

January 23, 2002

Mr. J. A. Scalice  
Chief Nuclear Officer and  
Executive Vice President  
Tennessee Valley Authority  
6A Lookout Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - ISSUANCE OF AMENDMENT  
REGARDING INCREASE OF THE TIME DELAY SETTING OF 6.9 KV  
EMERGENCY BUS DEGRADED VOLTAGE FUNCTION FROM 6 TO 10  
SECONDS (TAC NO. MB1954)

Dear Mr. Scalice:

The Commission has issued the enclosed Amendment No. 36 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated May 14, 2001. The amendment revises Technical Specification Section 3.3.5 "Loss of Power (LOP) Diesel Generator Start Instrumentation," to increase the time delay setting of the 6.9 kV shutdown board degraded voltage relays from a nominal 6 seconds to 10 seconds. This change will provide the plant with operating margin by allowing additional time for the class 1E Auxiliary Power System to react to projected voltage transients on the offsite grid.

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 by J.M.Goshen Acting for/**

L. Mark Padovan, Project Manager, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 36 to NPF-90  
2. Safety Evaluation

cc w/enclosures: See next page

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 36  
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 May 14, 2001, 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. 36, 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 startup following the Cycle 4 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA/**

Richard P. Correia, Chief, Section 2  
Project Directorate II  
Division of Project Licensing Management  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: January 23, 2002

ATTACHMENT TO AMENDMENT NO. 36  
FACILITY OPERATING LICENSE NO. NPF-90  
DOCKET NO. 50-390

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 areas of change.

Remove Page

3.3-51

B 3.3-147

Insert Page

3.3-51

B 3.3-147

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 36 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 May 14, 2001, Tennessee Valley Authority (the licensee) proposed to revise the Unit 1 Technical Specification (TS) Section 3.3.5, "Loss of Power (LOP) Diesel Generator Start Instrumentation," to increase the time delay setting of the 6.9 kV shutdown board degraded voltage relays from a nominal 6 seconds to 10 seconds. This change will provide the plant with operating margin by allowing additional time for the Class 1E Auxiliary Power System to react to projected voltage transients on the offsite grid. This change will provide the plant increased operating margin by allowing additional time for the automatic load tap changers on the common station service transformers (CSST) 'C' and 'D' to compensate for future projected voltage transients on the 161 kV off-site power grid.

**2.0 BACKGROUND**

The ac electrical power sources at Watts Bar Nuclear Plant, Unit 1 (WBN), are designed to ensure the availability of necessary power to engineered safety features systems so that the fuel, reactor coolant system, and containment design limits are not exceeded. The onsite Class 1E ac distribution system supplies electrical power to four power trains with each train powered by an independent Class 1E 6.9 kV shutdown board. Each 6.9 kV shutdown board has two separate and independent offsite sources of power as well as a dedicated onsite emergency diesel generator (EDG) source. The EDGs provide a source of emergency power when offsite power is either unavailable or insufficiently stable to allow safe unit operation. Undervoltage protection generates an LOP EDG start if a loss of voltage or degraded voltage condition occurs on the 161 kV offsite power grid. There are four LOP start signals, one for each 6.9 kV shutdown board.

Offsite power is supplied to the Watts Bar 161 kV transformer yard by two dedicated lines from the Watts Bar Hydro Plant switchyard. From the 161 kV transformer yard, two electrically and physically separated circuits provide ac power, through CSSTs 'C' and 'D' to the 6.9 kV shutdown boards. In order for the offsite power system to meet the requirements identified in General Design Criterion (GDC)-17, the Class 1E auxiliary power system must be able to supply all required safety-related loads (including motor starting) for a worst case design basis

ENCLOSURE

event without transferring to the EDGs. The four Class 1E 6.9 kV shutdown boards are each provided with one set of degraded voltage relays to protect class 1E loads. The degraded voltage relays have a voltage setpoint of 96% of 6900 V (nominal) and are arranged in a two-out-of-three coincidence logic to initiate a nominal time delay. This arrangement provides time for the load tap changers (LTCs) on CSSTs 'C' and 'D' to recover the degraded voltage condition at the 6.9 kV shutdown boards back to an acceptable level resetting the degraded voltage relays. The CSST LTCs maintain the nominal steady state 6.9 kV shutdown board voltage between 7010 and 7132 V for variation in board loading and grid voltage. The present time delay value is 6 seconds (nominal). If a degraded voltage condition still exists at the end of 6 seconds, an alarm will be annunciated in the control room, a trip of the respective 6.9 kV shutdown board supply breaker will occur, loads will be shed, and a diesel generator start will be initiated.

### 3.0 EVALUATION

The proposed license amendment would revise the TS, Section 3.3.5, "Loss of Power (LOP) Diesel Generator Start Instrumentation," to reflect a design change for the time delay setting of the 6.9 kV shutdown board degraded voltage relays from a nominal 6 seconds to 10 seconds. Specifically, the Trip Setpoint and Allowable Value for Table 3.3.5-1, Function 2(b), "6.9 kV Emergency Bus Undervoltage (Degraded Voltage) - Time Delay," would be revised as follows:

The current Trip Setpoint:  $\geq 5.84$  sec and  $\leq 6.16$  sec,  
would be revised to:  $\geq 9.73$  sec and  $\leq 10.27$  sec.

The current Allowable Value:<sup>3</sup>  $\geq 5.7$  sec and  $\leq 6.3$  sec,  
would be revised to:  $\geq 9.42$  sec and  $\leq 10.49$  sec.

The current site criteria assume that the 161 kV offsite grid source shall not have a change in voltage of more than 6 kV and shall not drop below 153 kV during mitigation of a design basis event (DBE). The revised criteria assume the minimum normal operating voltage is 164 kV, and a subsequent change in grid voltage at DBE initiation that results in a minimum post-event grid voltage of 153 kV. The LTCs will continue to maintain the steady state 6.9 kV shutdown board voltage between 7010 and 7132 V.

The design modification would change the setpoint of the degraded voltage relay timers from a nominal 6 seconds to 10 seconds to relax the offsite power criteria. The primary purpose of this change is to provide the plant additional operating margin by allowing additional time for the automatic LTCs on the CSSTs 'C' and 'D' to compensate for postulated degraded voltage conditions on the 161 kV off-site power grid.

Recent analysis of the offsite grid indicates that due to future grid loading projections (within about 2 years), voltage fluctuations on the grid could unnecessarily challenge the EDGs and associated equipment if the current time delay settings are maintained. The longer time delay setpoint would relax the present offsite power criteria by allowing a more severe worst case degraded voltage condition on the 161 kV grid to be accommodated by the CSST 'C' and 'D' LTCs. This extended time delay would eliminate an unnecessary electrical transient associated with the automatic transfer from the preferred offsite power supply to the EDGs when a degraded voltage condition of less than 10 seconds is experienced. Consequently, challenges to

equipment associated with the actuation of breakers, shedding of loads, starting of the EDGs, etc., would also be reduced or eliminated.

The analysis was performed using the Electrical Transient Analyzer Program. The software includes the capability to analyze the electrical auxiliary power system for loading, short-circuit currents, running voltages, and starting voltages. The calculations demonstrated the ability of the offsite power system to start and operate all required loads for a worst case DBE without transferring to the EDGs. Increasing the delay time from 6 to 10 seconds will not change the voltage recovery profile. The lower boundary dropout and the upper reset setpoint of the degraded voltage relays remains unchanged. Analyses have shown that operating equipment, such as motors, would not be damaged and would accelerate back to rated speed, thus ensuring their continued availability to perform their intended safety function. Specifically, the analysis demonstrated that the required safety-related equipment in operation at the time a degraded voltage condition occurred would continue to operate throughout the 10-second delay. If the degraded voltage condition cleared during this time period, the voltage would return to nominal levels and be available for equipment required to perform safety functions. Calculations demonstrated that the automatic LTCs remain capable of regulating the 6.9 kV shutdown board voltage within the present voltage relay setpoints. The LTCs will restore 6.9 kV shutdown board voltage for a safety injection signal with a simultaneous worst case grid drop before the degraded voltage relays actuate to transfer power supply to the EDGs. Engineered safeguard motors will have sufficient voltage available at the terminals to ensure proper starting and operation, when supplied by offsite power. Maximum loading on transformers, distribution system cables, and 6900 V and 480 V boards is bounded by current analyses and remains below component ratings. If the degraded condition still existed at the end of the 10-second time period, transfer to the EDGs would occur and the voltage would recover to an acceptable level. In either case, acceptable voltage levels would be available for equipment to respond in a timely manner if called upon to perform a safety function.

#### 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 a requirement 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 (66 FR 38767). 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 Nuclear Regulatory Commission staff has reviewed the information in the license amendment request and concluded that the additional time proposed would allow for the automatic load tap changers on the station service transformer 'C' and 'D' to compensate for the postulated degraded voltage conditions on the 161 kV offsite power grid. This will prevent unnecessary challenges to the emergency diesel generators due to spurious relay actuations which result in automatic transfer from the preferred offsite power supply to the emergency standby diesel generators when a degraded voltage condition of less than 10 seconds is experienced. The staff has reviewed the licensee's analysis and the analysis shows that the additional time delay does not introduce any new constraints that would prevent safety equipment from performing its designed function. Based on this, the proposed change is acceptable.

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.

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Date: January 23, 2002

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**WATTS BAR NUCLEAR PLANT**

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