UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 11, 2021

Mr. James Barstow
Vice President, Nuclear Regulatory
Affairs and Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT NOS. 142 AND 49 REGARDING REVISION TO TECHNICAL SPECIFICATIONS TO IMPLEMENT WCAP-17661-P-A, REVISION 1, "IMPROVED RAOC AND CAOC F_Q SURVEILLANCE TECHNICAL SPECIFICATIONS" (EPID L-2020-LLA-0037)

Dear Mr. Barstow:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 142 to Facility Operating License No. NPF-90 and Amendment No. 49 to Facility Operating License No. NPF-96 for the Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2, respectively. These amendments are in response to your application dated March 2, 2020.

The amendments revise technical specifications, as necessary, to implement new surveillance methods for the heat flux hot channel factor (F_Q), and delete Watts Bar, Unit 2, Facility Operating License Condition 2.C.10 as no longer necessary.

A copy of our related safety evaluation is also enclosed. Notice of issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

/RA/

Kimberly J. Green, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-390 and 50-391

Enclosures:
1. Amendment No. 142 to NPF-90
2. Amendment No. 49 to NPF-96
3. Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 142
License No. NPF-90

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (TVA, the licensee) dated March 2, 2020, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-90 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A as revised through Amendment No. 142 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. This license amendment is effective as of the date of its issuance, and shall be implemented no later than November 30, 2021.

FOR THE NUCLEAR REGULATORY COMMISSION

Undine S. Shoop

Digitally signed by Undine S. Shoop
Date: 2021.02.11 08:24:39 -05'00'

Undine Shoop, Chief
Plant Licensing Branch II-2
Division of operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Operating License
and Technical Specifications

Date of Issuance: February 11, 2021

ATTACHMENT TO AMENDMENT NO. 142

WATTS BAR NUCLEAR PLANT, UNIT 1

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace page 3 of Facility Operating License No. NPF-90 with the attached revised page 3.

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3.2-1	3.2-1
3.2-2	3.2-2
3.2-3	3.2-3
3.2-4	3.2-4
3.2-5	3.2-5
5.0-30	5.0-30
--	5.0-30a

(4) TVA, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required, any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis, instrument calibration, or other activity associated with radioactive apparatus or components; and

(5) TVA, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This 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 3459 megawatts thermal.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 142 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) Safety Parameter Display System (SPDS) (Section 18.2 of SER Supplements 5 and 15)

Prior to startup following the first refueling outage, TVA shall accomplish the necessary activities, provide acceptable responses, and implement all proposed corrective actions related to having the Watts Bar Unit 1 SPDS operational.

(4) Vehicle Bomb Control Program (Section 13.6.9 of SSER 20)

During the period of the exemption granted in paragraph 2.D.(3) of this license, in implementing the power ascension phase of the approved initial test program, TVA shall not exceed 50% power until the requirements of 10 CFR 73.55(c)(7) and (8) are fully implemented. TVA shall submit a letter under oath or affirmation when the requirements of 73.55(c)(7) and (8) have been fully implemented.

3.2 POWER DISTRIBUTION LIMITS

3.2.1 Heat Flux Hot Channel Factor ($F_Q(Z)$)

LCO 3.2.1 $F_Q(Z)$, as approximated by $F_Q^C(Z)$ and $F_Q^W(Z)$, shall be within the limits specified in the COLR.

APPLICABILITY: MODE 1.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. ----------NOTE---------- Required Action A.4 shall be completed whenever this Condition is entered prior to increasing THERMAL POWER above the limit of Required Action A.1. SR 3.2.1.2 is not required to be performed if this Condition is entered prior to THERMAL POWER exceeding 75% RTP after a refueling. ----------			
$F_Q^C(Z)$ not within limit.	A.1	Reduce THERMAL POWER $\geq$ 1% RTP for each 1% $F_Q^C(Z)$ exceeds limit.	15 minutes after each $F_Q^C(Z)$ determination
	AND		
	A.2	Reduce Power Range Neutron Flux—High trip setpoints $\leq$ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action A.1.	72 hours after each $F_Q^C(Z)$ determination
	AND		
	A.3	Reduce Overpower ΔT trip setpoints $\geq$ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action A.1.	72 hours after each $F_Q^C(Z)$ determination
	AND		

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.4 Perform SR 3.2.1.1 and SR 3.2.1.2.	Prior to increasing THERMAL POWER above the limit of Required Action A.1
B. $F_Q^W(Z)$ not within limits.	B.1.1 Implement a RAOC operating space specified in the COLR that restores $F_Q^W(Z)$ to within limits. AND	4 hours
	B.1.2 Perform SR 3.2.1.1 and SR 3.2.1.2 if control rod motion is required to comply with the new operating space. OR	72 hours
	B.2.1 ----------NOTE---------- Required Action B.2.4 shall be completed whenever Required Action B.2.1 is performed prior to increasing THERMAL POWER above the limit of Required Action B.2.1. ---------- Limit THERMAL POWER to less than RATED THERMAL POWER and reduce AFD limits as specified in the COLR. AND	4 hours
	B.2.2 Reduce Power Range Neutron Flux - High trip setpoints $\leq$ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.2.1. AND	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2.3 Reduce Overpower ΔT trip setpoints $\geq$ 1 % for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.2.1. AND B.2.4 Perform SR 3.2.1.1 and SR 3.2.1.2.	72 hours Prior to increasing THERMAL POWER above the limit of Required Action B.2.1
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify $F_Q^C(Z)$ is within limit.	Once after each refueling prior to THERMAL POWER exceeding 75% RTP AND Once within 24 hours after achieving equilibrium conditions after exceeding, by $\geq$ 10% RTP, the THERMAL POWER at which $F_Q^C(Z)$ was last verified AND In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.2.1.2	Verify $F_Q^W(Z)$ is within limit.	Once after each refueling within 24 hours after THERMAL POWER exceeds 75% RTP AND Once within 24 hours after achieving equilibrium conditions after exceeding, by $\geq$ 10% RTP, the THERMAL POWER at which $F_Q^W(Z)$ was last verified AND In accordance with the Surveillance Frequency Control Program

5.9 Reporting Requirements

5.9.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

3. WCAP-10216-P-A, Revision 1A, "RELAXATION OF CONSTANT AXIAL OFFSET CONTROL F(Q) SURVEILLANCE TECHNICAL SPECIFICATION," February 1994 (W Proprietary). (Methodology for Specification 3.2.3 - Axial Flux Difference (Relaxed Axial Offset Control).)

4. WCAP-12610-P-A, "VANTAGE + FUEL ASSEMBLY REFERENCE CORE REPORT," April 1995. (W Proprietary). (Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor).

5. WCAP-15088-P, Rev. 1, "Safety Evaluation Supporting A More Negative EOL Moderator Temperature Coefficient Technical Specification for the Watts Bar Nuclear Plant," July 1999, (W Proprietary), as approved by the NRC staff's Safety Evaluation accompanying the issuance of Amendment No. 20 (Methodology for Specification 3.1.4 - Moderator Temperature Coefficient.).

6. Caldon, Inc. Engineering Report-80P, "Improving Thermal Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM✓™ System," Revision 0, March 1997; and Caldon, Inc. Engineering Report-160P, "Supplement to Topical Report ER-80P: Basis for a Power Uprate With the LEFM✓™," Revision 0, May 2000; as approved by the NRC staff's Safety Evaluation accompanying the issuance of Amendment No. 31.

7. WCAP-11397-P-A, "Revised Thermal Design Procedure," April 1989. (Methodology for Specification 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).

8. WCAP-15025-P-A, "Modified WRB-2 Correlation, WRB-2M, for Predicting Critical Heat Flux in 17 x 17 Rod Bundles with Modified LPD Mixing Vane Grids," April 1999. (Methodology for Specification 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).

9. WCAP-14565-P-A, "VIPRE-01 Modeling and Qualification for Pressurized Water Reactor Non-LOCA Thermal-Hydraulic Safety Analysis," October 1999. (Methodology for Specification 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).

10. WCAP-12610-P-A and CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™."

11. WCAP-17661-P-A, Revision 1, "Improved RAOC and CAOC F_Q Surveillance Technical Specifications," February 2019 (Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor (T(Z) Surveillance Requirements for F_Q Methodology).)

(continued)

5.9 Reporting Requirements (continued)

5.9.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

(continued)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-391

WATTS BAR NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 49
License No. NPF-96

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (TVA, the licensee) dated March 2, 2020, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-96 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A as revised through Amendment No. 49 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. This license amendment is effective as of the date of its issuance, and shall be implemented no later than May 15, 2022.

FOR THE NUCLEAR REGULATORY COMMISSION

Undine S. Shoop

Digitally signed by Undine S. Shoop
Date: 2021.02.11 08:26:40 -05'00'

Undine Shoop, Chief
Plant Licensing Branch II-2
Division of operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Operating License
and Technical Specifications

Date of Issuance: February 11, 2021

ATTACHMENT TO AMENDMENT NO. 49

WATTS BAR NUCLEAR PLANT, UNIT 2

FACILITY OPERATING LICENSE NO. NPF-96

DOCKET NO. 50-391

Replace pages 3 and 4 of Facility Operating License No. NPF-96 with the attached revised pages 3 and 4.

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3.2-1	3.2-1
3.2-2	3.2-2
3.2-3	3.2-3
3.2-4	3.2-4
3.2-5	3.2-5
--	3.2-5a
5.0-31	5.0-31
5.0-33	5.0-33

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 3459 megawatts thermal.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 49 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, 2019, 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 in 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:

TVA may make changes to the approved fire protection program without prior approval of the Commission, only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

(9) By May 31, 2018, TVA shall report that a listing organization acceptable to the NRC (as the Authority Having Jurisdiction) has determined that the fire detection monitoring panel in the main control room either meets the appropriate designated standards or has been tested and found suitable for the specified purpose.

(10) Deleted.

(11) TVA will implement the compensatory measures described in Section 3.4, “Additional Compensatory Measures,” of TVA Letter CNL-18-012, dated January 17, 2018, during the timeframe the temperature indicator for RCS hot let 3 is not required to be operable for the remainder of Cycle 2. If the RCS hot leg 3 temperature indicator is returned to operable status prior to the end of Cycle 2, then these compensatory measures are no longer required.

(12) Adoption of 10 CFR 50.69, “Risk-Informed categorization and treatment of structures, systems and components for nuclear power plants”

(a) TVA is approved to implement 10 CFR 50.69 using the processes for categorization of Risk- Informed Safety Class (RISC)-1, RISC 2, RISC-3, and RISC-4 structures, systems, and components (SSCs) using: Probabilistic Risk Assessment (PRA) models to evaluate risk associated with internal events, including internal flooding, and seismic hazards; the shutdown safety assessment process to assess shutdown risk; the Arkansas Nuclear One, Unit 2 (ANO-2) passive categorization method to assess passive component risk for Class 2 and Class 3 SSCs and their associated supports; the results of non-PRA evaluations that are based on the IPEEE Screening Assessment for External Hazards; fire hazards by use of the fire protection program (FPP) safe shutdown equipment list (SSEL), and a screening of other external hazards updated using the external hazard screening significance process identified in ASME/ANS PRA Standard RA-Sa-2009, as specified in Unit 2 License Amendment [Number].

(b) Prior to implementation of the provisions of 10 CFR 50.69, TVA shall complete the implementation items in Enclosure 2, Attachment 1, "List of Categorization Prerequisites " to TVA letter CNL-19-108, “Response to NRC Second Request for Additional Information Regarding Watts Bar Nuclear Plant, Units 1 and 2, Application to Adopt 10 CFR 50.69, ‘Riskinformed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors’ (WBN-TS-17-24) (EPID L-2018-LLA-0493),” dated October 28, 2019.

3.2 POWER DISTRIBUTION LIMITS

3.2.1 Heat Flux Hot Channel Factor (F_Q (Z))

LCO 3.2.1 F_Q (Z), as approximated by F_Q^C (Z) and F_Q^W (Z), shall be within the limits specified in the COLR.

APPLICABILITY: MODE 1.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. ----------NOTE---------- Required Action A.4 shall be completed whenever this Condition is entered prior to increasing THERMAL POWER above the limit of Required Action A.1. SR 3.2.1.2 is not required to be performed if this Condition is entered prior to THERMAL POWER exceeding 75% RTP after a refueling. ----------			
F_Q^C (Z) not within limit.	A.1	Reduce THERMAL POWER ≥ 1% RTP for each 1% F_Q^C (Z) exceeds limit.	15 minutes after each F_Q^C (Z) determination
	AND		
	A.2	Reduce Power Range Neutron Flux – High trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action A.1.	72 hours after each F_Q^C (Z) determination
	AND		

(continued)

ACTIONS (continued)

A. (continued)	A.3	Reduce Overpower ΔT trip setpoints $\geq$ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action A.1.	72 hours after each $F_Q^C(Z)$ determination
	AND		
	A.4	Perform SR 3.2.1.1 and SR 3.2.1.2.	Prior to increasing THERMAL POWER above the limit of Required Action A.1

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. $F_Q^W(Z)$ not within limits.	B.1.1	Implement a RAOC operating space specified in the COLR that restores $F_Q^W(Z)$ to within limits. AND	4 hours
	B.1.2	Perform SR 3.2.1.1 and SR 3.2.1.2 if control rod motion is required to comply with the new operating space. OR	72 hours
	B.2.1	----------NOTE---------- Required Action B.2.4 shall be completed whenever Required Action B.2.1 is performed prior to increasing THERMAL POWER above the limit of Required Action B.2.1. ---------- Limit THERMAL POWER to less than RATED THERMAL POWER and reduce AFD limits as specified in the COLR. AND	4 hours
	B.2.2	Reduce Power Range Neutron Flux – High trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.2.1. AND	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued)	B.2.3	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.2.1.	72 hours
	AND		
	B.2.4	Perform SR 3.2.1.1 and SR 3.2.1.2.	Prior to increasing THERMAL POWER above the limit of Required Action B.2.1
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify $F_Q^C(Z)$ is within limit.	Once after each refueling prior to THERMAL POWER exceeding 75% RTP AND Once within 24 hours after achieving equilibrium conditions after exceeding, by $\geq$ 10% RTP, the THERMAL POWER at which $F_Q^C(Z)$ was last verified AND In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.2.1.2	Verify $F_Q^W(Z)$ is within limit.	Once after each refueling within 24 hours after THERMAL POWER exceeds 75% RTP AND Once within 24 hours after achieving equilibrium conditions after exceeding, by $\geq$ 10% RTP, the THERMAL POWER at which $F_Q^W(Z)$ was last verified AND In accordance with the Surveillance Frequency Control Program

5.9 Reporting Requirements

5.9.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

1. WCAP-9272-P-A, WESTINGHOUSE RELOAD SAFETY EVALUATION METHODOLOGY," July 1985 (W Proprietary). (Methodology for Specifications 3.1.4 - Moderator Temperature Coefficient, 3.1.6 - Shutdown Bank Insertion Limit, 3.1.7 - Control Bank Insertion Limits, 3.2.1 - Heat Flux Hot Channel Factor, 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor, 3.2.3 - Axial Flux Difference, and 3.9.1 - Boron Concentration).

2a. WCAP-16009-P-A, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," January 2005 (W Proprietary).(Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor, and 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).

2b. WCAP-10054-P-A, "Small Break ECCS Evaluation Model Using NOTRUMP Code," August 1985. Addendum 2, Rev. 1: "Addendum to the Westinghouse Small Break ECCS Evaluation Model using the NOTRUMP Code: Safety Injection into the Broken Loop and COSI Condensation Model," July 1997. (W Proprietary). (Methodology for Specifications 3.2.1 - Heat Flux Hot Channel Factor, and 3.2.2 - Nuclear Enthalpy Rise Hot Channel Factor).

3. WCAP-10216-P-A, Revision 1A, "RELAXATION OF CONSTANT AXIAL OFFSET CONTROL F(Q) SURVEILLANCE TECHNICAL SPECIFICATION," February 1994 (W Proprietary). (Methodology for Specification 3.2.3 - Axial Flux Difference (Relaxed Axial Offset Control).)

4. WCAP-12610-P-A, "VANTAGE + FUEL ASSEMBLY REFERENCE CORE REPORT," April 1995. (W Proprietary). (Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor).

(continued)

5.9 Reporting Requirements

5.9.5 CORE OPERATING LIMTS REPORT (COLR) (continued)

11. Caldon, Inc., Engineering Report-80P, "Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM√™ System," Revision 0, March 1997; and Caldon Ultrasonics Engineering Report ER-157P-A, "Supplement to Caldon Topical Report ER-80P: Basis for Power Uprates with an LEFM Check or LEFM CheckPlus System," Revision 8 and Revision 8 errata.

12. WCAP-17661-P-A, Revision 1, "Improved RAOC and CAOC F_Q Surveillance Technical Specifications," February 2019 (Methodology for Specification 3.2.1 - Heat Flux Hot Channel Factor (T(Z) Surveillance Requirements for F_Q Methodology).)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 142 AND 49

TO FACILITY OPERATING LICENSE NOS. NPF-90 AND NPF-96

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-390 AND 50-391

1.0 INTRODUCTION

By letter dated March 2, 2020, the Tennessee Valley Authority (TVA), the licensee for Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2, submitted a request to amend the Facility Operating Licenses and Technical Specifications (TSs), as necessary, to implement new surveillance methods for the heat flux hot channel factor (F_Q) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20062F243). The new surveillance methods are applicable to plants using either relaxed axial offset control (RAOC) or constant axial offset control (CAOC) surveillance formulations and are documented in the U.S. Nuclear Regulatory Commission (NRC) approved licensing topical report WCAP-17661-P-A, "Improved RAOC and CAOC F_Q Surveillance Technical Specifications" (ADAMS Package No. ML19225C138). The request, if implemented, would satisfy Condition 2.C.10 of the Watts Bar, Unit 2, Facility Operating License, and as such, TVA proposed to delete Watts Bar, Unit 2, Facility Operating License Condition 2.C.10 therewith.

Along with several improvements to the RAOC and CAOC surveillance methodologies, WCAP-17661-P-A addresses issues previously communicated in Westinghouse Nuclear Safety Advisory Letters (NSALs) 09-05, Revision 1, "Relaxed Axial Offset Control F_Q Technical Specification Actions," and 15-01, "Heat Flux Hot Channel Factor Technical Specification Surveillance."[1] These NSALs noted that there are non-conservatisms in the methodology in Westinghouse Standard TS (STS) 3.2.1B, "Heat Flux Hot Channel Factor ($F_Q(Z)$ (RAOC-W(Z) Methodology)," contained in NUREG-1431, Revision 4, "Standard Technical Specifications – Westinghouse Plants: Specifications" (ADAMS Accession No. ML12100A222), for plants that have implemented the RAOC methodology. In accordance with the guidance in NRC Administrative Letter (AL) 98-10, "Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety" (ADAMS Accession No. ML031110108), NSALs 09-05 and 15-01

[1] Westinghouse Electric Company issues NSALs to its customers to communicate a potential safety issue so that the customers can conduct a review of the issue and determine whether any action is required. The NRC does not have official record copies of NSALs 09-5 and 15-1.

contained recommended administrative actions that ensured a very conservative set of compensatory measures to address the non-conservatisms.

These measures were implemented administratively at Watts Bar, Unit 1.

At the time NSAL 09-05 was issued, Watts Bar, Unit 2, had not obtained its Facility Operating License. At the time of licensing, TVA instead enshrined the recommended administrative actions contained in NSALs 09-05 and 15-01 as requirements in the TS and included a condition in the Facility Operating License requiring cycle-specific verification of the conservatism of the compensatory measures, until such time as a permanent resolution was adopted.

2.0 REGULATORY EVALUATION[2]

The specification of and adherence to limits on F_Q ensures that the value of the initial total peaking factor assumed in the accident and transient analyses remains valid. As noted in NUREG-1431, "Standard Technical Specifications: Westinghouse Plants," the F_Q limits assumed in the emergency core cooling system (ECCS) performance evaluation are typically limiting relative to the F_Q limits assumed in safety analyses for other postulated accidents and anticipated operational occurrences (ADAMS Accession Nos. ML12100A222 and ML12100A228). Even if the ECCS limits are less limiting than those determined by another safety analysis, specification of and adherence to the F_Q limits still ensures that facility operation remains bounded by the safety analyses.

The regulatory evaluation, thus, identified performance requirements and design criteria contained within Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities." The applicable requirements related to the specific content of TSs, relative to the facility safety analyses, are also included. Finally, Section 0 of this SE summarizes the way in which the regulatory requirements apply specifically to the new TS for F_Q, as described in WCAP-17661-P-A.

2.1 Performance Requirements and Design Criteria

The performance requirements and design criteria applicable to the power distribution assumed in the safety analysis are those that pertain to accident and transient analyses. Primarily, these include the requirements contained in 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and General Design Criterion (GDC) 10, contained in 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." Because the TSs also prescribe appropriate remedial action to follow if TS limitations are not met, some additional GDCs relative to the reactor protection and reactivity control systems apply, as listed below.

The requirements in 10 CFR 50.46 state, in part, that the ECCS shall be designed such that an evaluation performed using an acceptable evaluation model demonstrates that acceptance criteria, set forth in 10 CFR 50.46(b), including peak cladding temperature, cladding oxidation, hydrogen generation, maintenance of coolable core geometry, and long-term core cooling are met for a variety of hypothetical loss-of-coolant accidents (LOCAs), including the most severe hypothetical LOCA.

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[2] This regulatory evaluation is adapted from the NRC staff safety evaluation approving WCAP-17661-P-A for use.

In Section 4.1 of the enclosure to its March 2, 2020, letter, TVA stated the following:

> WBN [Watts Bar] Units 1 and 2 were designed to meet the intent of the "Proposed General Design Criteria for Nuclear Power Plant Construction Permits" published in July, 1967. The Watts Bar construction permit was issued in January 1973. The dual-unit UFSAR [Updated Final Safety Analysis Report], however, addresses the NRC General Design Criteria (GDC) published as Appendix A to 10 CFR 50 in July 1971

Based on the above statement, the NRC staff evaluated the request relative to TVA's assessment of Watts Bar's conformance to the GDCs published in 10 CFR Part 50, Appendix A, i.e., the 1971 GDCs, which are listed below.

GDC 10, "Reactor Design," states as follows:

> The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

GDC 20, "Protection System Functions," states as follows:

> The protection system shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

GDC 26, "Reactivity Control System Redundancy and Capability," states as follows:

> Two independent reactivity control systems of different design principles shall be provided. One of the systems shall use control rods, preferably including a positive means for inserting the rods, and shall be capable of reliably controlling reactivity changes to assure that under conditions of normal operation, including anticipated operational occurrences, and with appropriate margin for malfunctions such as stuck rods, specified acceptable fuel design limits are not exceeded. The second reactivity control system shall be capable of reliably controlling the rate of reactivity changes resulting from planned, normal power changes (including xenon burnout) to assure acceptable fuel design limits are not exceeded. One of the systems shall be capable of holding the reactor core subcritical under cold conditions.

2.2 Technical Specifications

The requirements for TSs are set forth in 10 CFR 50.36, "Technical Specifications." Specific categories of TSs are provided in 10 CFR 50.36(c). These include Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs). If an LCO is not met, the facility must be shut down, or other acceptable remedial action must be taken. SRs are intended to ensure that facility operation remains within the LCOs. NRC Generic Letter (GL) 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," established the NRC position

that licensees could remove the cycle-specific values of certain operating limits from the TS and maintain them in a core operating limits report (COLR), provided that certain requirements were met (ADAMS Accession No. ML031200485).

Section (c)(2) of 10 CFR 50.36 contains requirements for LCOs, stating that such TSs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. The requirements indicate that LCOs must be established for each item that meets one or more of four criteria. One of the specified criteria (Criterion 2) is a process variable, design feature, or operating restriction that is an initial condition of a design-basis accident (DBA) or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Section (c)(3) of 10 CFR 50.36 ("Surveillance requirements") states:

> Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the [LCOs] will be met.

The guidance contained in GL 88-16 provides a means by which the values of certain parameters could be determined and modified on a cycle-specific basis without prior NRC review and approval. In order to implement this guidance, licensees are required, in part, to do the following: (1) use NRC-approved methodology to determine the operating limits; (2) include a list, in the TS Administrative Controls section, of the references used to determine the operating limits; and (3) maintain the limits in a COLR, which must be submitted to the NRC for information.

2.3 Discussion

The safety analyses required to establish that a facility will comply with the requirements of 10 CFR 50.46 and GDC 10, require as input the peak fuel power and the power distribution. Since the peak power and the power distribution are initial conditions of DBAs and transient analyses, facility operation must be controlled by LCOs that are established based on these parameters. Hence, Westinghouse pressurized water reactors (PWRs) have LCOs relative to F_Q. In accordance with 10 CFR 50.36(c)(2), the LCO is accompanied by SRs to ensure that the LCO is satisfied. At plants that have implemented GL 88-16, specific parameter values may be administratively controlled, and in such cases, these parameters must be determined in accordance with NRC-approved methodology and contained in the facility COLR.

If, during performance of an SR, F_Q is determined not to be within the limit, then the LCO is not met, and the TS remedial actions must be followed to ensure that facility operation remains safe. These remedial actions are based on (1) restoring compliance with the LCO, and (2) adjusting the reactor protection system settings so that the functionality required by GDCs 20 and 26 is maintained.

2.4 Summary of Proposed Changes

The following tables provide a summary of the TS changes that TVA proposed for Watts Bar, Units 1 and 2. Table 1 summarizes the changes for Condition A Required Actions and Table 2

summarizes the changes for Condition B Required Actions. The proposed changes to the Watts Bar, Units 1 and 2, TS 3.2.1 SRs are discussed following Tables 1 and 2.

2.4.1 Units 1 and 2, Required Actions and Completion Times, TS 3.2.1 Conditions A and B

Table 1: Required Actions and Completion Times, Condition A, Units 1 and 2

TS Requirements	Current Specification	Revised Specification
Condition A NOTE	[none]	Required Action A.4 shall be completed whenever this Condition is entered prior to increasing THERMAL POWER above the limit of Required Action A.1. SR 3.2.1.2 is not required to be performed if this Condition is entered prior to THERMAL POWER exceeding 75% RTP after a refueling.
Condition A	F^C_Q (Z)	F_Q^C (Z)
Required Action A.1	[Specification Unchanged] Completion Time: 15 minutes	[Specification Unchanged] Completion Time: 15 minutes after each F_Q^C (Z) determination
Required Actions A.2 and A.3	"… 1% for each 1% F^C_Q (Z) exceeds limit" A.2 Completion Time: 8 hours A.3 Completion Time: 72 hours	"… 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action A.1." A.2/A.3 Completion Times: 72 hours after each F_Q^C (Z) determination
Required Action A.4	Perform SR 3.2.1.1 [Completion Time Unchanged]	Perform SR 3.2.1.1 and SR 3.2.1.2. [Completion Time Unchanged]
Logical Structure	[Logical Structure Unchanged] All four required actions must be performed upon entry into Condition A.	[Logical Structure Unchanged] All four required actions must be performed upon entry into Condition A.

For Unit 1, Required Action A.3, TVA proposes to revise the station from "Reduce Overpower T trip setpoints…" to include a delta, as "Reduce Overpower ΔT trip setpoints…" which the NRC staff considers editorial.

Table 2: Required Actions and Completion Times, Condition B			
TS Requirements	**Unit 1 Current Specification**	**Unit 2 Current Specification**	**Revised Specifications**
Required Action B.1	Reduce AFD limits ≥ 1% for each 1% F_Q^W (Z) exceeds limit. Completion Time: 2 hours	Reduce AFD limits ≥ 1% for each 1% F_Q^W (Z) exceeds limit. Completion Time: 2 hours	Replace with Required Actions B.1.1 and B.1.2 (see below)
Required Action B.1.1	New for Watts Bar, Unit 1	New for Watts Bar, Unit 2	Implement a RAOC operating space specified in the COLR that restores F_Q^W (Z) to within limits. Completion Time: 4 hours
Required Action B.1.2	New for Watts Bar, Unit 1	New for Watts Bar, Unit 2	Perform SR 3.2.1.1 and SR 3.2.1.2 if control rod motion is required to comply with the new operating space. Completion Time: 72 hours
NOTE, Required Action B.2.1	New for Watts Bar, Unit 1	Required Actions B.2.1, B.2.2, B.2.3, and B.2.4 not required if SR 3.2.1.2 was performed at < 75% RTP.	Required Action B.2.4 shall be completed whenever Required Action B.2.1 is performed prior to increasing THERMAL POWER above the limit of Required Action B.2.1.
Required Action B.2.1	New for Watts Bar, Unit 1	Reduce maximum allowable power ≥ 3% RTP for each 1% F_Q^W (Z) exceeds limit. Completion Time: 4 hours	Limit THERMAL POWER to less than RATED THERMAL POWER and reduce AFD limits as specified in the COLR. Completion Time: 4 Hours

Table 2: Required Actions and Completion Times, Condition B (continued)			
TS Requirements	**Unit 1 Current Specification**	**Unit 2 Current Specification**	**Revised Specifications**
Required Action B.2.2	New for Watts Bar, Unit 1	Reduce Power Range Neutron Flux – High trip setpoints ≥ 1% for each 1% the maximum allowable power is reduced. Completion Time: 72 hours	Reduce Power Range Neutron Flux – High trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.2.1. Completion Time: 72 hours
Required Action B.2.3	New for Watts Bar, Unit 1	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% the maximum allowable power is reduced. Completion Time: 72 hours	Reduce Overpower ΔT trip setpoints ≥ 1% for each 1% that THERMAL POWER is limited below RATED THERMAL POWER by Required Action B.2.1. Completion Time: 72 hours
Required Action B.2.4	New for Watts Bar, Unit 1	Perform SR 3.2.1.1 and SR 3.2.1.2. Completion Time: Prior to increasing THERMAL POWER above the limit of Required Action B.2.1	Perform SR 3.2.1.1 and SR 3.2.1.2. Completion Time: Prior to increasing THERMAL POWER above the limit of Required Action B.2.1
Logical Structure	B.1 [B.1 was the only Required Action under Condition B for WBN, Unit 1]	B.1.1 AND B.2.1 AND B.2.2 AND B.2.3 AND B.2.4	B.1.1 AND B.1.2 OR B.2.1 AND B.2.2 AND B.2.3 AND B.2.4

2.4.2 Proposed Changes to TS 3.2.1 Surveillance Requirements

The existing Surveillance Requirements for Watts Bar, Units 1 and 2, differ slightly from the STS in NUREG-1431, Revision 4, and as such, the proposed changes to the SRs are slightly more extensive than described in WCAP-17661-P-A. The SRs are the same for both units, as are the proposed changes.

The NOTE above the TS 3.2.1 SRs states, "During power escalation at the beginning of each cycle, THERMAL POWER may be increased until an equilibrium power level has been achieved, at which a power distribution map is obtained." The licensee proposes to delete this note for both units.

The Frequency for SR 3.2.1.1 is proposed to change. In the first Frequency statement, the requirement presently states, "Once after initial fuel loading and each refueling prior to THERMAL POWER exceeding 75% RTP." The licensee proposes to delete the phrase, "initial fuel loading and," so that the new requirement would state, "Once after each refueling prior to THERMAL POWER exceeding 75% RTP."

The second Frequency statement presently requires performance of SR 3.2.1.1, "Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^C(Z)$ was last verified. The licensee proposes to change this frequency from 12 hours to 24 hours.

For Watts Bar, Unit 1, SR 3.2.1.2 presently includes a NOTE that states:

> If $F^W_Q(Z)$ is within limits and measurements indicate
>
> Maximum over z $\left[\frac{F^C_Q(Z)}{K(Z)}\right]$
>
> has increased since the previous evaluation of $F^C_Q(Z)$:
>
> a. Increase $F^W_Q(Z)$ by the appropriate factor specified in the COLR and reverify $F^W_Q(Z)$ is within limits; or
>
> b. Repeat SR 3.2.1.2 once per 7 EFPD using either the movable incore detectors or the PDMS until two successive power distribution measurements indicate
>
> Maximum over z $\left[\frac{F^C_Q(Z)}{K(Z)}\right]$
>
> has not increased.

For Watts Bar, Unit 2, SR 3.2.1.2, the present NOTE states:

> If $F_Q^W(Z)$, increased by the appropriate factor specified in the COLR, is not within limits:
>
> Repeat SR 3.2.1.2 one per 7 EFPD using the Power Distribution Monitoring System (PDMS) until two successive incore power distribution measurements indicate

Maximum over z $\left[\frac{F_Q^C(Z)}{K(Z)}\right]$

AND

Maximum over z $\left[\frac{F_Q^C(Z)*W(z)}{K(Z)}\right]$

TVA proposes to delete this NOTE from Watts Bar, Units 1 and 2, SR 3.2.1.2.

The first Frequency requirement for SR 3.2.1.2 is presently, "Once after initial fuel loading and each refueling prior to THERMAL POWER exceeding 75% RTP." This Frequency requirement will be revised to state, "Once after each refueling within 24 hours after THERMAL POWER exceeds 75% RTP."

The second Frequency requirement for SR 3.2.1.2 presently requires performance of SR 3.2.1.2, "Once within 12 hours after achieving equilibrium conditions after exceeding, by ≥ 10% RTP, the THERMAL POWER at which $F_Q^W(Z)$ was last verified." The licensee proposes to change the Frequency from 12 hours to 24 hours.

2.4.3 Proposed Changes to TS 5.9.5, "Core Operating Limits Report (COLR)"

Item 3 of the COLR references list for both units is a reference to WCAP-10216-P-A, Revision 1A, "Relaxation of Constant Axial Offset Control F(Q) Surveillance Technical Specification." While this reference will be retained in TS 5.9.5 for both units, the language indicating that it is the methodology for TS 3.2.1 – Heat Flux Hot Channel Factor (W(Z) Surveillance Requirements for F(Q) Methodology) will be deleted, as WCAP-17661-P-A replaces this methodology for that purpose.

For both units, TVA proposes to add a reference to the list, as follows:

> WCAP-17661-P-A, Revision 1, "Improved RAOC and CAOC F_Q Surveillance Technical Specifications," February 2019 (Methodology for Specification 3.2.1 – Heat Flux Hot Channel Factor (T(Z) Surveillance Requirements for F_Q Methodology).)

2.4.4 Unit 2 License Condition 10

License Condition 10 for Watts Bar, Unit 2, states:

> TVA will verify for each core reload that the actions taken if $F_Q^W(Z)$ is not within limits will assure that the limits on core power peaking $F_Q(Z)$ remain below the initial total peaking factor assumed in the accident analyses.

The licensee proposes to delete this Condition and replace it with:

> Deleted

3.0 TECHNICAL EVALUATION

The NRC staff evaluated the modified TSs proposed by TVA for Watts Bar, Units 1 and 2, and considered whether the modified TSs are consistent with the regulatory requirements identified in Section 2.1, above. Various F_Q limits, surveillance methods, and remedial actions have been found to satisfy these requirements as documented in the NRC staff's safety evaluation (SE) approving WCAP-17661-P-A for use. Therefore, in the technical evaluation below, the NRC staff evaluates whether TVA has proposed to implement revised RAOC F_Q TS that are consistent with WCAP-17661-P-A, and whether TVA has acceptably addressed two limitations that are identified in the NRC staff's SE for WCAP-17661-P-A. As discussed below, the staff has concluded that the licensee's implementation of WCAP-17661-P-A was acceptable for Watts Bar, Units 1 and 2, and TVA has acceptably addressed the two limitations identified in the NRC staff's SE for WCAP-17661-P-A.

3.1 Consistency with WCAP-17661-P-A and Changes to TS 3.2.1

The NRC staff reviewed the TS changes proposed for Watts Bar, Units 1 and 2, in comparison to the technical specifications approved in WCAP-17661-P-A. The NRC staff determined that the changes proposed by TVA for Watts Bar are consistent with the TS approved by the staff in WCAP-17661-P-A, except that there were two differences from WCAP-17661-P-A in the TSs for both units.

The first difference between the TS approved in WCAP-17661-P-A and the proposed TS for Watts Bar, Units 1 and 2, is in the title of TS 3.2.1. In WCAP-17661-P-A and in the STS, the title of TS 3.2.1 includes reference to both the axial offset control methodology, i.e., RAOC or CAOC, and the surveillance methodology, e.g., W(Z) or T(Z). Neither Watts Bar unit includes this level of specificity, and as such, TVA did not propose to rename TS 3.2.1, but rather to retain the title "Heat Flux Hot Channel Factor ($F_Q(Z)$)." This title is sufficiently descriptive concerning the LCO and associated surveillance, regardless of the axial offset control methodology or the surveillance methodology, and as such, the NRC staff determined that this minor difference between WCAP-17661-P-A and the TS revision proposed for implementation at Watts Bar, Units 1 and 2, is acceptable.

The second change proposed for Watts Bar, Units 1 and 2, is not described in WCAP-17661-P-A. The change would eliminate the phrase "initial fuel loading and…" from the frequencies associated with the SRs. The SRs are still required to be performed once after each refueling and on a periodic basis thereafter. This change eliminates language that was specific to the first fuel loadings at both units, which have been completed. Because the initial fuel loadings have been completed, the NRC staff determined that the language is no longer necessary, and its deletion is acceptable.

The NRC staff reviewed the remainder of the changes that TVA proposed for TS 3.2.1 for both units and determined that the changes are fully consistent with those provided in Appendix A of WCAP-17661-P-A. The overall F_Q surveillance formulation is provided in Chapter 4 of the topical report. The associated TS requirements and an example application using the RAOC methodology in use at Watts Bar, Units 1 and 2, are described in Chapters 5 and 6, respectively. Meanwhile, Chapter 4 of the NRC staff's SE approving WCAP-17661-P-A for use provides a detailed technical basis explaining why the new surveillance methodology and associated TS requirements, which are proposed for use at Watts Bar, are acceptable. Because TVA proposed to implement the new RAOC surveillance methodology in a manner

that is consistent with an NRC-approved topical report, the NRC staff finds that the proposed changes to TS 3.2.1 are acceptable.

3.2 Evaluation of Limitations for WCAP-17661-P-A

Chapter 5 of the SE approving WCAP-17661-P-A for use provides two limitations, adherence to which is necessary to ensure acceptable implementation of WCAP-17661-P-A. Relevant to the RAOC methodology, Limitation 1 on WCAP-17661-P-A stipulates requirements on the use of the A_{XY} factor within the power distribution surveillance methodology. Limitation 2 requires that the final power level reduction following a failed F_Q surveillance must be to 50-percent rated thermal power. TVA's submittal addresses these limitations.

Limitation 1 requires that the licensee apply approved nuclear methods to calculate surveillance condition-specific A_{XY} factors in manner consistent with the way the original cycle design calculations were performed. This limitation assures that corrections to the calculated transient F_Q surveillance parameter are valid when they are performed during mid-cycle conditions. TVA addressed this limitation by stating that it will use the Best-Estimate Analyzer for Core Operations – Nuclear (BEACON) core monitoring system described in NRC-approved licensing topical report WCAP-12472-P-A, "BEACON Core Monitoring and Operation Support System" (ADAMS Package No. ML003678347), or the Advanced Nodal Code (ANC) nuclear models described in NRC-approved licensing topical report WCAP-10965, "ANC: A Westinghouse Advanced Nodal Code" (ADAMS Legacy Library Package Accession No. 8610310286), and that TVA will calculate the A_{XY} factor using similar assumptions as those employed in the cycle depletion calculations. The NRC staff reviewed the information provided by the licensee and finds that it satisfactorily addressed this limitation.

Limitation 2 requires that the final reduction in thermal power following a failed F_Q surveillance is to 50-percent rated thermal power. TVA provided sample COLR input indicating its adherence to this limitation and stated that all COLR input for Watts Bar, Units 1 and 2, fuel cycles will continue to specify 50-percent rated thermal power as the final power level reduction in the event of a failed F_Q surveillance. The NRC staff reviewed the information provided by the licensee and finds that it satisfactorily addressed this limitation.

Based on its review of the information provided by the licensee, the NRC staff finds that TVA has acceptably addressed the two limitations included in the NRC staff SE approving WCAP-17661-P-A for use.

3.3 Proposed Changes to TS COLR References

The NRC staff reviewed the proposed changes to the TS COLR references for both units. The language in Reference 3 in TS 5.9.5 presently indicates that the methodology used for TS 3.2.1 is contained in WCAP-10216-P-A, "Relaxation of Constant Axial Offset Control F(Q) Surveillance Technical Specification." The NRC staff reviewed the proposed revision and finds that, because WCAP-10216-P-A will remain in use for TS 3.2.3, "Axial Flux Difference (AFD)," but WCAP-17661-P-A will now be used for TS 3.2.1, the change is acceptable. Similarly, the NRC staff finds that the proposed inclusion of the new Reference 11 in TS 5.9.5, which refers to WCAP-17661-P-A, is acceptable because this methodology will now be used to determine the operating limits and to perform associated surveillances for LCO 3.2.1. Finally, the methodology and TS changes provided in WCAP-17661-P-A are applicable to and appropriate for Watts Bar, Units 1 and 2, because both units are Westinghouse PWRs using the RAOC

power distribution surveillance methodology, for which WCAP-17661-P-A is intended and has been approved for use by the NRC staff.

3.4 Deletion of Watts Bar Unit 2, License Condition 10

Existing License Condition 10 for Watts Bar, Unit 2, states:

> TVA will verify for each core reload that the actions taken if $F_Q^W(Z)$ is not within limits will assure that the limits on core power peaking $F_Q(Z)$ remain below the initial total peaking factor assumed in the accident analyses.

The NRC staff reviewed the proposed deletion of License Condition 10 for the Watts Bar, Unit 2, Operating License. The NRC staff finds that the proposed deletion is acceptable because, upon implementation of this license amendment, the requirements of License Condition 10 will have been satisfied, and as such, the License Condition is no longer necessary.

4.0 TECHNICAL CONCLUSION

Based on the following considerations, the NRC staff concludes as follows:

1. TVA proposes to implement methods described in a TR that has been approved for use by the NRC staff for formulating and performing the F_Q surveillance,

2. The NRC staff confirmed that TVA's proposed implementation is consistent with the TS approved by the staff in WCAP-17661-P-A, and

3. TVA has acceptably addressed the Conditions and Limitations included in the NRC staff SE approving WCAP-17661-P-A.

The NRC staff has determined that it is acceptable for TVA to implement WCAP-17661-P-A at Watts Bar, Units 1 and 2, and because Unit 2 License Condition 10 has been satisfied, that condition may be deleted.

Because WCAP-17661-P-A provides an acceptable method to determine operating limits and to perform core surveillance in a way that demonstrates compliance with the requirements identified in Section 2.1 of this SE, the NRC staff concludes that the proposed license amendments are acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment on August 14, 2020. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, "Standards for Protection against Radiation," and changes SRs. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in

individual or cumulative occupational radiation exposure. The Commission previously issued a proposed finding that the amendment involves no significant hazards consideration, published in the Federal Register on April 21, 2020 (85 FR 22186), and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that 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.

Principal Contributor: B. Parks, NRR

Date: February 11, 2021

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT NOS. 142 AND 49 REGARDING REVISION TO TECHNICAL SPECIFICATIONS TO IMPLEMENT WCAP-17661-P-A, REVISION 1, "IMPROVED RAOC AND CAOC FQ SURVEILLANCE TECHNICAL SPECIFICATIONS" (EPID L-2020-LLA-0037) DATED FEBRUARY 11, 2021

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OFFICE	NRR/DSS/STSB/BC*	OGC (NLO)*	NRR/DORL/LPL2-2/BC	NRR/DORL/LPL2-2/PM
NAME	VCusumano	STurk (w/edits)	UShoop	KGreen
DATE	09/09/2020	10/02/2020	02/11/2020	02/11/2020

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