

March 21, 2000

*Complete NRR-058*

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 ICE CONDENSER ICE SAMPLING SURVEILLANCE  
REQUIREMENTS (TAC NO. MA7211)

Dear Mr. Scalice:

The Commission has issued the enclosed Amendment No. 22 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated November 15, 1999. The amendment revises the Technical Specifications (TS) and associated Bases to change the methodology and frequency for sampling the ice condenser ice bed (stored ice) and adds a new TS and associated bases to address sampling requirements for all ice additions to the ice bed.

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/

Robert E. Martin, Senior 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. 22 to NPF-90  
2. Safety Evaluation



cc w/enclosures: See next page

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

March 21, 2000

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Sincerely,

A handwritten signature in cursive script that reads "Robert Martin".

Robert E. Martin, Senior Project Manager, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-390

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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. 22  
License No. NPF-90

1. The Nuclear Regulator Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 15, 1999, 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 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. 22 , 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, to be implemented prior to startup following the Unit 1 Cycle 3 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION



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: **March 21, 2000**



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

ATTACHMENT TO AMENDMENT NO. 22

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 area of change.

Remove Pages

3.6 - 30  
B 3.6 - 72  
B 3.6 - 73

Insert Pages

3.6 - 30  
B 3.6 - 72  
B 3.6 - 73

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.6.11.5 -----NOTE-----                      The requirements of this SR are satisfied if the boron concentration and pH values obtained from averaging the individual sample results are within the limits specified below.                      -----</p> <p>Verify, by chemical analysis of the stored ice in at least one randomly selected ice basket from each ice condenser bay, that ice bed:</p> <p>a. Boron concentration is <math>\geq 1800</math> ppm and <math>\leq 2000</math> ppm; and</p> <p>b. pH is <math>\geq 9.0</math> and <math>\leq 9.5</math>.</p>	<p>54 months</p>
<p>SR 3.6.11.6 Visually inspect, for detrimental structural wear, cracks, corrosion, or other damage, two ice baskets from each azimuthal group of bays. See SR 3.6.11.3.</p>	<p>40 months</p>
<p>SR 3.6.11.7 -----NOTE-----                      The chemical analysis may be performed on either the liquid solution or on the resulting ice.                      -----</p> <p>Verify, by chemical analysis, that ice added to the ice condenser meets the boron concentration and pH requirements of SR 3.6.11.5.</p>	<p>Each ice addition</p>

## BASES

SURVEILLANCE  
REQUIREMENTSSR 3.6.11.4 (continued)

ice/frost removal. These requirements are based on the sensitivity of the partial blockage analysis to additional blockage. The Frequency of 9 months was based on ice storage tests and the allowance built into the required ice mass over and above the mass assumed in the safety analyses.

SR 3.6.11.5

Verifying the chemical composition of the stored ice ensures that the stored ice has a boron concentration of  $\geq 1800$  ppm and  $\leq 2000$  ppm as sodium tetraborate and a high pH,  $\geq 9.0$  and  $\leq 9.5$ , in order to meet the requirement for borated water when the melted ice is used in the ECCS recirculation mode of operation. Additionally, the minimum boron concentration setpoint is used to assure reactor subcriticality in a post LOCA environment, while the maximum boron concentration is used as the bounding value in the hot leg switchover timing calculation (Ref. 3). This is accomplished by obtaining at least 24 ice samples. Each sample is taken approximately one foot from the top of the ice of each randomly selected ice basket in each ice condenser bay. The SR is modified by a NOTE that allows the boron concentration and pH value obtained from averaging the individual samples' analysis results to satisfy the requirements of the SR. If either the average boron concentration or the average pH value is outside their prescribed limit, then entry into ACTION Condition A is required. Sodium tetraborate has been proven effective in maintaining the boron content for long storage periods, and it also enhances the ability of the solution to remove and retain fission product iodine. The high pH is required to enhance the effectiveness of the ice and the melted ice in removing iodine from the containment atmosphere. This pH range also minimizes the occurrence of chloride and caustic stress corrosion on mechanical systems and components exposed to ECCS and Containment Spray System fluids in the recirculation mode of operation. The Frequency of 54 months is intended to be consistent with the expected length of three fuel cycles, and was developed considering these facts:

- a. Long term ice storage tests have determined that the chemical composition of the stored ice is extremely stable;
- b. There are no normal operating mechanisms that decrease the boron concentration of the stored ice, and pH remains within a 9.0-9.5 range when boron concentrations are above approximately 1200 ppm.

(continued)

BASES

SURVEILLANCE  
REQUIREMENTS

SR 3.6.11.5 (continued)

- c. Operating experience has demonstrated that meeting the boron concentration and pH requirements has never been a problem; and
- d. Someone would have to enter the containment to take the sample, and, if the unit is at power, that person would receive a radiation dose.

SR 3.6.11.6

This SR ensures that a representative sampling of ice baskets, which are relatively thin walled, perforated cylinders, have not been degraded by wear, cracks, corrosion, or other damage. Each ice basket must be raised at least 10 feet for this inspection. However, for baskets where vertical lifting height is restricted due to overhead obstruction, a camera shall be used to perform the inspection. The Frequency of 40 months for a visual inspection of the structural soundness of the ice baskets is based on engineering judgment and considers such factors as the thickness of the basket walls relative to corrosion rates expected in their service environment and the results of the long term ice storage testing.

SR 3.6.11.7

This SR ensures that initial ice fill and any subsequent ice additions meet the boron concentration and pH requirements of SR 3.6.11.5. The SR is modified by a NOTE that allows the chemical analysis to be performed on either the liquid or resulting ice of each sodium tetraborate solution prepared. If ice is obtained from offsite sources, then chemical analysis data must be obtained for the ice supplied.

REFERENCES

1. Watts Bar FSAR, Section 6.2, "Containment Systems"
2. Title 10, Code of Federal Regulations, Part 50, Appendix K, "ECCS Evaluation Models"
3. Westinghouse Letter, WAT-D-10686, "Upper Limit Ice Boron Concentration In Safety Analysis"

(continued)



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 22 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 November 15, 1999, the Tennessee Valley Authority (TVA, the licensee) submitted a request for changes to the Watts Bar Nuclear Plant, Unit 1, Technical Specifications (TS). The requested changes revise the TS Surveillance Requirement (SR) 3.6.11.5 to change the methodology and frequency for sampling the ice condenser ice bed boron concentration and pH, and add a new TS SR 3.6.11.7 to address sampling requirements for each ice addition to the ice condenser.

2.0 EVALUATION

TVA's application is one of the products of an initiative between the U. S. Nuclear Regulatory Commission (NRC) staff and the Ice Condenser Mini Group (ICMG). The ICMG also interfaces in a parallel manner with the NRC staff through the Nuclear Energy Institute's (NEI) program for addressing proposed changes to the Standard Technical Specifications (STS). The need for consideration of changes to the TS for ice condenser containment (ICC) plants was addressed in the letter from William Beckner, NRC, to James Davis, NEI, dated October 2, 1998, as follows:

Over the past several weeks, a number of issues have been raised relative to licensee compliance with the technical specifications (TS). These TS involve ice condenser plants with TS similar to the Westinghouse Improved Standard Technical Specifications (ISTS) 3.6.15 "Ice Bed". These issues involved several different surveillances in this section and have highlighted problems literally complying with the TS, ambiguities in the requirements .....

SR 3.6.15.5 is a similar surveillance requirement to check that the boron concentration in the ice and pH are adequate. Unlike SR 3.6.15.2, the requirement does not seem to necessarily imply that each basket must meet the appropriate limits, but then neither is there a requirement to calculate the total or average concentration. Licensees have focused on ensuring that the average of all samples meets the limits by melting and

ENCLOSURE

mixing samples in the past. More recently, individual samples have been analyzed separately and have resulted in some samples falling below the limit. It is not clear if an individual sample falling below the limit would result in failure of the surveillance or if the total or average values may be calculated in a manner used in the weight surveillance.

The current Watts Bar TS SR 3.6.11.5 requires that every 18 months, ice in the ice bed be verified to have a boron concentration of greater than or equal to 1800 ppm and a pH between 9.0 and 9.5 as determined by nine ice samples. TVA's application includes the following changes to TS 3.6.11.5 for sampling of ice residing in the ice bed:

- The number of samples is increased from nine to 24 by requiring one sample from each of the 24 ice condenser bays.
- The interval for the surveillance is increased from once per 18 months to once per 54 months.
- A note is added to the effect that the results of the SR will be based on the average of the 24 individual samples.
- A boron concentration upper limit of 2000 ppm is added to reflect the value required for the post loss-of-coolant hot leg switchover timing calculation.

In addition a new TS 3.6.11.7 is added with the following changes applicable to each addition of ice:

- For each ice addition, the ice must meet the boron concentration and pH requirements of SR 3.6.11.5, and
- The chemical analysis of the boron concentration and pH may be performed on either the liquid solution or the resulting ice.

The staff notes that the product of the increased number of samples and the longer surveillance interval for sampling of ice in the ice bed results in approximately the same level of sampling as was previously the case over a 54-month interval. TVA has also stated, and has included in the Bases, that there are no normal operating mechanisms that decrease the boron concentration of the stored ice, and pH remains within a 9.0 to 9.5 range when boron concentrations are above approximately 1200 ppm. The Bases continue to retain the stipulation that if either the average boron concentration or average pH value is outside the prescribed limit, then entry into ACTION Condition A is required.

The addition of the Note in SR 3.6.11.5 indicating that the SR is satisfied based on the averages of the boron concentration and pH provides clarification that, as TVA states, the sample results should be "consistent with the accident analysis assumption that the bulk containment sump pH and boron concentration will not be altered from their accident analysis assumed values following complete ice melt." This clarifies the staff's previously discussed concern regarding the use of average concentrations.

The provision of the additional SR 3.6.11.7 provides further assurance that the boron concentration and pH of ice that may be added to the ice bed as often as each refueling outage will be controlled within the limit values.

The staff has found that the licensee's proposed changes, as discussed above, provide the needed clarifications addressed in William Beckner's letter of October 2, 1998. These changes should ensure a clearer and more consistent interpretation and implementation of the TS related to boron concentration and pH. Therefore the staff finds these changes to be acceptable.

### 3.0 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.

### 4.0 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 Title 10, Code of Federal Regulations (10 CFR) Part 20 and changes surveillance requirements. 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 (64 FR 70092, dated December 15, 1999). 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.

### 5.0 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.

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Date: **March 21, 2000**

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