Operating Cycle (CAC No. MF7219)," dated July 25, 2016 (ML16174A354)
3. TVA Letter to NRC, "Watts Bar Nuclear Plant, Unit 2, Final Safety Analysis Report (FSAR), Amendment 97," dated January 11, 2010 (ML100191421)
4. Westinghouse Report WCAP-16009-P-A, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Of Uncertainty Method (ASTRUM)," January 2005 (Westinghouse Proprietary Class 2) (ML050910157)
5. Westinghouse Report WCAP-15063-P-A, Revision 1 with Errata, "Westinghouse Improved Performance Analysis and Design Model (PAD 4.0)," July 2000 (Westinghouse Proprietary Class 2) (ML003735304)
6. NRC Information Notice 2009-23, "Nuclear Fuel Thermal Conductivity Degradation," dated October 8, 2009 (ML091550527)
7. NRC Information Notice 2011-21, "Realistic Emergency Core Cooling System Evaluation Model Effects Resulting from Nuclear Fuel Thermal Conductivity Degradation," December 13, 2011 (ML113430785)
8. NRC Information Notice 2009-23, Supplement 1, "Nuclear Fuel Thermal Conductivity Degradation," dated October 26, 2012 (ML121730336)
9. NRC letter to Florida Power and Light Company, "Turkey Point Units 3 and 4 - Issuance of Amendments Regarding Extended Power Uprate (TAC Nos. ME4907 and ME4908), dated June 15, 2012 (ML11293A365)

Enclosure

Attachment 1

Proposed License Condition (Mark-Ups) for WBN Unit 2

- C. The license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act, and to the rules regulations, and orders of the Commission now or hereafter in effect, and is subject to the additional conditions specified or incorporated below.

(1) Maximum Power Level

TVA is authorized to operate the facility at reactor core power levels not in excess of 3411 megawatts thermal.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 17, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. TVA shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

- (3) TVA shall implement permanent modifications to prevent overtopping of the embankments of the Fort Loudon Dam due to the Probable Maximum Flood by June 30, 2018.

- (4) PAD4TCD may be used to establish core operating limits **until the WBN Unit 2 steam generators are replaced with steam generators equivalent to the existing steam generators at WBN Unit 1 for Cycles 1 and 2 only. PAD4TCD may not be used to establish core operating limits for subsequent reload cores.**

- (5) By December 31, 2018, the licensee shall report to the NRC that the actions to resolve the issues identified in Bulletin 2012-01, "Design Vulnerability in Electrical Power System," have been implemented.

- (6) The licensee shall maintain in effect the provisions of the physical security plan, security personnel training and qualification plan, and safeguards contingency plan, and all amendments made pursuant to the authority of 10 CFR 50.90 and 50.54(p).

- (7) TVA shall fully implement and maintain in effect all provisions of the Commission approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The TVA approved CSP was discussed in NUREG-0847, Supplement 28, as amended by changes approved by License Amendment No. 7.

- (8) TVA shall implement and maintain in effect all provisions of the approved fire protection program as described in the Fire Protection Report for the facility, as described in NUREG-0847, Supplement 29, subject to the following provision:

Enclosure

Attachment 2

Proposed License Condition (Final Typed) for WBN Unit 2

- C. The license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act, and to the rules regulations, and orders of the Commission now or hereafter in effect, and is subject to the additional conditions specified or incorporated below.

(1) Maximum Power Level

TVA is authorized to operate the facility at reactor core power levels not in excess of 3411 megawatts thermal.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 17, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. TVA shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

- (3) TVA shall implement permanent modifications to prevent overtopping of the embankments of the Fort Loudon Dam due to the Probable Maximum Flood by June 30, 2018.
- (4) PAD4TCD may be used to establish core operating limits until the WBN Unit 2 steam generators are replaced with steam generators equivalent to the existing steam generators at WBN Unit 1.
- (5) By December 31, 2018, the licensee shall report to the NRC that the actions to resolve the issues identified in Bulletin 2012-01, "Design Vulnerability in Electrical Power System," have been implemented.
- (6) The licensee shall maintain in effect the provisions of the physical security plan, security personnel training and qualification plan, and safeguards contingency plan, and all amendments made pursuant to the authority of 10 CFR 50.90 and 50.54(p).
- (7) TVA shall fully implement and maintain in effect all provisions of the Commission approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The TVA approved CSP was discussed in NUREG-0847, Supplement 28, as amended by changes approved by License Amendment No. 7.
- (8) TVA shall implement and maintain in effect all provisions of the approved fire protection program as described in the Fire Protection Report for the facility, as described in NUREG-0847, Supplement 29, subject to the following provision: