

May 5, 2006

Mr. Karl W. Singer
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 THE CHANGE IN THE STEAM GENERATOR NARROW RANGE
LEVEL REQUIREMENTS TO ACCOMMODATE THE REPLACEMENT STEAM
GENERATORS AT WATTS BAR NUCLEAR PLANT, UNIT 1 (TAC NO. MC9235)

Dear Mr. Singer:

The Commission has issued the enclosed Amendment No. 61 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant (WBN), Unit 1. This amendment is in response to your application dated December 13, 2005 (WB-TS-05-06).

The amendment authorizes modification to the Technical Specifications for WBN, Unit 1 to include a change in the steam generator (SG) level requirement for Limiting Condition for Operation 3.4.7.b and Surveillance Requirements 3.4.5.2, 3.4.6.3 and 3.4.7.2 from greater than or equal to (\$) 6 percent (%) to \$ 32% following replacement of the SGs during the Unit 1, Cycle 7 refueling outage, which is currently scheduled to begin in the fall of 2006.

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/

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures:

1. Amendment No. 61 to NPF-90
2. Safety Evaluation

cc w/enclosures: See next page

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Tennessee Valley Authority

WATTS BAR NUCLEAR PLANT

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 61
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 December 13, 2005, 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. 61, 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 entering Mode 5 upon restart from the Unit 1 Cycle 7 (U1C7) Refueling Outage.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Michael L. Marshall, Jr., Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: May 5, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 61

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace the following pages of the Appendix A Technical Specifications with the attached pages.

REMOVE

3.4-10
3.4-13
3.4-14
3.4-15

INSERT

3.4-10
3.4-13
3.4-14
3.4-15

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 61 TO FACILITY OPERATING LICENSE NO. NPF-90

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

1.0 INTRODUCTION

By application dated December 13, 2005 (Agencywide Documents Access Management System accession number, ML053530127), Tennessee Valley Authority (the licensee) requested changes to the Technical Specifications (TSs) of the license of Watts Bar Nuclear Plant (WBN) Unit 1. Notice of this amendment request was given through the *Federal Register* on February 14, 2006 (71 FR 7814).

The requested changes provide a revision to the WBN TSs to revise the steam generator (SG) level requirement for Limiting Condition for Operation (LCO) 3.4.7.b and Surveillance Requirements (SRs) 3.4.5.2, 3.4.6.3 and 3.4.7.2 from greater than or equal to (\$) 6 percent (%) to \$ 32% following replacement of the SGs during the Unit 1, Cycle 7 refueling outage.

During the Unit 1 Cycle 7 refueling outage, the existing WBN Unit 1 Westinghouse Model D3 SGs will be replaced with Westinghouse Model 68AXP SGs. The external envelope and interfaces with existing piping and support structures for the replacement SGs (RSGs) are similar to the old (existing) Steam Generators (OSGs), except that the elevation of several RSG flow and level instrument taps (upper taps and lower narrow range taps) will increase by approximately 5 feet. The span between the upper taps and lower narrow range taps will remain approximately the same. Internally the RSGs differ from the OSGs in several ways, including increased tube surface area, different tube material, different tube supports, and longer tube length. The tube length increases from just below the lower narrow range taps in the OSGs to more than 4 feet above the lower narrow range taps in the RSGs.

To support use of the RSGs, the licensee has performed numerous analyses and evaluations to determine the impact of the RSG differences. A calculation performed by Westinghouse to determine the RSG narrow range level instrument uncertainties for Emergency Operating Procedure setpoint applications identified the need to revise the TSs to increase the required percentage of SG narrow range level from 6% to 32% to ensure that the top of the tubes are covered. This change accounts for the change in relative location of the top of the tubes versus the lower narrow range taps and the narrow range water level instrument uncertainty.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) establishes the fundamental regulatory requirements with respect to the operability of SGs, which are required for heat transfer. Specifically, the General Design Criteria (GDC) in Appendix A to 10 CFR Part 50 state that “a system to transfer heat from structures, systems, and components important to safety, to an ultimate heat sink” (GDC 44), and “to remove residual heat shall be provided” (GDC 34). Furthermore, it “shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences” (GDC 10).

To assure SG operability, “instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions” (GDC 13). The SG narrow range level indicator is an input to the reactor protection system, which “shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety” (GDC 20). Furthermore, “the protection system shall assure that specified acceptable fuel design limits are not exceeded for any single malfunction of the reactivity control systems, such as accidental withdrawal (not ejection or dropout) of control rods” (GDC 25).

The LCOs are the lowest functional capability or performance levels of equipment required for safe operation. If the SG level were to drop below the required percentage of the narrow range SG level, the SG would not be operable and would not be able to provide certain safety functions. Therefore, the SG narrow range level is included as an LCO in the plant’s TSs that are regulated under 10 CFR 50.36(c)(2) *Limiting conditions for operation*. To ensure that the LCOs will be met, the SG level is subject to surveillance and meets the requirements of 10 CFR 50.36(c)(3) *Surveillance requirements*.

3.0 TECHNICAL EVALUATION

The function of the SGs is to transfer heat produced by the fission process in the reactor core to the secondary side of the plant. To assure that the SGs are able to perform this function, the water level on the secondary side of the SG is to be maintained above the tops of SG tubes whenever the SG is required to be operable. The operability of the SGs is determined by the narrow range SG level indicator, which provides input to the reactor protection system.

The basic function of the reactor protection circuits associated with the low SG water level is to preserve the SG heat sink for removal of long term residual heat. This is of particular importance during Modes 3, 4, and 5 to mitigate the consequences of an inadvertent rod withdrawal from subcritical, ejection of a control rod, or an accidental boron dilution.

WBN will be replacing their SGs during the Cycle 7 refueling outage. The RSGs differ from the OSGs in that the RSG tubes are longer and the elevation of several RSG flow and level instrument taps (upper taps and lower narrow range taps) will increase by approximately 5 feet. The tube length increases from just below the lower narrow range taps in the OSGs to more than 4 feet above the lower narrow range taps in the RSGs, and therefore WBN proposes changing the required percentage of the narrow range SG level. This will ensure that the RSG

level will be maintained above the top of the RSG tubes, which will demonstrate RSG operability.

3.1 Proposed Changes

The proposed amendment would revise the WBN, Unit 1 TS 3.4.5, *RCS Loops - MODE 3*, TS 3.4.6, *RCS Loops -MODE 4*, and TS 3.4.7, *RCS Loops - MODE 5, Loops Filled*, to change the SG level requirement for LCO 3.4.7.b and SRs 3.4.5.2, 3.4.6.3, and 3.4.7.2 from 6% to 32% following replacement of the SGs.

In addition, symbols (i.e., \$, <, etc.) on affected pages are being spelled out as an administrative change. Revision bars are not shown for these changes.

The TS changes affect the following sections:

Section 3.4.5, *RCS Loops - MODE 3* - Revise SR 3.4.5.2 to read: "Verify steam generator secondary side water levels are greater than or equal to 32% narrow range for required RCS loops."

Section 3.4.6, *RCS Loops - MODE 4* - Revise SR 3.4.6.3 to read: "Verify SG secondary side water levels are greater than or equal to 32% narrow range for required RCS loops."

Section 3.4.7, *RCS Loops- MODE 5, Loops Filled* - Revise LCO 3.4.7.b to read: "The secondary side water level of at least two steam generators (SGs) shall be greater than or equal to 32% narrow range."

Section 3.4.7 - Revise SR 3.4.7.2 to read: "Verify SG secondary side water level is greater than or equal to 32% narrow range for required SGs."

In summary, the above changes revise the value of the secondary side narrow range water level from 6% for the OSGs to 32% for the RSGs. This change will assure that the secondary side water level in the RSGs is high enough to cover the tubes.

3.2 Technical Justification of Proposed TS Changes

The proposed TS changes address the SG narrow range level requirements during Modes 3, 4, and 5. For SG operability, the top of the SG tubes must be covered. Since the tubes are longer in the RSGs than the OSGs, the level tap elevations are greater in the RSGs than the OSGs, and the elevation of the top of the SG tubes relative to the level taps is greater for the RSGs than the OSGs, the required percentage of the SG narrow range level would need to be revised so that the top of the RSG tubes remain covered.

The licensee performed a series of calculations and analyses to determine the appropriate required percentage of the SG narrow range level for the RSGs. The SG narrow range level instrumentation uses the differential pressure between the vessel and the reference leg to determine level. This type of instrumentation is subject to errors due to density changes in the vessel contents or the reference leg. The two main sources of error are 1) pressure and temperature changes in the vessel resulting in a change in the differential pressure across the vessel and 2) a temperature change in the environment around the reference leg.

To determine the required narrow range level for the RSGs (including instrument uncertainties), the process pressure uncertainty, reference leg temperature uncertainty, and narrow range level channel uncertainty were added to the minimum narrow range level without uncertainties. The result was rounded up to 32% to define an easily readable value on the indicator and add some additional conservatism.

This value accounts for the change in relative location of the top of the tubes versus the lower narrow range taps and the narrow range water level instrument uncertainty. The change in the required percentage of the SG narrow range level from 6% to 32% accounts for the differences in SG design between the OSGs and RSGs and ensures the operability of the RSGs for the Mode 3, 4, and 5 accidents and transients that rely upon SG operability. The new value will be used in the same manner as the old one to assess SG operability.

The proposed change in the required percentage of the SG narrow range level from 6% to 32% ensures that the RSGs are operable and available to act as a heat sink for both normal operations and anticipated operational occurrences. Furthermore, the same acceptance criteria is being used for the RSGs as was used for the OSGs, so that there is no reduction in the margin of safety. This change does not affect whether the instrumentation used to monitor SG level will be available, nor does it affect the transmission of the level signal to the reactor protection circuitry. Therefore, this change does not affect the ability of the protection system to mitigate accident and transient consequences.

The proposed TS changes meet the requirements of the applicable GDCs in Appendix A to 10 CFR Part 50. In addition, since the new minimal required percentage of the SG narrow range level will be used in the same manner as the old one, it is necessary to include the new value in the LCO and SR sections of the TSs, which are regulated under 10 CFR 50.36. For these reasons, the staff finds the aforementioned 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 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 surveillance requirements. The NRC staff has determined that the amendment 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 has previously issued a proposed finding that the amendment involve no significant hazards consideration, and there has been no public comment on such finding (71 FR 7814). Accordingly, the amendment 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 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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Samantha Crane

Date: May 5, 3006