



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

March 4, 2009

Mr. Preston D. Swafford  
Chief Nuclear Officer and  
Executive Vice President  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 – ISSUANCE OF AMENDMENT  
REGARDING AUXILIARY FEEDWATER START UPON TRIP OF MAIN  
FEEDWATER PUMPS (TAC NO. MD9713)

Dear Mr. Swafford:

The Commission has issued the enclosed Amendment No. 75 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated September 18, 2008, as supplemented February 11, 2009.

This amendment revises requirements for the auxiliary feedwater system auto-start function associated with the trip of main feedwater pumps.

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

Sincerely,

A handwritten signature in black ink, appearing to read "John G. Lamb".

John G. Lamb, Senior Project Manager  
Watts Bar Special Projects Branch  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 75 to NPF-90  
2. Safety Evaluation

cc: Distribution via 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. 75  
License No. NPF-90

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated September 18, 2008, as supplemented February 11, 2009, 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 Appendices A and B, as revised through Amendment No. 75 , 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 270 days from the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



L. Raghavan, Chief  
Watts Bar Special Projects Branch  
Division of operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Operating License  
And Technical Specifications

Date of Issuance: March 4, 2009

ATTACHMENT TO AMENDMENT NO. 75  
FACILITY OPERATING LICENSE NO. NPF-90  
DOCKET NO. 50-390

Replace Page 3 of Operating License NPF-90 with the attached 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

3.3-28  
3.3-38

Insert Pages

3.3-28  
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. 75 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
<p>I. One Steam Generator Water Level--High High channel inoperable.</p>	<p>I.1 -----NOTE----- One channel may be bypassed for up to 12 hours for surveillance testing. -----</p> <p>Place channel in trip.</p> <p><u>OR</u></p> <p>I.2.1 Be in MODE 3.</p> <p><u>OR</u></p> <p>I.2.2 Be in MODE 4.</p>	<p>72 hours</p> <p>78 hours</p> <p>84 hours</p>
<p>J. One or more Turbine Driven Main Feedwater Pump trip channel(s) inoperable.</p>	<p>J.1 Restore channel(s) to OPERABLE status.</p> <p><u>OR</u></p> <p>J.2 Be in MODE 3.</p>	<p>48 hours</p> <p>54 hours</p>
<p>K. One channel inoperable.</p>	<p>K.1 -----NOTE----- One channel may be bypassed for up to 12 hours for surveillance testing. -----</p> <p>Place channel in bypass.</p> <p><u>OR</u></p>	<p>72 hours</p> <p>(continued)</p>

**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 Turbine Driven Main Feedwater Pumps	1 <sup>(i)</sup> , 2 <sup>(j)</sup>	1 per pump	J	SR 3.3.2.8 SR 3.3.2.9 SR 3.3.2.10	≥ 48 psig	50 psig
f. Auxiliary Feedwater Pumps Train A and B Suction Transfer on Suction Pressure - Low	1, 2, 3	3	F	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 the second Turbine Driven Main Feedwater (TDMFW) Pump in service or removing one of two TDMFW pumps from service.

(j) When one or more Turbine Driven Feedwater Pump(s) are supplying feedwater to steam generators.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 75

TO FACILITY OPERATING LICENSE NO. NPF-90

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

1.0 INTRODUCTION

By letter dated September 18, 2008 (Agencywide Document and Management System Accession No. ML082670543), as supplemented February 11, 2009 (ML090420467), the Tennessee Valley Authority (TVA or the licensee), submitted a request for changes to the Watts Bar Nuclear Plant (WBN), Unit 1, Technical Specifications (TSs). The requested changes would modify 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 auxiliary feedwater (AFW) automatic start on trip of all main feedwater (MFW) pumps. In addition, the proposed change would also revise limiting condition for operation (LCO) 3.3.2, Condition J, to be consistent with WBN Unit 1 design bases.

The proposed change is needed to address a Nuclear Regulatory Commission (NRC)-identified noncompliance with TSs due to a conflict in the Mode 2 applicability and plant design.

The licensee's supplementary submittal dated February 11, 2009, provided clarifying information that did not change the scope of the proposed amendment as described in the original notice of proposed action published in the *Federal Register* and did not change the initial proposed no significant hazards determination.

2.0 REGULATORY EVALUATION

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include TSs as part of the license. The Commission's regulatory requirements related to the content of the TSs are contained in Title 10, *Code of Federal Regulations* (10 CFR), Part 50, Section 50.36, "Technical specifications." The TS requirements in 10 CFR 50.36 include the following categories: (1) safety limits, limiting safety systems settings and control settings, (2) limiting conditions for operation, (3) surveillance requirements, (4) design features, and (5) administrative controls. The requirements for the auto-start of AFW resulting from a MFW pump trip are included in the TSs in accordance with 10 CFR 50.36(c)(2), "Limiting Conditions for Operation."

As stated in 10 CFR 50.59(c)(1)(i), a licensee is required to submit a license amendment pursuant to 10 CFR 50.90 if a change to the TSs is required. Furthermore, the requirements of 10 CFR 50.59 necessitate that the NRC approve the TS changes before the changes are

implemented. TVA's submittal meets the requirements of 10 CFR 50.59(c)(1)(i) and 10 CFR 50.9.

General Design Criterion (GDC) 13 "Instrumentation and Control," of Appendix A "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, among other things, that instrumentation be provided to monitor variables and systems and that controls be provided to maintain these variables and systems within prescribed operating ranges. The proposed operational change continues to provide system monitoring and proper actuation to satisfy the anticipatory trip function. No changes are proposed to the safety-related instrumentation.

GDC 20 through 29, "Protection and Reactivity Control Systems," of Appendix A, "General Design Criteria," to 10 CFR Part 50, provides the expectations for protection systems associated with reactor operation. The proposed change does not alter the ability for the reactor trip functions to actuate. The proposed operational allowance is consistent with the WBN Unit 1 design and analysis and ensures proper actuation to satisfy the anticipatory trip function. Therefore, the recommendations of these GDC continue to be met with the proposed change.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Background

The condensate and feedwater system is designed to supply a sufficient quantity of feedwater to the steam generator (SG) secondary side inlet during normal operating conditions and to guarantee that feedwater will not be delivered to the SGs when feedwater isolation is required. The condensate and feedwater system includes three hotwell pumps, three condensate booster pumps, two turbine-driven (TD) MFW pumps, and one standby motor-driven (MD) MFW pump.

The AFW system supplies, in the event of a loss of the MFW supply, sufficient feedwater to the SGs to remove primary system stored and residual core energy. The AFW system includes two MD pumps and one TD pump.

Each TDMFW pump is equipped with one oil pressure switch located on the turbine's hydraulic control circuit, which makes up one channel of the AFW auto-start circuit. A low pressure signal from this pressure switch indicates a trip of that pump, and a trip of both TDMFW pumps will automatically start the MDAFW pumps and the TDAFW pump.

TS 3.3.2 item 6e required that the AFW automatic start function on the trip of all MFW pumps be operable in Modes 1 and 2. This function allowed AFW flow to the SGs in case the MFW pumps trip during power operation. Neither the plant design nor TSs provides allowance for defeating this start signal during startup and low power operations. However, TVA recognized that operating the TDAFW pump might make reactivity control difficult during startup and low power operations. As a result, TVA had been defeating this AFW automatic start function by resetting the trip circuit on a MFW pump such that the AFW automatic start circuit would have indication that a MFW was running, even though it was not.

In 2006, the NRC issued non-cited violation (NCV) 05000390/2006004-04 for failing to have an operable AFW start signal on loss of all MFW pumps during startup operations. As corrective actions for the NCV, TVA 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.

A Green, NRC-identified non-cited violation of TS 3.0.4.a was identified 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. TVA defeated this channel by introducing a signal that artificially indicated that a MFW pump was operating.

The finding was determined 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 SG level, loss of offsite power, and safety injection were functional. Inspection Reports 2006-004, dated October 27, 2006 (ML063000192), and 2008-003, dated August 7, 2008 (ML082210342), provide more detail on the finding.

The proposed amendment is needed to address the NRC-identified noncompliance with TSs.

For TVA to comply with the current TS for entry into Mode 2, each TDMFW pump would be required to be in a tripped condition. This configuration would result in an auto-start of the MD and TD AFW pumps. The presence of such an automatic AFW system start signal at this point in the plant startup sequence (Mode 3 to Mode 2) is an unnecessary burden on the operators, because the SG demand for feedwater is too low to require operation of all three AFW pumps.

### 3.2 Proposed Change to Function 6.e of Table 3.3.2-1

The proposed change will revise Function 6.e of Table 3.3.2-1 to read: "Trip of all Turbine Driven Main Feedwater Pumps"

This change is necessary to clarify that this trip function is only applicable to the TDMFW pumps and not the standby MFW pump. This change is editorial in nature. It does not alter any TS requirements or operational restrictions and, therefore, does not affect plant safety.

Based on review of the above, the NRC staff finds this editorial change acceptable.

### 3.3 Proposed Change to Mode 2 Applicability for Function 6.e

The proposed change will revise Mode 2 applicability for Function 6.e with the following note: "When one or more Turbine Driven Feedwater Pump(s) are supplying feedwater to steam generators."

Between 2-percent and 4-percent reactor thermal power, the licensee resets a TDMFW pump and places it into service. During the process of placing the first TDMFW pump in service, the anticipatory AFW auto-start channel for the non-operating TDMFW pump is placed in "bypass" (the electrical control circuit is de-energized) by the licensee to prevent inadvertent AFW auto-start during rollup trip testing and overspeed trip testing. Once the operating TDMFW pump has established sufficient feed flow to maintain SG level, the anticipatory AFW auto-start channel for the nonoperating TDMFW pump is placed in the "trip" condition, and the AFW pumps secured. Under these conditions, the AFW auto start circuit will be in a half trip condition (one-out-of-two) in Mode 2 and during the transition from Mode 2 to Mode 1. If the operating TDMFW pump were to trip during this period an AFW auto-start signal would be generated causing all three AFW pumps to start.

Modifying the requirement for auto-start of the AFW pumps to be required only when one or more TDMFW pumps are in service limits the potential for an overcooling transient due to inadvertent AFW actuation. Inadvertent AFW actuation during startup or shutdown would start all three AFW pumps including the TDAFW pump. The steam demand to drive the TDAFW pump at low power could lead to reactivity transients due to overcooling.

Since the AFW pumps are used as the primary means of removing heat from the reactor core in Mode 2, the anticipatory AFW auto-start function serves no useful purpose because the AFW system is already in service. If an AFW pump were to fail during startup or shutdown, the redundant AFW pump(s) would start automatically on low-low SG level, if not already manually initiated by the operator in accordance with the licensee Abnormal Operating Instruction (AOI) 16, "Loss of Normal Feedwater."

Based on a review of the above, the NRC staff concludes that the anticipatory AFW auto-start channels need not be operational until a TDMFW pump is placed in service and finds this change acceptable.

#### 3.4 Proposed Change to Mode 1 Applicability for Function 6.e

The proposed change will revise Mode 1 applicability for Function 6.e with the following note: "Entry into Condition J may be suspended for up to 4 hours when placing the second turbine driven main feedwater (TDMFW) pump in service or removing one of two TDMFW pumps from service."

This provision will allow placing the second TDMFW pump in service or removing one of the two TDMFW pumps from service during Mode 1 operations without the requirement to enter LCO 3.3.2, Condition J, for an inoperable channel. Entering into an LCO Action to place a system into service or remove a system from service is atypical without express allowance in the TS (e.g., the allowance associated with emergency core cooling system and low temperature overpressure protection system). The TS provision to allow suspension of up to 4 hours to routinely place the second TDMFW pump in service or routinely remove one of the two TDMFW pumps from service during Mode 1 operations without the requirement to enter LCO 3.3.2, Condition J, for an inoperable trip channel will resolve NRC Inspection Report 2008-003 concerns and reduce administrative burden on the licensee. In addition, plant safety is not compromised during this short period because the safety-grade AFW auto-start channels (i.e., SG low-low levels) are operable.

Based on a review of the above, the NRC staff finds this change acceptable.

#### 3.5 Proposed Change to LCO 3.3.2, Condition J

The proposed change will revise LCO 3.3.2, Condition J to read: "One or more Turbine Driven Main Feedwater Pump trip channel(s) inoperable."

This provision is proposed to accurately reflect plant design bases. The design basis events, which impose AFW safety function requirements, are loss of normal feedwater, MFW line breaks, main steam line breaks, loss of offsite power (LOOP), and small break loss-of-coolant accidents. These design bases events assume AFW auto-start on either low-low SG level, safety injection or a LOOP signal. These ESFAS signals are Class 1 E, which means that they meet all

requirements for reliable power supplies, separation, redundancy, testability, seismic and environmental qualifications as specified in 10 CFR 50.55a(h)(2), Protection Systems.

Therefore, the NRC staff concludes that the loss of both anticipatory trip channels does not place the plant in an unanalyzed condition since the primary success path for accident mitigation is provided by SG low-low level signals. The NRC staff also concludes that the plant should not be required to enter LCO 3.0.3. Based on a review of the above, the NRC staff finds this change acceptable.

### 3.6 Proposed Change to LCO 3.3.2, Required Action J.1

The proposed change will revise LCO 3.3.2, Required Action J.1 to read: "Restore channel(s) to OPERABLE status."

LCO 3.3.2, Condition J, applies to both anticipatory trip channels. The trip channels are combined using an "AND" logic circuit. Failure of one or both channels results in loss of AFW auto-start function. Therefore, both trip channels must be declared OPERABLE within 48 hours of entering Condition J or be in Mode 3 in accordance with Required Action J.2.

Based on a review of the above, the NRC staff finds the proposed TS change acceptable.

### 3.7 Summary

In summary, the proposed TS change will eliminate the requirement that LCO 3.3.2 Function 6.e be met in Mode 2 when the TDMFW pumps are not running and will allow one anticipatory AFW auto-start channel to be inoperable for a limited period in Mode 1 when placing the second TDMFW in or out of service. In the unlikely event that an AFW pump trips during plant startup or shutdown (i.e., Mode 2), the redundant AFW pumps would start automatically on low-low SG level, if not already manually initiated by the operator in accordance with the licensee AOI-16, "Loss of Normal Feedwater."

The NRC staff finds the proposed TS changes acceptable.

## 4.0 STATE CONSULTATION

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

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves 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 has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding 73 FR 65698, dated November 4, 2008. Accordingly, the amendment meets 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 amendment.

## 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) 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: A. Lewin  
G. Armstrong  
J. Lamb

Date: March 4, 2009

March 4, 2009

Mr. Preston D. Swafford  
Chief Nuclear Officer and  
Executive Vice President  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 — ISSUANCE OF AMENDMENT  
REGARDING AUXILIARY FEEDWATER START UPON TRIP OF MAIN  
FEEDWATER PUMPS (TAC NO. MD9713)

Dear Mr. Swafford:

The Commission has issued the enclosed Amendment No. 75 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated September 18, 2008, as supplemented February 11, 2009.

This amendment revises requirements for the auxiliary feedwater system auto-start function associated with the trip of main feedwater pumps.

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

Sincerely,

**/RA/**

John G. Lamb, Senior Project Manager  
Watts Bar Special Projects Branch  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 75 to NPF-90  
2. Safety Evaluation

cc: Distribution via Listserv

DISTRIBUTION: via ListServ

ADAMS Accession Number: ML090480566

OFFICE	WBSPB/PM	WBSPB/LA	SBPB/BC	ITSB/BC	OGC	WBSPB/BC
NAME	JLamb	BClayton	DHarrison	RElliott	DRoth	LRaghavan
DATE	02/13/09	03/04/09	02/19/09	02/07/09	02/27/09	03/04/09

**OFFICIAL RECORD COPY**