



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

October 17, 2017

Mr. J. W. Shea
Vice President, Nuclear Regulatory Affairs
and Support Services
Tennessee Valley Authority
1101 Market Street, LP 3R-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 – ISSUANCE OF
AMENDMENTS REGARDING AUXILIARY BUILDING GAS TREATMENT
SYSTEM (CAC NOS. MF8526 AND MF8527)

Dear Mr. Shea:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 116 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1, and Amendment No. 16 to Facility Operating License No. NPF-96 for Watts Bar, Unit 2. These amendments are in response to your application dated October 20, 2016, as supplemented by letters dated May 5, 2017, and July 21, 2017.

These amendments revise Technical Specification 3.7.12, "Auxiliary Building Gas Treatment System (ABGTS)," to provide an action when both trains of the ABGTS are inoperable due to the auxiliary building secondary containment enclosure boundary being inoperable.

A copy of the related 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 "Robert G. Schaaf".

Robert G. Schaaf, 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. 116 to NPF-90
2. Amendment No. 16 to NPF-96
3. Safety Evaluation

cc w/enclosures: 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. 116
License No. NPF-90

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (TVA, the licensee) dated October 20, 2016, as supplemented by letters dated May 5 and July 21, 2017, 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. 116 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 60 days from the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Undine Shoop, 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: October 17, 2017

ATTACHMENT TO AMENDMENT NO. 116

WATTS BAR NUCLEAR PLANT, UNIT 1

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace page 3 of 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 marginal lines indicating the areas of change.

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- (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. 116 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.

3.7 PLANT SYSTEMS

3.7.12 Auxiliary Building Gas Treatment System (ABGTS)

LCO 3.7.12 Two ABGTS trains shall be OPERABLE.

----- NOTE -----

The Auxiliary Building Secondary Containment Enclosure (ABSCE) boundary may be opened intermittently under administrative controls that ensure the ABSCE can be closed consistent with the safety analysis.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION		REQUIRED ACTION	COMPLETION TIME
A.	One ABGTS train inoperable.	A.1 Restore ABGTS train to OPERABLE status.	7 days
B.	Two ABGTS trains inoperable due to inoperable ABSCE boundary.	B.1 Initiate actions to implement mitigating actions.	Immediately
		<u>AND</u>	
		B.2 Verify mitigating actions ensure main control room occupants do not exceed 10 CFR 50 Appendix A GDC 19 limits.	24 hours
		<u>AND</u>	
		B.3 Restore ABSCE boundary to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>C. Required Action and associated Completion Time of Condition A or B not met.</p> <p><u>OR</u></p> <p>Two ABGTS trains inoperable for reasons other than Condition B.</p>	<p>C.1 Be in MODE 3.</p> <p><u>AND</u></p> <p>C.2 Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>



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. 16
License No. NPF-96

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (TVA, the licensee) dated October 20, 2016, as supplemented by letters dated May 5 and July 21, 2017, 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. 16 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 60 days from the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Undine Shoop, 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: October 17, 2017

ATTACHMENT TO AMENDMENT NO. 16
WATTS BAR NUCLEAR PLANT, UNIT 2
FACILITY OPERATING LICENSE NO. NPF-96
DOCKET NO. 50-391

Replace page 3 of 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 and insert the attached new page(s). The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

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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 3411 megawatts thermal.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 16 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 for Cycles 1 and 2 only. PAD4TCD may not be used to establish core operating limits for subsequent reload cycles.

(5) By December 31, 2017, 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:

3.7 PLANT SYSTEMS

3.7.12 Auxiliary Building Gas Treatment System (ABGTS)

LCO 3.7.12 Two ABGTS trains shall be OPERABLE

----- NOTE -----
The Auxiliary Building Secondary Containment Enclosure (ABSCE) boundary may be opened intermittently under administrative controls that ensure the ABSCE can be closed consistent with the safety analysis.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One ABGTS train inoperable	A.1 Restore ABGTS train to OPERABLE status.	7 days
B. Two ABGTS trains inoperable due to inoperable ABSCE boundary.	B.1 Initiate actions to implement mitigating actions.	Immediately
	<u>AND</u>	
	B.2 Verify mitigating actions ensure main control room occupants do not exceed 10 CFR 50 Appendix A GDC 19 limits.	24 hours
	<u>AND</u>	
	B.3 Restore ABSCE boundary to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>C. Required Action and associated Completion Time of Condition A or B not met.</p> <p><u>OR</u></p> <p>Two ABGTS trains inoperable for reasons other than Condition B.</p>	<p>C.1 Be in MODE 3.</p> <p><u>AND</u></p> <p>C.2 Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 116 AND 16

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 application dated October 20, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16294A551), as supplemented by letters dated May 5, 2017, and July 21, 2017 (ADAMS Accession Nos. ML17125A244 and ML17205A322, respectively), the Tennessee Valley Authority (TVA, the licensee) requested changes to the Technical Specifications (TSs) for Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2. The requested changes would revise Watts Bar TS 3.7.12, "Auxiliary Building Gas Treatment System (ABGTS)," to provide an action when both trains of the ABGTS are inoperable due to the auxiliary building secondary containment enclosure (ABSCE) boundary being inoperable.

The supplements dated May 5, 2017, and July 21, 2017, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on February 28, 2017 (82 FR 12137).

2.0 REGULATORY EVALUATION

2.1 Description of the Watts Bar Design

The containment at each of the Watts Bar units is a free-standing steel pressure vessel surrounded by a reinforced concrete shield building. The annular space between the walls and domes of the steel containment vessel and the concrete shield building provides for the collection, mixing, holdup, and controlled release of containment out-leakage. An emergency gas treatment system (EGTS) initiates and maintains a negative pressure in the annulus between the shield building and the steel containment vessel by means of filtered exhaust ventilation of the annular space following receipt of a safety injection signal.

The ABSCE is that portion of the auxiliary building (AB) and condensate demineralizer waste evaporator building that serves to maintain an effective barrier for airborne radioactive

contaminants released in the AB during abnormal events, and for any through-the-line leakage from containment into the ABSCE that could become airborne during a design-basis accident (DBA).

The ABGTS filters radioactive nuclide releases from the ABSCE during an accident to levels low enough to keep the site boundary dose rates and control room operator doses below the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 100, and 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 19, respectively. The ABGTS draws down the ABSCE to a negative pressure and maintains the negative pressure following abnormal events or a DBA, to ensure that no contaminated air is released to the environs without first being processed by the ABGTS. The ABGTS is initiated following receipt of a Phase A containment isolation signal.

The ABSCE is common to both Watts Bar units. The ABGTS, with redundant filter trains, is also common to both units; however, there are separate TSs for each unit. TS 3.7.12, "Auxiliary Building Gas Treatment System (ABGTS)" is similar for both Units 1 and 2, addressing the same ABSCE boundary and ABGTS components, and is applicable in Modes 1, 2, 3, and 4.

2.2 Description of the Proposed Changes

The licensee stated that the TS 3.7.12 limiting condition for operation (LCO), "Two ABGTS trains shall be OPERABLE," has no allowance for opening the ABSCE enclosure boundary intermittently under administrative controls, unlike the provisions of NUREG-1431, "Standard Technical Specifications - Westinghouse Plants" (STs) for ventilation system boundaries. As a result, performance of certain activities such as maintenance and testing of components on an outage unit that requires the ABSCE boundary to be opened, cannot be done under the current TS 3.7.12 without requiring the operating unit in Modes 1, 2, 3, or 4 to enter the Required Action to be in Mode 3 (hot standby) in 6 hours and be in Mode 5 (cold shutdown) in 36 hours. The licensee also stated that TS 3.7.12 has no Required Action when the ABSCE boundary is degraded, unlike the provisions of the STs. Since the ABSCE boundary is common to both units, under the current TS 3.7.12, a degraded ABSCE boundary could render both ABGTS trains inoperable, requiring both units to enter the current TS 3.7.12 Condition B, leading to the shutdown of both units.

In its application dated October 20, 2017, the licensee proposed the following changes to TS 3.7.12:

- A Note would be added to TS LCO 3.7.12 that would allow the ABSCE boundary to be opened intermittently under administrative controls without entering the Required Actions of the LCO.
- A new Condition B, "Two ABGTS trains inoperable due to inoperable ABSCE boundary," would be added to TS 3.7.12 with a Completion Time (CT) of 24 hours to restore the ABSCE boundary to operable status.
- Existing Condition B would be re-designated as Condition C.

In its supplement dated May 5, 2017, in response to NRC staff requests for additional information (RAIs) dated March 16, 2017 (ADAMS Accession No. ML17076A0232), the licensee proposed the following modifications to its originally proposed changes:

- The TS 3.7.12 LCO Note would be revised to clarify that the administrative controls would ensure that the ABSCE can be closed consistent with the safety analysis.
- Condition B would be revised to specify three Required Actions. Action B.1 would require immediate initiation of actions to implement mitigating actions, Action B.2 would require verification within 24 hours that mitigating actions ensure main control room (MCR) occupants do not exceed 10 CFR Part 50 Appendix A, GDC 19 limits, and Action B.3 would require restoration of the ABSCE boundary to operable status within 7 days.

The licensee also provided, for information, planned updates to the TS Bases, which will be implemented in accordance with the Technical Specifications Bases Control Program in TS 5.6.

2.3 Regulatory Review

The NRC staff considered the following regulatory requirements during its review of the proposed change.

Section 50.36 of 10 CFR, "Technical specifications," establishes the regulatory requirements related to the contents of the TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. The regulation does not specify the particular requirements to be included in a plant's TSs.

Section 50.36(a)(1) of 10 CFR requires each applicant for a license authorizing operation of a production or utilization facility to include a summary statement of the bases or reasons for proposed TSs, other than those covering administrative controls; however, the bases shall not become part of the TSs.

Section 50.36(c)(2) of 10 CFR states that LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility, and when an LCO is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the LCO can be met.

Section 50.36(c)(3) of 10 CFR states that SRs 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.

Section 100.11 of 10 CFR, "Determination of exclusion area, low population zone, and population center distance," for all DBAs, except the Fuel Handling Accident (FHA), requires that the licensee determine:

- (1) An exclusion area of such size that an individual located at any point on its boundary for two hours immediately following onset of the postulated fission product release would not receive a total radiation dose to the whole body in

excess of 25 rem¹ [roentgen equivalent man] or a total radiation dose in excess of 300 rem¹ to the thyroid from iodine exposure.

(2) A low population zone of such size that an individual located at any point on its outer boundary who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure.

Section 50.67 of 10 CFR, "Accident source term," for the DBA FHA. Section 50.67(b)(2) of 10 CFR states that the NRC may issue the amendment only if the applicant's analysis demonstrates with reasonable assurance that:

- (i) An individual located at any point on the boundary of the exclusion area for any 2-hour period following the onset of the postulated fission product release, would not receive a radiation dose in excess of 0.25 Sv (25 rem)² total effective dose equivalent (TEDE).
- (ii) An individual located at any point on the outer boundary of the low population zone, who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage), would not receive a radiation dose in excess of 0.25 Sv (25 rem) total effective dose equivalent (TEDE).
- (iii) Adequate radiation protection is provided to permit access to and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 0.05 Sv (5 rem) total effective dose equivalent (TEDE) for the duration of the accident.

Appendix A to Part 50, "General Design Criteria for Nuclear Power Plants," Criterion 19, "Control room," states, in part, that:

A control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. Adequate radiation protection shall be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident.

¹ The whole body dose of 25 rem referred to above corresponds numerically to the once in a lifetime accidental or emergency dose for radiation workers which, according to NCRP [National Council on Radiation Protection and Measurements] recommendations may be disregarded in the determination of their radiation exposure status (see NBS [National Bureau of Standards] Handbook 69 dated June 5, 1959). However, neither its use nor that of the 300 rem value for thyroid exposure as set forth in these site criteria guides are intended to imply that these numbers constitute acceptable limits for emergency doses to the public under accident conditions. Rather, this 25 rem whole body value and the 300 rem thyroid value have been set forth in these guides as reference values, which can be used in the evaluation of reactor sites with respect to potential reactor accidents of exceedingly low probability of occurrence, and low risk of public exposure to radiation.

² The use of 0.25 Sievert (Sv) (25 rem) TEDE is not intended to imply that this value constitutes an acceptable limit for emergency doses to the public under accident conditions. Rather, this 0.25 Sv (25 rem) TEDE value has been stated in this section as a reference value, which can be used in the evaluation of proposed design basis changes with respect to potential reactor accidents of exceedingly low probability of occurrence and low risk of public exposure to radiation.

The NRC staff also relied on the following regulatory guidance in evaluating the proposed change:

- NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light Water Reactor] Edition," Chapter 6, "Engineered Safety Features," Section 6.2.3, "Secondary Containment Functional Design," Revision 2, July 1981 (ADAMS Accession No. ML052340701).
- NUREG-0800, SRP Chapter 15, "Transient and Accident Analysis," Section 15.0.1, "Radiological Consequence Analyses using Alternative Source Terms," Revision 0, July 2000 (ADAMS Accession No. ML003734190).
- NUREG-0800, SRP Section 15.1.5 Appendix A, "Radiological Consequences of Main Steam Line Failures Outside Containment of a PWR [Pressurized Water Reactor]," Revision 2, July 1981 (ADAMS Accession No. ML052350118).
- NUREG-0800, SRP Section 15.6.3, "Radiological Consequences of Steam Generator Tube Failure (PWR)," Revision 2, July 1981 (ADAMS Accession No. ML052350149).
- NUREG-0800, SRP Section 15.6.5 Appendix A, "Radiological Consequences of a Design Basis Loss-of-Coolant Accident including Containment Leakage Contribution," Revision 1, July 1981 (ADAMS Accession No. ML052350158).
- NUREG-0800, SRP Chapter 16, "Technical Specifications," Revision 3, March 2010 (ADAMS Accession No. ML100351425).
- Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000 (ADAMS Accession No. ML003716792).
- RG 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors," May 2003 (ADAMS Accession No. ML031490640).

The NRC staff also considered plant-specific licensing basis information as well as generically approved guidance in Revision 4 to NUREG-1431, "Standard Technical Specifications, Westinghouse Plants," Volumes 1 and 2, dated April 2012 (ADAMS Accession Nos. ML12100A222 and ML12100A228, respectively) in determining the acceptability of the proposed changes to TS 3.7.12.

3.0 TECHNICAL EVALUATION

The NRC staff reviewed the impact of modifying the Watts Bar TSs to provide an action when both trains of the ABGTS are inoperable due to the ABSCE boundary being inoperable, on all DBAs currently analyzed in the Watts Bar Updated Final Safety Analysis Report (UFSAR) that could have the potential for significant dose consequences. The Watts Bar UFSAR Chapter 15 describes the DBAs and their radiological consequence analysis results.

The NRC staff evaluated the impact of modifying TS 3.7.12 on the licensee's design basis radiological consequence dose analyses to ensure that either the modification will not result in an increase in the radiation dose consequences, or any proposed increase in the radiation dose consequences will remain within the design criteria specified in 10 CFR 50.67, 10 CFR Part 100, and the accident-specific design criteria outlined in RG 1.183 and RG 1.195. The NRC staff review of these DBAs determined that there is one DBA, the Loss-of-Coolant Accident (LOCA), which takes credit for the ABSCE and ABGTS, and is possibly impacted by the proposed changes.

The ABSCE is that portion of the AB and condensate demineralizer waste evaporator building that serves to maintain a barrier for airborne radioactive contaminants released in the AB during abnormal events. The secondary containment enclosures are designed to provide a positive barrier to all potential primary containment leakage pathways during a DBA. For a DBA, the ABSCE provides a barrier to leakage from containment that can potentially become airborne. In addition, the ABSCE maintains a barrier for airborne radioactive contaminants originating inside the ABSCE during normal and abnormal events.

The ABGTS is a fully redundant air cleanup system provided to filter radioactive nuclide releases from the ABSCE during an accident to levels sufficiently low to keep the site boundary dose rates below the requirements of 10 CFR Part 100. This is accomplished by exhausting filtered air from the ABSCE to maintain a negative pressure within the ABSCE boundary. Exhaust air leaving the ABSCE is processed by the ABGTS filter train before it is discharged to the environment. The ABGTS initiates filtered ventilation of the ABSCE exhaust air following receipt of a Phase A containment isolation signal.

Watts Bar TS LCO 3.7.12 requires two trains of the ABGTS to be operable in Modes 1, 2, 3, and 4. SRs 3.7.12.1 through SR 3.7.12.4 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 LCO will be met for the ABGTS. TS SR 3.7.12.4 verifies the ABGTS is capable of maintaining pressure between -0.25 and -0.5 inches (in.) water gauge (WG) with respect to atmospheric pressure during the post-accident mode of operation at a flow rate greater than or equal to 9300 and less than or equal to 9900 cubic feet per minute in the ABSCE. The primary purpose of this SR is to demonstrate the integrity of the ABSCE. To meet this SR, the ABSCE boundary must be intact. If the boundary is not intact, the SR cannot be met and both trains of the ABGTS cannot perform their specified safety function. Watts Bar TS 3.7.12 provides specific Conditions, Required Actions, and Completion Times for ABGTS inoperability due to degradation. However, it does not provide any corresponding Conditions, Required Actions, and Completion Times associated with the ABSCE boundary degradation. Therefore, if the pressure boundary SR is not met (i.e., both trains of the ABGTS are inoperable) in Modes 1, 2, 3, or 4, existing TS 3.7.12 Condition B is entered, requiring the unit to be in Mode 3 in 6 hours and Mode 5 in 36 hours.

In its application dated October 20, 2016, and its supplement dated May 5, 2017, the licensee discussed the possibility of utilizing the requested TS changes to facilitate the steam generator replacement for Watts Bar Unit 2 during Refueling Outage (RFO) 4 in 2022. The licensee further stated that the steam generator replacement may occur as early as during RFO 2 in 2019. The licensee stated that the steam generator replacement will require a single breach manned for approximately 1 to 2 months, and that the breach (e.g., a roll-up door) will only be opened when needed to move equipment or personnel into the AB. In its letter dated July 21, 2017, the licensee clarified these statements as summarized below.

The licensee stated that the steam generator replacement project (SGRP) currently plans to have three breaches greater than the allowable breach area for the ABSCE. These include the upper and lower containment access through the air locks and a fabric door leading through penetration X-1. To support the SGRP activity, on a one-time basis, the breaches are planned to be kept in the open position. Therefore, the planned SGRP activities will not be in conformance with the proposed addition of the note, which is intended to support normal operation, short duration events (e.g., door openings, fire damper testing and inspections, and damper strokes). The licensee further acknowledged that allowing the breach openings of the ABSCE on a continuous basis during the SGRP does not comply with the proposed note allowing the ABSCE boundary to be opened intermittently under administrative control.

The licensee stated that TVA plans to submit a separate amendment request to modify the proposed note to TS 3.7.12 to allow a one-time exception for the ABSCE breaches to be opened continuously to support the SGRP. The staff concurs that the new note as proposed in the current amendments is intended for short duration events only. Based on the clarification provided in its letter dated July 21, 2017, the staff did not give any further consideration to the discussion related to the SGRP in the licensee's letters dated October 20, 2016, and May 5, 2017. The one-time exception to the note that the licensee may request for future use during SGRP of Watts Bar Unit 2 will be evaluated on its own merits when a future request is submitted to the NRC.

3.1 Addition of TS LCO 3.7.12 Note

The licensee stated in its supplement dated May 5, 2017, that the proposed note in TS 3.7.12 would eliminate the need to enter LCO 3.7.12 when the ABSCE boundary is opened intermittently under administrative controls that ensure the ABSCE can be closed consistent with the safety analysis. This action is needed when one unit is operating and the other unit is shutdown. Without the proposed note to intermittently open the ABSCE boundary under administrative controls, the unit in Mode 1, 2, 3, or 4 may be forced into an unnecessary shutdown in order to open the ABSCE boundary.

For entry and exit through doors, the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls are proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the control room. This individual will have a method to rapidly close the opening when a need for AB isolation is indicated.

The licensee stated that the proposed Note in TS 3.7.12 would apply to any breach of the ABSCE that exceeds the total allowable breach area for the ABSCE. The total allowable breach area for operability of the ABSCE boundary is approximately 150 square inch. The total allowable breach area is derived from AB pressure testing and assures the required pressure criteria of -0.25 in. water gauge (WG) can be maintained. The maximum allowable breach area is updated continuously based on the most recent surveillance testing results.

The licensee stated in its supplement dated May 5, 2017, that, in accordance with TVA procedure TI-65, "Breaching the Containment Annulus, ABSCE, or MCRHZ [main control room habitability zone] Pressure Boundaries," the following administrative controls are used for ABSCE breaches in excess of the total allowable breach area:

- The breach opening can be closed at all times within two minutes of notification from the MCR. This allows sufficient time to be able to drawdown the ABSCE to -0.25 in. WG within four minutes.
- Individuals performing the administrative actions are stationed at both the breach location and in the MCR with clear communications established.
- Means to restore the breach, if required, are staged (e.g., blind flanges, foam penetrations, fabric roll-up doors).
- Non-routine ABSCE boundary breaches require that a mock-up/walk-through demonstration be performed prior to the entry to ensure that the breach can be restored within two minutes.
- Attachment 5 to TI-65 ensures the administrative controls are in place prior to opening the breach and requires a senior reactor operator approval to commence work.

In its supplement dated May 5, 2017, the licensee provided data from surveillance testing in accordance with SR 3.7.12.4 to verify the capability of the ABGTS to establish the required negative pressure and the margins embedded in that data. The licensee provided the requested information for the last 6 years of the performance of the SR. The data was provided for both A and B trains of the ABGTS. For tests from years 2011 to 2015, the drawdown time varied between 0 to 23 seconds, with pressure readings between -0.3 to -0.39 in. WG. All the tests were performed with a starting pressure of -0.31 to -0.37 in. WG, maintained by normal ventilation systems. The drawdown time starts when the AB isolation is initiated and stops when the AB pressure goes below -0.28 in. WG. The zero second drawdown time is reflective of situations when the minimum required pressure of -0.28 in. WG in the AB continued to be met throughout the transition from normal ventilation systems to the ABGTS. For the case with 23 seconds drawdown time, the AB pressure is -0.36 in. WG. In addition, two tests were performed in 2016 by including the Unit 2 reactor building in the ABGTS boundary. The two tests were performed to determine drawdown time from zero in. WG to -0.28 in. WG. The tests resulted in drawdown times of 31 and 39 seconds. When compared to the 4 minute total allocated drawdown time (2 minutes for closing the breach and 2 minutes for drawdown), the staff concludes that the licensee has adequately demonstrated the capability of the ABGTS to establish the AB to the required negative pressure, when the ABGTS boundary is opened under procedural controls allowed by the proposed note.

Section 50.36(b) of 10 CFR requires the TSs be derived from the analyses and evaluation included in the safety analysis report. Section 15.5.3 of the Watts Bar UFSAR contains the analysis of the environmental consequences of a postulated LOCA. This analysis assumes that activity leaking to the AB is directly released to the environment for the first 4 minutes, after which it is held up for 0.3 hours and then released through the ABGTS system filter. The design basis in UFSAR Section 15.5.3 includes the time for the ABGTS to drawdown the AB to a pressure of negative 1/4-inch (-0.25 in.) WG.

The NRC staff has reviewed the proposed change to add a note to TS LCO 3.7.12 provided in the licensee's application and supplements, and has determined that it is consistent with the NRC-approved design basis as reflected in Watts Bar UFSAR Section 15.5.3. Because the proposed change is consistent with the NRC-approved design basis, there is reasonable assurance that in the event of a LOCA, the radioactive release will be mitigated as assumed in

the licensing basis and therefore, the regulatory limits stated in 10 CFR 100.11 will be met. The proposed note is consistent with similar notes for ventilation system boundaries in NUREG-1431, with additional clarity provided regarding compliance with the accident analyses during the application of the note. The licensee has demonstrated that adequate procedures exist at Watts Bar to comply with the note.

Based on the above considerations, the NRC staff finds that the proposed change to add a Note to TS LCO 3.7.12 does not affect the current Watts Bar radiological consequence analyses. Therefore, the NRC staff concludes that this change is acceptable with respect to the radiological consequences of DBAs and consequently, the requirements of 10 CFR 50.36 will continue to be met. Conforming TS Bases changes will be controlled by the licensee in accordance with the Technical Specifications Bases Control Program in TS 5.6.

3.2 Addition of new TS 3.7.12 Condition B

The current Watts Bar TS 3.7.12 Condition B requires the unit to be in Mode 3 in 6 hours and in Mode 5 in 36 hours if both ABGTS trains are inoperable for any reason. The licensee proposed new Condition B to address both trains of ABGTS being inoperable due to the ABSCE boundary being inoperable. The revised Condition includes several Required Actions and associated Completion Times. Required Action B.1 requires immediate initiation of actions to implement mitigating actions, Required Action B.2 requires verification within 24 hours that mitigating actions ensure main control room occupants do not exceed 10 CFR Part 50, Appendix A, GDC 19 limits, and Required Action B.3 requires restoration of the ABSCE boundary to operable status within 7 days. The licensee stated that the proposed TS 3.7.12 Condition B is similar to Watts Bar, Units 1 and 2, TS 3.7.10, "Control Room Emergency Ventilation System (CREVS)."

The licensee stated in its application dated October 20, 2016, that during the period that the ABSCE boundary is inoperable, appropriate compensatory measures would be utilized. The licensee stated that the preplanned measures would be available to address both intentional and unintentional entry into the proposed new LCO 3.7.12 Condition B. TVA stated that approved written procedures would be in place describing actions to be taken in the event of an entry into LCO 3.7.12 Condition B; and that the procedures will describe appropriate, preplanned compensatory measures consistent with the intent, as applicable, of GDC 19, 60, and 64 and 10 CFR Part 100 to protect plant personnel from potential hazards such as radioactive contamination, toxic chemicals, smoke, temperature and relative humidity, and physical security.

In its supplement dated May 5, 2017, the licensee provided additional detail regarding when the new Condition B would be utilized. The licensee stated that entry into Condition B could be intentional or unintentional, and stated that intentional entries are generally expected to occur during plant outages. Condition B would apply to those breaches where the maximum allowable breach area is expected to be exceeded and the ABSCE boundary cannot be restored to design limits within 4 minutes (e.g., a fire damper inspection where an individual is inside a section of duct work).

In its supplement dated May 5, 2017, the licensee stated that the compensatory measures could include limiting the size of the opening until repairs are made (e.g., covering the opening with plywood, steel plates, foam, or thaxton plugs), limiting access to the opening, or protective measures for personnel [e.g., self-contained breathing apparatus (SCBA)]. The licensee committed to having written procedures available prior to implementing the approved

amendments that describe the compensatory measures to be taken in the event of an intentional or unintentional entry into TS 3.7.12 Condition B.

In addressing how the requirements of 10 CFR Part 100 and GDC 19 are met using the compensatory measures, the licensee stated that it had performed a calculation that determined the time needed to restore the ABSCE boundary following a LOCA before exceeding the 10 CFR Part 100 and GDC 19 limits without crediting any compensatory measures. TVA calculated the offsite Exclusion Area Boundary, Low Population Zone, and MCR doses without the ABSCE established following a LOCA.

The licensee's calculation, provided in Enclosure 3 of the May 5, 2017, supplement, analyzed the design basis LOCA as modeled in UFSAR Section 15.5.3 and determined how long it would take to exceed 10 CFR Part 100 and GDC 19 limits when the ABSCE boundary was inoperable. An inoperable ABSCE boundary would result in ABGTS being inoperable as well. Therefore, the licensee did not credit ABGTS filtration. The design basis LOCA models were used as the starting point for the calculation. Instead of crediting ABGTS at 4 minutes, the licensee modified the model to credit ABGTS filtration at various times (2 hours, 4 hours, 6 hours, and 7 hours) to determine when regulatory limits would be exceeded. The licensee also ran a model to determine the result if ABGTS was not credited at all. The analysis showed that without taking credit for ABGTS filtration at all, the 10 CFR Part 100 limits and GDC 19 whole body and beta limits would not be exceeded. However, the analysis showed that GDC 19 thyroid limits would be exceeded unless ABGTS filtration was credited at 6 hours post-accident.

The results of this calculation determined that the ABSCE boundary could be inoperable indefinitely without 10 CFR Part 100 limits being exceeded. However, the calculation determined that the ABSCE boundary can only be inoperable for up to 6 hours following a LOCA without exceeding the limits of GDC 19. The licensee concluded that 6 hours is more than enough time to take appropriate actions to ensure GDC 19 limits are not exceeded (e.g., requiring MCR personnel to don SCBAs). The licensee stated that the 7-day Completion Time of Required Action B.3 is reasonable based on the determination that the mitigating actions of Required Actions B.1 and B.2 will ensure protection of MCR occupants within analyzed limits while limiting the probability that MCR occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA.

The NRC staff has reviewed the proposed changes and the licensee's calculation provided in its supplement dated May 5, 2017. The NRC staff also performed an independent confirmatory calculation using the NRC-approved LOCA licensing basis as the starting point. The NRC staff's assessment confirmed the licensee's conclusion that (1) the ABSCE boundary could be inoperable indefinitely without 10 CFR Part 100 limits being exceeded, and that (2) the ABSCE boundary can only be inoperable for up to 6 hours following a LOCA without exceeding the limits of 10 CFR Part 50, Appendix A, GDC 19. The NRC staff agrees with the licensee's conclusion that 6 hours is more than enough time to take appropriate actions to ensure GDC 19 limits will not be exceeded (e.g., requiring MCR personnel to don SCBAs).

The staff finds that, during the period that the ABSCE pressure boundary is inoperable, appropriate compensatory measures consistent with the intent of 10 CFR Part 50, Appendix A, GDC 19, and 10 CFR Part 100 will be utilized to protect the plant personnel from potential hazards such as radioactive contamination, temperature and relative humidity and to ensure physical security. These preplanned measures will be available to address these concerns for intentional and unintentional entry into the condition. Actions must be taken within 24 hours to

verify that, in the event of a DBA, MCR occupant radiological exposures will not exceed 10 CFR Part 50, Appendix A, GDC 19 limits. The 24-hour Completion Time of new Required Action B.2 is reasonable based on the immediate implementation of mitigating actions as directed by Required Action B.1, and the low probability of a DBA occurring during this time period. The 7-day Completion Time of Required Action B.3 is reasonable based on the determination that the mitigating actions will ensure protection of the MCR occupants within analyzed limits while limiting the probability that MCR occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 7-day Completion Time is a reasonable time to diagnose, plan and repair (as needed), and test most anticipated problems with the ABSCE boundary.

The NRC staff concludes that the proposed changes in the application dated October 20, 2016, are consistent with the provisions in NUREG-1431 for two trains of ventilation systems made inoperable by an inoperable ventilation system boundary; but the change was not consistent with the NRC-approved design basis as reflected in UFSAR Section 15.5.3. However, in its supplement dated May 5, 2017, the licensee elected to adopt provisions similar to an inoperable control room envelope in Watts Bar TS 3.7.10, "Control Room Emergency Ventilation System (CREVS)," and in STS 3.7.10, "Control Room Emergency Filtration System (CREFS)," in lieu of provisions for other ventilation system boundaries (e.g., STS 3.7.12, "Emergency Core Cooling System (ECCS) Pump Room Exhaust Air Cleaning System (PREACS)"; STS 3.7.13, "Fuel Building Air Cleanup System (FBACS)"; and STS 3.7.14, "Penetration Room Exhaust Air Cleanup System (PREACS).") The proposed action to immediately initiate actions to implement mitigating actions provides greater clarity and removes any ambiguity with respect to protecting control room inhabitants than the blanket 24 hour completion time allowed by the STSs for ventilation systems other than STS 3.7.10 for the Control Room Envelope boundary. The staff also finds that the 7-day completion time for restoring an inoperable ABSCE boundary is reasonable and acceptable.

Based on the above considerations, the NRC staff finds that there is reasonable assurance that the 10 CFR Part 100 and 10 CFR Part 50, Appendix A, GDC 19 limits will be met and, therefore, the proposed change to add a new Condition B to TS LCO 3.7.12 is acceptable with respect to the radiological consequences of DBAs, and consequently, the requirements of 10 CFR 50.36 will continue to be met. Conforming TS Bases changes will be controlled by the licensee in accordance with the Technical Specifications Bases Control Program in TS 5.6.

3.3 Administrative TS Changes

The licensee proposed to re-designate the existing Condition B and Required Actions B.1 and B.2 due to the addition of the new proposed Condition B. Current condition B will become Condition C and Required Actions B.1 and B.2 will become Required Actions C.1 and C.2. The new Condition C is also revised to specify that it applies to the condition of two inoperable ABGTS trains for reasons other than an inoperable ABSCE boundary, which is now addressed by new Condition B.

This proposed change clarifies that new Condition C should not be entered due to inoperability of the ABSCE boundary, and that Condition C should be entered when the Completion Time of either Condition A or new Condition B are not met. These proposed changes have no impact on the DBA radiological dose consequences and are acceptable to the NRC staff from a dose consequence perspective. Given the acceptability of the proposed TS changes discussed

above in Sections 3.1 and 3.2, the changes are necessary to maintain the logical integrity of the TSs, and are therefore acceptable.

3.4 Summary of NRC Staff Conclusions

The NRC staff reviewed the radiological impact of the licensee's proposed changes to TS 3.7.12 on previously analyzed radiological consequences of the postulated DBAs. The NRC staff finds that the licensee's proposed changes do not impact any of the methodologies, assumptions or inputs of the radiological consequences analyses and there is reasonable assurance that the licensee's estimates of the exclusion area boundary, low-population zone, and control room doses will remain unchanged and continue to comply with the criteria stated in Section 2.3 above. Therefore, the proposed changes are acceptable with regard to the radiological consequences of postulated design basis accidents and will allow the TSs to continue to meet the requirements of 10 CFR 50.36.

The NRC staff reviewed the impact of the proposed addition of the note on the capability of the ABGTS system to drawdown the secondary containment to the required negative pressure when called upon. The staff finds that the administrative and procedural controls at Watts Bar will not adversely impact the ABGTS ability to function and perform as needed in providing assistance to maintain offsite and control room operator doses within acceptable limits. With respect to the proposed addition of new Condition B, immediate initiation of mitigating actions followed by verification that 10 CFR Part 50, Appendix A, GDC 19 limits will be met for the control room occupants is an acceptable method. Therefore, the proposed changes are acceptable and will allow the TSs to continue to meet the requirements of 10 CFR 50.36.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendments on September 7, 2017. 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. 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 amendments involve no significant hazards consideration, and there has been no public comment on this finding published in the *Federal Register* on February 28, 2017 (82 FR 12137). 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: October 17, 2017

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 – ISSUANCE OF
 AMENDMENTS REGARDING AUXILIARY BUILDING GAS TREATMENT
 SYSTEM (CAC NOS. MF8526 AND MF8527)
 DATED OCTOBER 17, 2017

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