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

September 17, 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. 148 AND 55 TO REVISE TECHNICAL SPECIFICATIONS FOR FUNCTION 6.E OF TABLE 3.3.2-1, "ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION" (EPID L-2020-LLA-0195)

Dear Mr. Barstow:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 148 to Facility Operating License No. NPF-90 and Amendment No. 55 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 August 27, 2020.

The amendments revise Watts Bar, Units 1 and 2, Technical Specification 3.3.2, "ESFAS Instrumentation," Table 3.3.2-1 "Engineered Safety Feature Actuation System Instrumentation," Function 6.e, "Auxiliary Feedwater - Trip of all Turbine Driven Main Feedwater Pumps," to include the electric motor-driven standby main feedwater pump trip channel for the auxiliary feedwater auto-start logic and add a new surveillance requirement.

A copy of our related safety evaluation is also enclosed. A 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. 148 to NPF-90
2. Amendment No. 55 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. 148
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 August 27, 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. 148 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 prior to the completion of the Watts Bar, Unit 1, Cycle 17 Refueling Outage (U1R17).

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona

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Date: 2021.09.17 13:49:32 -04'00'

David J. Wrona, 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: September 17, 2021

ATTACHMENT TO AMENDMENT NO. 148

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. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

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

Remove Pages	Insert Pages
3.3-31	3.3-31
3.3-32	3.3-32
3.3-33	3.3-33
--	3.3-33a
3.3-38	3.3-38

(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. 148 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.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
O. One MSVV Room Water Level High channel inoperable.	----------NOTE---------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. ----------	
	O.1 Place channel in trip	72 hours
	OR	
	O.2 Be in MODE 3	78 hours
P. One Standby Main Feedwater Pump trip channel inoperable	P.1 Place channel in trip.	48 hours
	OR	
	P.2 Be in MODE 3.	54 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------
Refer to Table 3.3.2-1 to determine which SRs apply for each ESFAS Function.

SURVEILLANCE		FREQUENCY
SR 3.3.2.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.2	Perform ACTUATION LOGIC TEST.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.2.3	Perform MASTER RELAY TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.4	Perform COT.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.5	----------NOTE---------- Slave relays tested by SR 3.3.2.7 are excluded from this surveillance. ---------- Perform SLAVE RELAY TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.6	----------NOTE---------- Verification of relay setpoints not required. ---------- Perform TADOT.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.7	Perform SLAVE RELAY TEST on slave relays K603A, K603B, K604A, K604B, K607A, K607B, K609A, K609B, K612A, K625A, and K625B.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.2.8	----------NOTE---------- Verification of setpoint not required. ---------- Perform TADOT.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.9	----------NOTE---------- This Surveillance shall include verification that the time constants are adjusted to the prescribed values. ---------- Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.10	----------NOTE---------- Not required to be performed for the turbine driven AFW pump until 24 hours after $\geq$ 1092 psig in the steam generator. ---------- Verify ESFAS RESPONSE TIMES are within limit.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.11	----------NOTE---------- Verification of setpoint not required. ---------- Perform TADOT.	Once per reactor trip breaker cycle

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.2.12	Verify the Standby Main Feedwater Pump trip channel is in the trip status when a Turbine Driven Main Feedwater Pump is supplying feedwater to the steam generators.	Once within 4 hours during startup after the first Turbine Driven Main Feedwater Pump is supplying feedwater to the steam generators AND In accordance with the Surveillance Frequency Control Program

Table 3.3.2-1 (page 5 of 7)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6. Auxiliary Feedwater (continued)						
c. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d. Loss of Offsite Power	1, 2 ,3	4 per bus	F	Refer to Function 4 of Table 3.3.5-1 for SRs and Allowable Values		
e. Trip of all Main Feedwater Pumps						
(1) Turbine Driven Main Feedwater Pumps	1[(i)], 2	1 per pump	J	SR 3.3.2.8 SR 3.3.2.9 SR 3.3.2.10	≥ 48 psig	50 psig
and						
(2) Standby Main Feedwater Pump	1, 2	1	P	SR 3.3.2.8 SR 3.3.2.10 SR 3.3.2.12	NA	NA
f. Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3, 4[(k)]	3	B	SR 3.3.2.6 SR 3.3.2.9 SR 3.3.2.10	A) ≥ 0.5 psig B) ≥ 1.33 psig	A) 1.2 psig B) 2.0 psig
7. Automatic Switchover to Containment Sump						
a. Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA

(continued)

(i) Entry into Condition J may be suspended for up to 4 hours when placing a Turbine Driven Main Feedwater (TDMFW) Pump in service or removing a TDMFW pump from service.

(j) Deleted.

(k) When steam generators are relied on for heat removal.

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. 55
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 August 27, 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. 55 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 prior to the completion of the Watts Bar, Unit 2, Cycle 4 Refueling Outage (U2R4).

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona

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Date: 2021.09.17 13:49:56 -04'00'

David J. Wrona, 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: September 17, 2021

ATTACHMENT TO AMENDMENT NO. 55

WATTS BAR NUCLEAR PLANT, UNIT 2

FACILITY OPERATING LICENSE NO. NPF-96

DOCKET NO. 50-391

Replace page 3 of Facility Operating License No. NPF-96 with the attached revised page 3. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

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

Remove Pages	Insert Pages
3.3-30	3.3-30
3.3-33	3.3-33
3.3-34	3.3-34
3.3-35	3.3-35
3.3-36	3.3-36
3.3-37	3.3-37
3.3-38	3.3-38
3.3-39	3.3-39
--	3.3-39a
3.3-40	3.3-40
3.3-41	3.3-41

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. 55 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. FULL SPECTRUM LOCA Methodology shall be implemented when 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:

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
N. One Vessel ΔT channel inoperable.	----------NOTE---------- One channel may be bypassed for up to 12 hours for surveillance testing. ----------		
	N.1	Set the Trip Time Delay threshold power level for (T_s) and (T_m) to 0% power.	72 hours
	OR		
	N.2	Be in MODE 3.	78 hours
O. One MSVV Room Water Level High channel inoperable.	----------NOTE---------- The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels. ----------		
	O.1	Place channel in trip.	72 hours
	OR		
	O.2	Be in MODE 3.	78 hours
P. One Standby Main Feedwater Pump trip channel inoperable.	P.1	Place channel in trip.	48 hours
	OR		
	P.2	Be in MODE 3.	54 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.2.10	----------NOTE---------- Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 1092 psig in the steam generator. ---------- Verify ESFAS RESPONSE TIMES are within limit.	In accordance with the Surveillance Frequency Control Program
SR 3.3.2.11	----------NOTE---------- Verification of setpoint not required. ---------- Perform TADOT.	Once per reactor trip breaker cycle
SR 3.3.2.12	Verify the Standby Main Feedwater Pump trip channel is in the trip status when a Turbine Driven Main Feedwater Pump is supplying feedwater to the steam generators.	Once within 4 hours during startup after the first Turbine Driven Main Feedwater Pump is supplying feedwater to the steam generators AND In accordance with the Surveillance Frequency Control Program

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 1 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1.	Safety Injection						
a.	Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
c.	Containment Pressure – High	1, 2, 3	3	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤ 1.6 psig	1.5 psig
d.	Pressurizer Pressure – Low	1, 2, 3(a)	3	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 1864.8 psig	1870 psig
e.	Steam Line Pressure - Low	1, 2, 3(a)	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 666.6(d) psig	675(d) psig
2.	Containment Spray						
a.	Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c.	Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤2.9 psig	2.8 psig

(continued)

(a) Above the P-11 (Pressurizer Pressure) Interlock.

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(d) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 2 of 9)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3. Containment Isolation						
a. Phase A Isolation						
1) Manual Initiation	1, 2, 3, 4	2	B	SR 3.3.2.8	NA	NA
2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
3) Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
b. Phase B Isolation						
1) Manual Initiation	1, 2, 3, 4	2 per train, 2 trains	B	SR 3.3.2.8	NA	NA
2) Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5 SR 3.3.2.7	NA	NA
3) Containment Pressure – High High	1, 2, 3	4	E	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤2.9 psig	2.8 psig

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 3 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4.	Steam Line Isolation						
a.	Manual Initiation	1, 2 [e], 3 [e]	1/valve	F	SR 3.3.2.8	NA	NA
b.	Automatic Actuation Logic and Actuation Relays	1, 2 [e], 3 [e]	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
c.	Containment Pressure – High High	1, 2 [e], 3 [e]	4	E	SR 3.3.2.1 SR 3.3.2.4 [b] [c] SR 3.3.2.9 [b] [c] SR 3.3.2.10	≤ 2.9 psig	2.8 psig
d.	Steam Line Pressure						
1)	Low	1, 2 [e], 3 [a][e]	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 [b] [c] SR 3.3.2.9 [b] [c] SR 3.3.2.10	≥ 666.6 [d] psig	675 [d] psig
2)	Negative Rate - High	3 [e][f]	3 per steam line	D	SR 3.3.2.1 SR 3.3.2.4 [b] [c] SR 3.3.2.9 [b] [c] SR 3.3.2.10	≤ 108.5 [g] psi	100 [g] psi

(continued)

(a) Above the P-11 (Pressurizer Pressure) Interlock.

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(d) Time constants used in the lead/lag controller are $t_1 \geq 50$ seconds and $t_2 \leq 5$ seconds.

(e) Except when all MSIVs are closed and de-activated.

(f) Function automatically blocked above P-11 (Pressurizer Interlock) setpoint and is enabled below P-11 when safety injection on Steam Line Pressure Low is manually blocked.

(g) Time constants utilized in the rate/lag controller are t_3 and $t_4 \geq 50$ seconds.

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 4 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5.	Turbine Trip and Feedwater Isolation						
a.	Automatic Actuation Logic and Actuation Relays	1, 2 (h), 3 (h)	2 trains	H	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b.	SG Water Level – High High (P-14)	1, 2 (h), 3 (h)	3 per SG	I	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≤83.1%	82.4%
c.	Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
d.	North MSV Vault Room Water Level – High	1, 2 (h)(i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9	≤ 5.31 inches	4 inches
e.	South MSV Vault Room Water Level – High	1, 2 (h)(i)	3 per vault room	O	SR 3.3.2.6 SR 3.3.2.9	≤ 4.56 inches	4 inches

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(h) Except when all MFIVs, MFRVs, and associated bypass valves are closed and de-activated or isolated by a closed manual valve.

(i) MODE 2 if Turbine Driven Main Feed Pumps are operating.

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 5 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6.	Auxiliary Feedwater						
a.	Automatic Actuation Logic and Actuation Relays	1, 2, 3	2 trains	G	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b.	SG Water Level – Low Low	1, 2, 3	3 per SG	M	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 16.4%	17.0%
	Coincident with:						
	1) Vessel ΔT Equivalent to power ≤ 50% RTP	1, 2	3	N	SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
	With a time delay (T_s) if one SG is affected					≤ 1.01 T_s (Note 1, Page 3.3-40)	T_s (Note 1, Page 3.3-40)
	or						
	A time delay (T_m) if two or more SGs are affected					≤ 1.01 T_m (Note 1, Page 3.3-40)	T_m (Note 1, Page 3.3-40)
	OR						
	2) Vessel ΔT equivalent to power > 50% RTP with no time delay (T_s and T_m = 0)	1, 2	3	N	SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c)	Vessel ΔT variable input ≤ 52.6% RTP	Vessel ΔT variable input 50% RTP
c.	Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 6 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
6.	Auxiliary Feedwater (continued)						
	d. Loss of Offsite Power	1, 2, 3	4 per bus	F	Refer to Function 4 of Table 3.3.5-1 for SRs and Allowable Values. Notes (b) and (c) are applicable to SR 3.3.5.2 for this function.		
	e. Trip of all Main Feedwater Pumps						
	(1) Turbine Driven Main Feedwater Pumps	1 [(j)], 2	1 per pump	J	SR 3.3.2.8 [(b)(c)] SR 3.3.2.9 [(b)(c)] SR 3.3.2.10	≥43.3 psig	50 psig
	and						
	(2) Standby Main Feedwater Pumps	1, 2	1	P	SR 3.3.2.8 SR 3.3.2.10 SR 3.3.2.12	NA	NA
	f. Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3, 4[(m)]	3	B	SR 3.3.2.6 SR 3.3.2.9 [(b)(c)] SR 3.3.2.10	A) ≥ 0.5 psig B) ≥ 1.33 psig	A) 1.2 psig B) 2.0 psig

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

(j) Entry into Condition J may be suspended for up to 4 hours when placing a Turbine Driven Main Feedwater (TDMFW) Pump in service or removing a TDMFW pump from service.

(k) Deleted.

(m) When steam generators are being relied on for heat removal.

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 7 of 9)
Engineered Safety Feature Actuation System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
7.	Automatic Switchover to Containment Sump						
a.	Automatic Actuation Logic and Actuation Relays	1, 2, 3, 4	2 trains	C	SR 3.3.2.2 SR 3.3.2.3 SR 3.3.2.5	NA	NA
b.	Refueling Water Storage Tank (RWST) Level - Low	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥155.6 inches from Tank Base	158 inches from Tank Base
	Coincident with Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.					
	and						
	Coincident with Containment Sump Level - High	1, 2, 3, 4	4	K	SR 3.3.2.1 SR 3.3.2.4 (b) (c) SR 3.3.2.9 (b) (c) SR 3.3.2.10	≥ 37.2 inches above el. 702.8 ft	38.2 inches above el. 702.8 ft

(continued)

(b) If the as found channel setpoint is outside its redefined as found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. The methodologies used to determine the as found and as left tolerances for the NTSP are specified in FSAR Section 7.1.2.

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 8 of 9)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
8. ESFAS Interlocks						
a. Reactor Trip, P-4	1, 2, 3	1 per train, 2 trains	F	SR 3.3.2.11	NA	NA
b. Pressurizer Pressure, P-11						
(1) Unblock (Auto Reset of SI Block)	1, 2, 3	3	L	SR 3.3.2.1 SR 3.3.2.4 SR 3.3.2.9	≤ 1975.2 psig	1970 psig
(2) Enable Manual Block of SI	1, 2, 3	3	L	SR 3.3.2.1 SR 3.3.2.4 SR 3.3.2.9	≥ 1956.8 psig	1962 psig

SURVEILLANCE REQUIREMENTS (continued)

Table 3.3.2-1 (page 9 of 9)
Engineered Safety Feature Actuation System Instrumentation

NOTE 1: Steam Generator Water Level Low-Low Trip Time Delay:

$$T_s = A(P)^3 + B(P)^2 + C(P) + D$$

$$T_m = E(P)^3 + F(P)^2 + G(P) + H$$

Where:

P = Vessel ΔT Equivalent to power (% RTP), P $\leq$ 50% RTP.

T_s = Time Delay for Steam Generator Water Level – Low Low Reactor Trip, one Steam Generator affected.

T_m = Time Delay for Steam Generator Water Level – Low Low Reactor Trip, two or more Steam Generators affected.

A = -0.0085041

B = 0.9266400

C = -33.85998

D = 474.6060

E = -0.0047421

F = 0.5682600

G = -23.70753

H = 357.9840

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 148 AND 55

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 August 27, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20244A303), the Tennessee Valley Authority (TVA, the licensee), submitted a license amendment request (LAR) to revise the Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2, Technical Specifications (TSs). The requested changes would revise Watts Bar, Units 1 and 2, TS 3.3.2, "ESFAS Instrumentation," Table 3.3.2-1 "Engineered Safety Feature Actuation System Instrumentation," Function 6.e, "Auxiliary Feedwater - Trip of all Turbine Driven Main Feedwater Pumps," to include the electric motor-driven standby main feedwater (SBMFW) pump trip channel for the auxiliary feedwater auto-start logic and add a new surveillance requirement (SR) to verify the status of the SBMFW pump trip channel when a turbine-driven main feedwater (TDMFW) pump is in service. The proposed changes would also add a new condition to TS 3.3.2 to require actions when one SBMFW pump trip channel is inoperable.

2.0 REGULATORY EVALUATION

2.1 System Description

The proposed changes to the Watts Bar TSs are associated with the design and operation of the main feedwater (MFW) system and the auxiliary feedwater (AFW) system.

2.1.1 Main Feedwater System

The MFW system includes two TDMFW pumps, one electric motor-driven SBMFW pump, with high and low pressure feedwater (FW) heaters, demineralizers, and other equipment needed to process FW flow. The two variable speed TDMFW pumps are capable of delivering FW to the four steam generators (SGs) under all expected operating conditions. The AFW pumps along with TDMFW pumps are currently used for plant startup, shutdown, and low power operation along with use of the FW bypass headers. The small bypass FW control valves provide increased sensitivity for flow regulation (i.e., rangeability) during low-load operations, as

compared to the larger main control valves. The TDMFW pump speed is automatically adjusted to meet system demands.

The SBMFW pump is a centrifugal, single-stage, double-volute type pump capable of accelerating from hot standby (with its discharge check valve closed) to rated speed within 15 seconds as required to supplement MFW flow. The SBMFW pump can be used as needed in Mode 3 (i.e., Hot Standby as defined in TS Table 1.1-1) for items such as system cleanup and pressure testing. During certain times of the year, to improve plant efficiency, the SBMFW pump is used to supplement TDMFP flow at high plant loads. Also, the SBMFW pump will automatically start if one of the TDMFW pumps trips above 67-percent power. The SBMFW pump was originally used for plant startup and shutdown. However, because the SBMFW pump does not have a trip circuit to automatically start the AFW pumps, the usage of SBMFW pump for normal plant startup and shutdown in Modes 1 (i.e., Power Operation as defined in TS Table 1.1-1) and 2 (i.e., Startup as defined in TS Table 1.1-1) was discontinued.

The MFW system is described in Section 3.2.1 of the Enclosure to the LAR and in Section 10.4.7.2 of the Watts Bar Updated Final Safety Analysis Report (UFSAR) (ADAMS Accession No. ML20323A305).

2.1.2 Auxiliary Feedwater System

The AFW system provides a secondary side heat sink for the reactor in the event that the MFW System is not available. The system has two motor driven pumps and a turbine driven pump. The normal source of water for the AFW System is the condensate storage tank. A low suction pressure to the AFW pumps will automatically realign the pump suctions to the essential raw cooling water system. The AFW System is aligned so that upon a pump start, flow is initiated to the respective SGs immediately.

The two motor-driven AFW pumps and one turbine-driven pump are configured into three trains. The pumps are equipped with independent recirculation lines to prevent pump operation against a closed system. Each motor-driven AFW pump is powered from an independent Class 1E power supply and feeds two SGs. The turbine-driven AFW pump receives steam from one of two main steam lines upstream of the main steam isolation valves. Each of the steam feed lines will supply 100 percent of the requirements of the turbine-driven AFW pump. The turbine-driven AFW pump supplies a common header capable of feeding all SGs.

The AFW system actuates automatically on SG low-low level by the engineered safety features actuation system (ESFAS). The motor-driven AFW pumps start on a two-out-of-three low-low level signal in any SG and the turbine-driven pump starts on a two-out-of-three low-low level signal in any two SGs. The system also actuates on loss of offsite power, safety injection, and trip of both TDMFW pumps. The AFW system is designed to supply sufficient water to the SGs to remove decay heat with SG pressure at the lowest setpoint (plus 3-percent tolerance plus 3-percent accumulation) of the main steam safety valves. Subsequently, the AFW system supplies sufficient water to cool the unit to residual heat removal entry conditions, with steam released through the atmospheric dump valves.

Separate engineered safety feature power subsystems and control air subsystems serve each motor-driven AFW pump and its associated valves. The valves associated with the turbine-driven pump are served by one of the two electric and control air subsystems. The turbine-driven pump valves associated with SG 1 and SG 2 are served by Train B and the valves associated with SG 3 and SG 4 are served by Train A. The turbine-driven pump receives

control power from a third direct current electric channel that is distinct from the channels serving the motor driven pumps.

The AFW system is described in Section 3.2.2 of the Enclosure to the LAR and in Section 10.4.9 of the Watts Bar UFSAR (ADAMS Accession No. ML20323A305). Table 1 of the Enclosure to the LAR denotes the design basis events (DBE) that impose AFW system safety function requirements and the credited instrumentation for the AFW system initiation in the accident analysis.

2.2 Description of Proposed Changes

In the LAR, TVA proposed the following changes to Watts Bar, Units 1 and 2, TS 3.3.2:

- Revise Function 6.e in TS Table 3.3.2-1 to state: "Trip of All Main Feedwater Pumps."

- Relocate the current requirements for the TDMFW pumps to new Function 6.e(1) in TS Table 3.3.2-1.

- Add a new Function 6.e(2) in TS Table 3.3.2-1 to include the SBMFW pump trip function with applicability during Modes 1 and 2.

- Add a new SR 3.3.2.12 for TS Table 3.3.2-1, Function 6.e(2), to verify the SBMFW pump trip channel is in the trip status when a TDMFW pump is supplying FW to the SGs. The SR frequency is once within four hours during startup after the first TDMFW pump is supplying FW to the SGs and thereafter in accordance with the Surveillance Frequency Control Program.

- Revise TS Table 3.3.2-1, footnotes (i) for Unit 1 and (j) Unit 2 for TS Table 3.3.2-1, to state: "Entry into Condition J may be suspended for up to 4 hours when placing a Turbine Driven Main Feedwater (TDMFW) Pump in service or removing a TDMFW pump from service."

- Delete TS Table 3.3.2-1, footnotes (j) for Unit 1 and (k) for Unit 2.

- Add a Condition P to TS 3.3.2 that applies when the SBMFW pump trip channel is inoperable. The Required Actions for Condition P require either placing the channel in trip within 48 hours or being in Mode 3 within 54 hours.

2.3 Applicable Regulatory Requirements and Guidance

The U.S. Nuclear Regulatory Commission (NRC, the Commission) staff's evaluation is based upon the following regulations and guidance:

Section 182.a of the Atomic Energy Act of 1954, as amended, requires nuclear power plant operating licenses to include TS as part of any license. The regulation, Title 10 of the *Code of Federal Regulations* (10 CFR) section 50.36(a)(1), requires an applicant for an operating license to submit proposed TSs in accordance with the requirements of 10 CFR 50.36 and include a "summary statement of the bases or reasons for such specifications, other than those covering administrative controls." However, per 10 CFR 50.36(a)(1), these TS bases "shall not become part of the technical specifications."

Section 50.36(b) of 10 CFR requires that each license authorizing reactor operation include TSs derived from the analyses and evaluation included in the safety analysis report and amendments thereto.

Section 50.36(c) of 10 CFR requires that TSs include certain items. Per 10 CFR 50.36(c)(2)(i), TSs must include limiting conditions for operation (LCOs), which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. That provision also requires that when an LCO of a nuclear reactor is not met, the licensee must shut down the reactor or follow any remedial action permitted by the TSs until the condition can be met.

Section 50.36(c)(3) of 10 CFR requires that TSs include surveillance requirements (SRs), which 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.

NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 16, "Technical Specifications," Revision 3, provides guidance for the NRC staff review of TSs.

Information Notice 2015-05, "Inoperability of Auxiliary and Emergency Feedwater Auto-Start Circuits on Loss of Main Feedwater Pumps," informs holders of operating licenses for nuclear power reactors of several instances between 2006 and 2012 where licensees operated their MFW systems in such a manner that the automatic initiation of auxiliary or emergency FW on loss of all MFW pumps was disabled.

3.0 TECHNICAL EVALUATION

3.1 Background

In Attachment 1 to the LAR enclosure, the licensee provided information in chronological order from the issuance of the Safety Evaluation Report related to the operation of Watts Bar, Units 1 and 2, in June 1982 to the current status of TS 3.3.2. The discussion included the regulatory correspondence between TVA and the NRC concerning the use of SBMFW pump during startup and shutdown activities. Below is a summary of the information from the LAR related to the issues considered in this SE. Further detailed information can be found in Attachment 1 to the LAR and the various documents referenced therein.

The original design and licensing basis for Watts Bar allowed the SBMFW pump to be used with the FW bypass headers for plant startup, shutdown, and low power operation while TDMFW pumps were being placed into or removed from service. The NRC's evaluation of the design basis for operation of the SBMFW pump is documented in Section 10.4.7 of NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, Docket Nos. 50-390 and 50-391," issued in June 1982 (ADAMS Accession No. ML072060490).

TVA Technical Specification (TS) Change Request No. 04-013 to the NRC, dated September 23, 2004, requested a revision to TS LCO 3.3.2 Table 1, Function 6.e, to allow the AFW Start upon trip of the TDMFW pumps to be required only when one or more of the pumps are operating (ADAMS Accession No. ML042740448). In the change request, TVA noted that during plant startup and up to approximately 18 percent load, the SBMFW pump is normally

used instead of the TDMFW pumps. In the unlikely event that the SBMFW pump trips, in addition to auto-start of AFW pumps upon low-low level, AFW pumps can be manually started to supply the required feedwater and continue with plant startup until sufficient steam is generated for TDMFW pump supply.

In a request for additional information, dated May 25, 2006 (ADAMS Accession No. ML061590317), the NRC staff expressed the following concerns with the use of the SBMFW pump during startup:

> The practice of using the SBMFW pump until the plant is operating at around 18 percent power before starting a turbine driven main feedwater pump renders this AFW initiation circuitry incapable of performing its function in Mode 2 (as well as in Mode 1 below 18 percent power) and does not appear to satisfy the intent of the TS requirement that was established. The fact that the turbine driven main feedwater pumps are not normally started until the plant reaches 18 percent power does not justify the proposed change; the intent of the existing TS requirement must be considered and addressed.

On July 28, 2006, TVA withdrew the TS change request (ADAMS Accession No. ML062130453). In a letter dated August 18, 2006 (ADAMS Accession No. ML062150153), the NRC acknowledged TVA's withdrawal of the TS change request and reiterated the NRC staff concerns, including the following:

> The licensee's practice is to enable the TDMFW pump trip/AFW automatic actuation circuitry prior to entering Mode 2 so that the operability requirement specified by TS Table 3.3.2 Item 6.e is satisfied even though automatic AFW actuation could not occur unless the TDMFW pumps are operating.

The NRC Integrated Inspection Report (IR), issued on October 27, 2006 (ADAMS Accession No. ML063000192), identified a Green non-cited violation of TS 3.3.2 for failing to have an AFW start signal during startup operations when using the SBMFW pump in lieu of a TDMFW pump. In the IR, the inspectors observed that the licensee's practice of using the SBMFW during startups is not consistent with the requirements of TS 3.3.2 and its Bases. The inspectors also concluded that there was no loss of safety function of the system or single train because the AFW start on low-low steam generator was still functional.

The NRC IR issued on August 7, 2008 (ADAMS Accession No. ML082210342), identified a Green non-cited violation of TS 3.0.4.a for entering Modes 2 and 1 without an operable channel of AFW automatic start on a trip of all MFW pumps, as required by TS 3.3.2. The IR stated that the licensee defeated this channel by introducing a signal that artificially indicated that a MFW pump was operating and that this practice existed since initial plant startup. As corrective actions for the NCV issued in 2006, the licensee changed operating procedures to use TS 3.0.4b which allows, based on the results of a risk assessment, entering a Mode when a TS LCO is not met. The licensee was informed that its position on an operable channel was inconsistent with the licensing basis and that TS requirements associated with entering Modes 1 and 2 had not been met. The IR also deemed the finding to be of very low safety significance because the finding did not represent a loss of system safety function, because the AFW automatic start on low-low steam generator level, loss of offsite power, and safety injection were functional.

TVA submitted a new LAR to the NRC on September 18, 2008 (ADAMS Accession No. ML082670543). The proposed TS change modified Modes 1 and 2 Applicability for Function 6.e of TS Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation." This safety function is associated with AFW automatic start on Trip of all Main Feedwater Pumps. In addition, the proposed change also revised LCO 3.3.2, Condition J, to be consistent with the Watts Bar, Unit 1 design bases. The licensee stated that due to the non-compliance issues addressed in NRC IRs, the AFW motor-driven pumps and the TDMFW pumps will be used for normal plant startup and shutdown in compliance with this proposed change.

The NRC approved the above request on March 4, 2009 (ADAMS Accession No. ML090480566), which is the current licensing basis for Watts Bar, Units 1 and 2, TS Table 3.3.2-1, Function 6.e, "Trip of Turbine Driven Feedwater Pumps – AFW auto-start."

Based on the discussion above, the SBMFW pump was used for startup and shutdown operations of Watts Bar Unit 1 from initial plant startup in 1982 to 2009 with no anticipatory auto-start of the AFW pumps upon its trip. Since 2009, Watts Bar, Unit 1, and Unit 2, which began operation in 2016, have been operating with a combination of TDMFW pumps and AFW pumps for startup and shutdown activities. If power level was high enough to operate with TDMFW pumps alone, the anticipatory auto-start function of the AFW pumps would occur if both TDMFW pumps were tripped. The current LAR proposes to use only the SBMFW pump for startup and shutdown activities. The proposal is supported by a design change to facilitate the anticipatory auto-start function of the AFW pumps upon a trip of the SBMFW pump.

3.2 Description of Proposed Design Change in Support of TS Changes

The proposed TS changes are supported by a design change to the AFW auto-start logic. The modification uses contacts from the SBMFW pump supply breakers to the AFW auto-start logic to monitor the status of the electric motor driven SBMFW pump. The breaker contact will close upon the opening of the breaker, indicating the pump has tripped. The licensee indicated that this change is consistent with NRC Information Notice 2015-05, "Inoperability of Auxiliary and Feedwater Auto-Start Circuits on Loss of Main Feedwater Pumps," which notes that plants with motor-driven MFW pumps sense the position of the pump's supply breaker to determine whether the pump is running.

The SBMFW pump circuitry will include a hand switch, to allow the SBMFW pump trip channel to be placed in the trip status should the SBMFW pump trip channel become inoperable or when a TDMFW pump is supplying FW to the SGs.

The primary intent of the NRC staff evaluation is to determine the acceptability of the proposed changes to TS 3.3.2. The NRC staff evaluation of the proposed TS changes assumes implementation of the proposed design change, as described in the LAR, which ensures the proposed operation of the AFW auto-start logic.

In the LAR, the licensee stated that:

- Only the SBMFW pump will be providing FW to the SGs during Mode 2. If the SBMFW pump trips during this period, the anticipatory AFW auto-start circuitry being implemented by the design change will actuate both the motor driven AFW pumps and the turbine driven AFW pump.

- The SBMFW pump will continue operating into Mode 1 until approximately 10-percent rated thermal power at which time the first TDMFW pump will be placed in service. The SBMFW pump will be removed from service after confirmation that TDMFW pump is delivering flow to the SGs.

- Once a TDMFW pump is providing FW to the SGs, the SBMFW pump will be placed in trip status. A new SR 3.3.2.12 is proposed to TS 3.3.2 to verify that the SBMFW pump channel is placed in trip after a TDMFW pump is providing FW to the SGs. This action is necessary to allow AFW auto-start actuation should both TDMFW pumps trip, thus ensuring the anticipatory AFW auto-start will occur on a loss of FW.

- The existing features to automatically start the SBMFW pump upon the loss of a single TDMFW pump when plant load is greater than 67 percent and the ability to supplement MFW flow at higher plant loads are not impacted by the proposed changes. When either of these functions are in service, a trip of both TDMFW pumps will actuate the AFW auto-start circuitry.

The licensee stated that proposed change to the AFW auto-start logic has no impact on the AFW system operation, flow capabilities, or its response to accidents. The only change is providing an anticipatory auto-start of the AFW system when SBMFW pump trips during startup and shutdown activities.

In Section 3.2.2 of the Enclosure to the LAR, the licensee provided a list of DBEs that impose AFW system safety function requirements and the credited instrumentation in TS 3.3.2 for the AFW system. The credited instrumentation are either SG low-low level or safety injection level actuation and these functions are not impacted by the proposed changes to TS 3.3.2.

TS 3.3.2 Table 1, Function 6.e, imposes an anticipatory function that provides early actuation of the AFW system in the event of a loss of normal FW but is not credited in the Watts Bar accident analyses for actuation of the AFW system. The anticipatory AFW automatic start circuitry associated with the trip of the TDMFW pumps and the SBMFW pump does not meet single failure criteria. The Watts Bar accident analyses in UFSAR Section 15.2.8, “Loss of Normal Feedwater” (ADAMS Accession No. ML20323A316), credit the initiation of the AFW system by SG low-low water level for mitigating the loss of normal FW.

The NRC staff reviewed the LAR and Watts Bar UFSAR. The AFW automatic start from trip of MFW pumps is only required in Modes 1 and 2 when the SBMFW pumps are providing the only supply of FW to the SGs. This change alleviates the need to swap between AFW level control and MFW bypass valves in Mode 2, thus simplifying startup activities. Additionally, the current Function 6.e is an anticipatory function that provides early actuation of the AFW system for the loss of normal FW and is not credited in the Watts Bar accident analyses. The credited UFSAR Section 15.2.8 design basis function AFW auto-start channels are associated with steam generator low-low levels and remain unchanged.

To maintain the anticipatory AFW automatic start function that currently exists, the licensee has proposed a design change to install a handswitch to the SBMFW pump circuitry. A new SR 3.3.2.12 is proposed to verify the SBMFW pump trip channel is in the trip status when a TDMFW pump is supplying feedwater to the SGs. The staff’s evaluation of the proposed new SR 3.3.2.12 is provided in SE Section 3.3.4. The SR will ensure that the SBMFWP handswitch is in the correct tripped position when a TDMFW pump is supplying FW to the SGs. Placing the SBMFW pump trip channel in trip during this time allows AFW auto-start actuation should both

TDMFW pumps trip. This is the same configuration as the present AFW auto-start logic for this anticipatory function.

Based on the information provided by the licensee in the LAR, and the NRC staff's review of the UFSAR DBEs, the NRC staff finds that the operation of the SBMFW pump during startup and shutdown activities after the implementation of the design change together with the proposed changes to TS 3.3.2, evaluated below, will ensure that the anticipatory AFW automatic start from the trip of the MFW pumps is capable of performing its function in Modes 1 and 2.

3.3 Evaluation of Proposed Technical Specification Changes

TVA submitted a LAR to revise TSs associated with the AFW auto-start logic in the ESFAS. The licensee provided markups of the TSs showing the proposed changes in its LAR. The changes are evaluated individually below. The changes to the ESFAS auto-start logic for the AFW pumps will allow the licensee additional flexibility during low power operation and will improve control of SG level at low powers. The change will also simplify operation of the units during startup and shutdown.

In its LAR, TVA also provided markups to the TS bases for information only. The bases changes include additional details regarding the ESFAS AFW auto-start logic and operation of the feedwater system during startup and shutdown, and control of the trip channel for the SBMWF pump.

The NRC staff evaluated the licensee's LAR to determine if the proposed changes are consistent with the guidance, regulations, and licensing information discussed in Section 2.3 of this safety evaluation. In determining whether an amendment to a license will be issued, the Commission is guided by the considerations that govern the issuance of initial licenses to the extent applicable and appropriate.

3.3.1 Proposed Revision of Function 6.e in Table 3.3.2-1

The NRC staff reviewed the licensee's proposal to revise Function 6.e of Table 3.3.2-1 to read: "Trip of all Main Feedwater Pumps." The staff also reviewed the licensee's justification in the LAR and the DBEs in the Watts Bar UFSAR. The proposed change clarifies Function 6.e by explicitly stating that it applies to both the TDMFW pumps and the SBMFW pump, whereas it previously applied only to the TDMFW pumps. The NRC staff finds that the change is acceptable because the change continues to ensure that AFW will auto-start when the MFW is lost.

3.3.2 Proposed Relocation of TDMFW Pump Trip Channels to New Function 6.e(1)

The NRC staff reviewed the licensee's proposal to relocate the TDMFW pump trip channels to new Function 6.e(1) in Table 3.3.2-1. The staff also reviewed the licensee's justification in the LAR and the DBEs in the Watts Bar UFSAR. The proposal results in no changes to the modes of operation, required channels, SRs, allowable value, and nominal trip setpoint for the TDMFW pump trip channels that are currently covered by Function 6.e. The relocation allows the proposed function for the SBMFW pump to be included under Function 6.e as 6.e(2). Therefore, the NRC staff finds the proposed change is acceptable.

3.3.3 Proposed Addition of New Function 6.e(2)

The NRC staff reviewed the licensee's proposal to add new Function 6.e(2) to TS Table 3.3.2-1. The proposed function is an AFW pump auto-start on the trip of the SBMFW in conjunction with both MFW pumps in a tripped status. The proposed applicability of the SBMFW pump trip channel is Modes 1 and 2. In the proposed configuration, an AFW automatic start will occur if all of the MFW pumps trip. The AFW anticipatory auto-start on MFW pump trips will be capable of performing its function in both Modes 1 and 2, even if the SBMFW is the only source of feedwater to the SGs. The NRC staff finds the proposed change to be acceptable because it will simplify plant operation, provide improved feedwater level control and retain the anticipatory AFW auto-start if MFW is lost.

The NRC staff also reviewed the licensee's proposal to apply SR 3.3.2.8 and SR 3.3.2.10 to the SBMFW pump trip channel. SR 3.3.2.8 is the performance of the trip actuating device operational test (TADOT) that checks the manual actuation functions and AFW pump start on trip of the MFW pumps. SR 3.3.2.10 ensures that individual channel ESF response times are less than or equal to the maximum values assumed in the accident analyses. These SRs are performed on a frequency in accordance with the Surveillance Frequency Control Program. The frequency is adequate to verify the required operation of the trip circuits, and the addition of SBMFW pump logic does not require more frequent testing. The NRC staff finds that these SRs along with new SR 3.3.2.12 discussed below are acceptable to ensure that the anticipatory auto-start feature functions as designed.

Breaker contacts from the SBMFW pump supply breaker are used to monitor the electric motor-driven SBMFW pump and provide input to the AFW auto-start logic. The SBMFW pump breaker contacts do not have associated allowable values or trip setpoints. Therefore, the no channel calibration is required. SR 3.3.2.9 is a channel calibration that applies to the TDMFW pump pressure switches in proposed Function 6.e(1). Since the breaker contacts do not require calibration, SR 3.3.2.9 does not apply to proposed Function 6.e(2) for the SBMFW pump. The NRC staff finds it acceptable that SR 3.3.2.9 is not applied to the SBMFW pump because the function is provided by an electrical contact that does not require calibration.

The licensee proposed that new SR 3.3.2.12 would be applicable to the SBMFW pump trip. This proposed SR is discussed below.

3.3.4 Proposed Addition of New SR 3.3.2.12

The NRC staff reviewed the licensee's proposal to add a new SR 3.3.2.12. The SR will verify the SBMFW pump trip channel is in trip status (allowing AFW auto-start) whenever a TDMFW pump is supplying FW feedwater to the SGs. When the SBMFW pump hand switch is in the trip position, an AFW auto-start actuation will occur if both TDMFW pumps trip. The configuration with the SBMFW pump in trip ensures early actuation of the AFW system for the loss of normal FW event. The Frequency for this SR is proposed to be once within 4 hours during startup after the first TDMFW pump is supplying water to the SGs, and in accordance with the Surveillance Frequency Control Program. The 4-hour delay is reasonable to allow startup and alignment of the first TDMFW pump to provide FW to the SGs. The NRC staff notes that the anticipatory auto-start function is not credited in the safety analyses for the plant. Because the proposed change does not impact the credited AFW auto-start function provided by the SG low-low levels and ensures performance of the anticipatory function from the trip of the MFW pumps, the staff finds the proposed SR 3.3.2.12 and its frequency to be acceptable.

3.3.5 Proposed Revision of TS Table 3.3.2-1 Footnotes (i) (Unit 1) and (j) (Unit 2)

The NRC staff reviewed the licensee's proposal to revise TS Table 3.3.2-1 footnotes (i) (Unit 1) and (j) (Unit 2). The note applies only to Mode 1 and allows a 4-hour suspension of Condition J when placing a TDMFW pump into service or removing it from service. Condition J is applied if one or more TDMFW pump trip channels are inoperable. The proposal expands the exception provided by the note from only one to both TDMFW pumps because the SBMFW pump will now provide FW to the SGs into Mode 1. Therefore, a TDMFW pump will not be started in Mode 2 and both will be started in Mode 1. The proposed footnote will allow the TDMFW pumps to be placed in or removed from service in Mode 1 without requiring entry into TS 3.3.2, Condition J for up to 4 hours if a trip channel is inoperable. The proposed footnotes are similar to the current footnotes except that the applicability of the notes is expanded to placing into or removing either TDMFW pump from service. The 4-hour delay is consistent with the existing footnotes. As described in Watts Bar UFSAR Section 15.2.8 (ADAMS Accession No. ML20323A316), current Function 6(e) is an anticipatory function and not credited in the accident analyses for AFW actuation. The 4-hour time provision is unchanged and plant safety is not compromised because the safety grade AFW auto-start channels associated with SG low-low levels are operable and remain the credited design basis function. The NRC staff finds this change acceptable because it allows operational flexibility, is consistent with the existing footnotes, and the safety-grade AFW auto-start channels for SG low-low level credited in the safety analyses remain operable.

3.3.6 Proposed Revision of TS Table 3.3.2-1 Footnotes (j) (Unit 1) and (k) (Unit 2)

The NRC staff reviewed the licensee's proposal to remove footnotes (j) for Unit 1 and (k) for Unit 2 from Table 3.3.2-1 because the footnotes will not apply to the TDMFW pumps if the change is approved. The existing footnotes are only applicable in Mode 2 and when one or more TDMFW pump(s) are supplying feedwater to the SGs. If the change is approved, the TDMFW pumps will not be used in Mode 2, and therefore, the footnote is not needed. The SBMWF pump will provide FW to the SGs in this Mode. The proposed AFW auto-start logic will initiate AFW on the trip of both TDMFW pumps and the trip of the SBMFW pump in this Mode. Therefore, with the TDMFW pumps not in service (tripped), in the event that the SBMFW pump trips, the anticipatory AFW auto-start signal would be generated causing all three AFW pumps to start. The NRC staff finds the deletion of the footnotes acceptable because the AFW anticipatory auto-start function remains operable with the SBMFW pump providing feedwater to the SGs in Mode 2. Thus, if the SBMFW pump trips, AFW will initiate to provide feed to the SGs.

3.3.7 Proposed Addition of Condition P to TS 3.3.2

The NRC staff evaluated the proposal to add a Condition P to TS 3.3.2. Condition P requires that the SBMFW pump trip channel be placed in trip when it is inoperable. The Required Action ensures that the AFW System will automatically start if all MFW pumps trip. Required Action P.1 allows 48 hours to place the channel in the trip status. Required Action P.2 allows an additional 6 hours to bring the plant to Mode 3 if Required Action P.1 is not performed. Additionally, the proposed change is consistent with the existing Condition J for the TDMFW pump trip channel. The NRC staff concludes that the new Condition provides requirements that assure that the automatic start of the AFW pumps will occur upon the loss of all MFW pumps. The 48 hour Completion Time is reasonable to allow flexibility during startup, and plant safety is ensured because the SG low-low level AFW auto-start channels are operable as credited in the accident analyses. The AFW auto-start on loss of MFW is not credited in the accident analyses.

The proposed Completion Time of 6 hours to place the unit in Mode 3 without challenging plant systems is reasonable based on operating experience and is consistent with other TS action times associated with entering Mode 3 from Mode 1. Therefore, the NRC staff finds the change acceptable.

3.4 Summary and Technical Conclusion

The NRC staff has determined that the LAR properly identifies the new AFW auto-start logic channel for the SBMFW pump trip and proposes the appropriate applicability, limiting conditions, and SRs to ensure that the auto-start will function if required. These changes will ensure the that the LCO is met, thus ensuring continued compliance with 10 CFR 50.36(c)(2)(i). The existing SRs specify the test requirements for the new logic channel and the new SR ensures that the channel is placed in trip when the SBMFW pump is not being used, thus ensuring compliance with 10 CFR 50.36(c)(3). Additionally, the changes will simplify the operation of the units during startup and shutdown. Because the proposed changes do not affect the ability of the SG low-low level safety channels to perform their safety function to automatically start the AFW system and are consistent with the protection credited in the safety analyses, the NRC staff concludes that the proposed changes are acceptable and that the TSs, as revised, will continue to meet the requirements of 10 CFR 50.36(c)(2)(i) to include LCOs and 10 CFR 50.36(c)(3) to include SRs.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment on April 22, 2021. The State official had no comments.

5.0 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 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 December 1, 2020 (85 FR 77275), 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.

6.0 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 Contributors: R. Karipineni, NRR
C. Cheung, NRR
S. Smith, NRR

Date: September 17, 2021

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT NOS. 148 AND 55 TO REVISE TECHNICAL SPECIFICATIONS FOR FUNCTION 6.E OF TABLE 3.3.2-1, "ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION" (EPID L-2020-LLA-0195) DATED SEPTEMBER 17, 2021

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DATE	4/21/2021	9/3/2021	9/17/2021	9/17/2021

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