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

May 5, 2021

Mr. James Barstow
Vice President, Nuclear Regulatory
Affairs and Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT NOS. 145 AND 51 FOR ONE-TIME CHANGE TO TECHNICAL SPECIFICATION 3.7.11 TO EXTEND THE COMPLETION TIME FOR MAIN CONTROL ROOM CHILLER MODIFICATIONS (EPID L-2020-LLA-0114)

Dear Mr. Barstow:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 145 to Facility Operating License No. NPF-90 and Amendment No. 51 to Facility Operating License No. NPF-96 for the Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2, respectively. These amendments are in response to your application dated May 19, 2020, as supplemented by letter dated December 16, 2020.

The amendments revise Watts Bar, Units 1 and 2, Technical Specification (TS) 3.7.11, “Control Room Emergency Air Temperature Control System (CREATCS),” to add a one-time footnote to the Completion Time for Required Action A.1 to allow each CREATCS train to be inoperable for up to 60 days while replacing each respective train’s chiller. The amendments also add a one-time footnote to the Completion Time for Required Action E.1 to allow up to a 4-day delayed entry into TS Limiting Condition for Operation 3.0.3 if both trains of CREATCS become inoperable. Both changes are limited to the time that the CREATCS modifications are being performed, in the timeframe of May 1, 2022, to May 1, 2023.

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

Sincerely,

/RA/

Kimberly J. Green, 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. 145 to NPF-90
2. Amendment No. 51 to NPF-96
3. Safety Evaluation

cc: 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. 145
License No. NPF-90

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (TVA, the licensee) dated May 19, 2020, as supplemented by letter dated December 16, 2020, 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. 145 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 within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona

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David J. Wrona, 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: May 5, 2021

ATTACHMENT TO AMENDMENT NO. 145

WATTS BAR NUCLEAR PLANT, UNIT 1

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace page 3 of Facility Operating License No. NPF-90 with the attached revised page 3.

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3.7-25	3.7-25
3.7-26	3.7-26

(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. 145 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

3.7.11 Control Room Emergency Air Temperature Control System (CREATCS)

LCO 3.7.11 Two CREATCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREATCS train inoperable.	A.1 Restore CREATCS train to OPERABLE status.	30 days*
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, 3, or 4.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours
C. Required Action and associated Completion Time of Condition A not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	C.1 Place OPERABLE CREATCS train in operation. OR C.2 Suspend movement of irradiated fuel assemblies.	Immediately Immediately

(continued)

* An allowance is permitted for one CREATCS train to be inoperable for up to 60 days. This TS provision is only authorized for one entry per train during modification activities planned for the upgrade of the main control room chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023, provided compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two CREATCS trains inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	D.1 Suspend movement of irradiated fuel assemblies.	Immediately
E. Two CREATCS trains inoperable in MODE 1, 2, 3, or 4.	E.1 Enter LCO 3.0.3.	Immediately**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.11.1	Verify each CREATCS train has the capability to remove the assumed heat load.	In accordance with the Surveillance Frequency Control Program

** An allowance to monitor the main control room temperature every hour and verify the main control room temperature is less than or equal to 90°F is permitted for up to four days in lieu of the immediate entry into LCO 3.0.3. If the main control room temperature exceeds 90°F, or the duration without a train of CREATCS being OPERABLE exceeds four days, immediate entry into LCO 3.0.3 is required. This provision is only applicable during modification activities planned for the upgrade of the main control room chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023, provided compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.

UNITED STATES
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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-391

WATTS BAR NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 51
License No. NPF-96

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (TVA, the licensee) dated May 19, 2020, as supplemented by letter dated December 16, 2020, 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. 51 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 within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona

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Date: 2021.05.05 11:07:54 -04'00'

David J. Wrona, 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: May 5, 2021

ATTACHMENT TO AMENDMENT NO. 51

WATTS BAR NUCLEAR PLANT, UNIT 2

FACILITY OPERATING LICENSE NO. NPF-96

DOCKET NO. 50-391

Replace page 3 of Facility Operating License No. NPF-96 with the attached revised page 3.

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3.7-24	3.7-24
3.7-25	3.7-25

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 3459 megawatts thermal.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 51 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 until the WBN Unit 2 steam generators are replaced with steam generators equivalent to the existing steam generators at WBN Unit 1. FULL SPECTRUM LOCA Methodology shall be implemented when the WBN Unit 2 steam generators are replaced with steam generators equivalent to the existing steam generators at WBN Unit 1.

(5) By December 31, 2019, 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

3.7.11 Control Room Emergency Air Temperature Control System (CREATCS)

LCO 3.7.11 Two CREATCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One CREATCS train inoperable.	A.1	Restore CREATCS train to OPERABLE status.	30 days*
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, 3, or 4.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours
C. Required Action and associated Completion Time of Condition A not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	C.1	Place OPERABLE CREATCS train in operation.	Immediately
	OR		
	C.2	Suspend movement of irradiated fuel assemblies.	Immediately
D. Two CREATCS trains inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	D.1	Suspend movement of irradiated fuel assemblies	Immediately

* An allowance is permitted for one CREATCS train to be inoperable for up to 60 days. This TS provision is only authorized for one entry per train during modification activities planned for the upgrade of the main control room chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023, provided compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two CREATCS trains inoperable in MODE 1, 2, 3, or 4.	E.1 Enter LCO 3.0.3.	Immediately**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.11.1	Verify each CREATCS train has the capability to remove the assumed heat load.	In accordance with the Surveillance Frequency Control Program

** An allowance to monitor the main control room temperature every hour and verify the main control room temperature is less than or equal to 90°F is permitted for up to four days in lieu of the immediate entry into LCO 3.0.3. If the main control room temperature exceeds 90°F, or the duration without a train of CREATCS being OPERABLE exceeds four days, immediate entry into LCO 3.0.3 is required. This provision is only applicable during modification activities planned for the upgrade of the main control room chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023, provided compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 145 AND 51

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 letter dated May 19, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20140A342), as supplemented by letter dated December 16, 2020 (ADAMS Accession No. ML20351A424), the Tennessee Valley Authority (TVA, the licensee), submitted a license amendment request (LAR) to revise the Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2, Technical Specifications (TSs). The requested changes would revise Watts Bar, Units 1 and 2, TS 3.7.11, "Control Room Emergency Air Temperature Control System (CREATCS)," to add a one-time footnote to the Completion Time for Required Action A.1 to allow each CREATCS train to be inoperable for up to 60 days while replacing each respective train's chiller. The requested changes would also add a one-time footnote to the Completion Time for Required Action E.1 to allow up to a 4-day delayed entry into TS Limiting Condition for Operation (LCO) 3.0.3 if both trains of CREATCS become inoperable. Both changes are limited to the time that the CREATCS modifications are being performed, in the timeframe of May 1, 2022, to May 1, 2023.

The supplement dated December 16, 2020, 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, the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on July 14, 2020 (85 FR 42442).

To facilitate the review of the LAR, a regulatory audit was performed by the NRC staff consistent with NRC Office of Nuclear Reactor Regulation Office Instruction LIC-111, "Regulatory Audits," Revision 1 (ADAMS Accession No. ML19226A274). The audit plan was provided to TVA on August 25, 2020 (ADAMS Accession No. ML20239A969), was conducted remotely from September 2, 2020, through October 1, 2020, and included staff discussions with the licensee. The regulatory audit summary was issued on January 26, 2021 (ADAMS Accession No. ML21012A084).

2.0 REGULATORY EVALUATION

2.1 System Description

The CREATCS, which the licensee describes in Section 3.1 of the LAR, provides temperature control for the Main Control Room (MCR) during power operations and following design basis accidents (e.g., isolation of the MCR).

The CREATCS consists of two independent and redundant trains that provide cooling of recirculated MCR air. Each train consists of an air-handling unit (AHU), water chiller, chilled water pump, and associated piping, ductwork, instrumentation, and controls to provide for MCR temperature control. Each CREATCS train is a subsystem that provides air temperature control for the MCR.

Watts Bar Updated Final Safety Analysis Report (UFSAR) Section 6.4 “Habitability Systems” (ADAMS Accession No. ML19336A067) describes the Main Control Room Habitability System (MCRHS) as:

> the set of equipment, components, supplies, and other features, including the building enclosure, provided to ensure that a suitable environment is maintained for personnel and equipment in the MCRHS area for safe, long-term occupancy during normal and emergency operations of the plant.
>
> The Main Control Room Habitability Zone (MCRHZ) is the envelope of spaces which are maintained habitable by pressurization to 1/8 inch water gage minimum above atmospheric to minimize infiltration of airborne contaminants which may be present outside the pressure boundary. It is also called the MCRHS area.
>
> . . .
>
> The MCRHS area includes all rooms on plan Elevation 755 of the Control Building . . . All rooms to which MCR personnel may require access during emergency operations are included within this envelope. The MCR requires continuous occupancy . . .
>
> All controls and displays necessary to bring the plant to a safe shutdown condition are included within the MCRHS area . . . Heating, ventilating, air conditioning, and air cleanup components to which access may be necessary are enclosed within the MCRHS area.

Section 9.4.1 “Control Room Area Ventilation System” of the UFSAR (ADAMS Accession No. ML19176A145) reads, in part:

> The following building air-conditioning and ventilating system components are each provided with two 100% capacity units. Each meets the single failure criterion, and automatic switchover is assured if one of the units fails. These systems include the:
>
> 1. MCR air-conditioning system, water chillers, air handling units, and piping.

2. Control Building emergency air cleanup supply fans and filter assemblies.

3. Control Building emergency pressurizing air supply fans.

. . .

Fresh air for control room emergency pressurizing is taken from the outdoors from either of two intakes. One is the emergency air intake, located on the east end of the Control Building roof at Elevation 775 and the other is connected to the fresh air intake on the roof at the west end of the Control Building. Both intakes are isolated during a tornado warning.

All essential air-conditioning equipment, ventilating equipment, isolation dampers, and ducts are designed to withstand the safe shutdown earthquake (SSE). Nonessential components are seismically designed to the extent that they will not affect system operation if they should fail due to a seismic event. All air-conditioning and essential ventilating equipment are protected from the effects of a design basis tornado . . . by isolation dampers located at all external openings to the Control Building. A concrete hood located over the air intake provides additional protection from the effects of tornado generated missiles.

All air conditioning equipment necessary to ensure MCR habitability in the event of a flood is located in the Auxiliary and Control Buildings at elevations where the equipment remains functional during flooding up to the design basis flood elevation. …

Piping which could be a source of pipe whip (i.e., high energy lines) does not pass through areas containing essential Control Building air conditioning or air cleanup equipment. The equipment is also separated from and protected from potential sources of missiles and jet impingement which could adversely affect operation of the system . . .

2.2 Requested Changes

The proposed changes for the Watts Bar, Units1 and 2, TS would add a footnote to the current 30-day Completion Time for TS 3.7.11, Required Action A.1 to allow one CREATCS train to be inoperable for up to 60 days while performing modifications to the CREATCS chillers. The footnote would state:

* An allowance is permitted for one CREATCS train to be inoperable for up to 60 days. This TS provision is only authorized for one entry per train during modification activities planned for the upgrade of the main control room chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023, provided compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.

In Section 2.3 of the LAR, the licensee provided the reason for the proposed footnote. The licensee plans to replace the CREATCS chillers to improve their efficiency. The licensee estimates that the time required to replace the chillers, during which they will be inoperable, exceeds the 30 day Completion Time of Required Action A.1 of TS 3.7.11.

The proposed amendment also adds a footnote to the existing immediate Completion Time for Required Action E.1 to allow delayed entry into TS Limiting Condition for Operation (LCO) 3.0.3 for up to 4 days if both CREATCS trains are inoperable during the modifications to the CREATCS chillers. The footnote would state:

> ** An allowance to monitor the main control room temperature every hour and verify the main control room temperature is less than or equal to 90°F is permitted for up to four days in lieu of the immediate entry into LCO 3.0.3. If the main control room temperature exceeds 90°F, or the duration without a train of CREATCS being OPERABLE exceeds four days, immediate entry into LCO 3.0.3 is required. This provision is only applicable during modification activities planned for the upgrade of the main control room chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023, provided compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.

In Section 3.4.2 of the LAR the licensee provided the reason for the proposed footnote for the Completion Time for Condition E. During the replacement process, the licensee will make two trains of CREATCS chillers inoperable. The licensee stated that delayed entry into LCO 3.0.3 is needed to allow stabilization of the water and air flow from the modified CREATCS train during Post Modification Testing (PMT). Without the change, both units would immediately enter LCO 3.0.3.

2.3 Regulations and Guidance

2.3.1 Regulations

In Section 50.36, “Technical specifications,” of Title 10 of the *Code of Federal Regulations* (10 CFR), the NRC established its regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (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) states: “A summary statement of the bases or reasons for such specifications … shall also be included in the application, but shall not become part of the technical specifications.”

As stated in 10 CFR 50.36(b), the technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto.

As stated in 10 CFR 50.36(c)(2), LCOs are the lowest functional capability or performance level of equipment required for safe operation of the facility. When LCOs are not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the LCOs can be met.

Appendix A, “General Design Criteria for Nuclear Power Plants,” to 10 CFR, Part 50, “Domestic Licensing of Production and Utilization Facilities,” contains the principal design criteria for a proposed facility that must be included in an application for a construction permit for a

production or utilization facility under 10 CFR 50.34, or a design certification, combined license, design approval, or manufacturing license. These General Design Criteria (GDC) establish the minimum requirements for the principal design criteria for water-cooled nuclear power plants similar in design and location to plants for which construction permits have been issued by the Commission.

GDC 2, "Design bases for protection against natural phenomena," states in part that, "Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions."

GDC 4, "Environmental and dynamic effects design bases," states, in part, that, "Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit."

GDC 5, "Sharing of structures, systems, and components," states, in part, that structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.

GDC 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 . . . Equipment at appropriate locations outside the control room shall be provided (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures.

2.3.2 Regulatory Guidance

Regulatory Guide (RG) 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," Revision 1 (ADAMS Accession No. ML013100014), describes assumptions acceptable to the NRC staff for use in assessing the habitability of the control room during and after a postulated external release of hazardous chemicals from mobile or stationary sources, offsite or onsite to satisfy GDC 4 and GDC 19.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition — Design of Structures, Components, Equipment, and Systems," Section 3.6.1, "Plant Design For Protection Against Postulated Piping Failures In Fluid Systems Outside Containment," Revision 3, provides guidance to NRC staff for conducting reviews of piping failures outside containment to ensure that the environmental effects of such failures would not cause the loss of needed functions of safety-related systems and to ensure that the plant could be safely shut down in the event of such failures (ADAMS Accession No. ML070550032).

The NRC staff's guidance for review of the TS and TS changes is in Chapter 16, "Technical Specifications," of NUREG-0800, "Standard Review Plan [SRP]," Revision 3, dated March 2010 (ADAMS Accession No. ML100351425).

Chapter 18, Revision 3, "Human Factors Engineering," provides the NRC staff with guidance for the review human performance for applicants (ADAMS Accession No. ML16125A114).

The NRC's guidance for the format and content of the Watts Bar, Units 1 and 2, TSs can be found in NUREG-1431, "Standard Technical Specifications [STS] Westinghouse Plants."

NUREG-1764, "Guidance for the Review of Changes to Human Actions," Revision 1, provides the NRC staff with guidance about the level of review for the human actions (HAs) described in the proposed amendment using a risk-informed approach (ADAMS Accession No. ML072640413). Appendix A to NUREG-1764 contains two tables of generic HAs for boiling water reactors and pressurized-water reactors (PWRs) that are risk important. Based on the review of Table A.2, the staff conducted a Level 3 review, the least stringent, because the operator actions related to the modification of the CREATCS chillers are not considered risk important.

3.0 TECHNICAL EVALUATION

The licensee proposes a change to Watts Bar, Units 1 and 2, TS 3.7.11, Required Action A.1, to extend the completion time for up to 60 days for an inoperable CREATCS train during the planned upgrade of the CREATCS chillers.

TVA plans to perform the upgrade of the CREATCS chillers with both Watts Bar units operating. TVA stated that performing the CREATCS chillers' upgrade activities with both units at power ensures stable plant conditions with the largest contingent of plant personnel, material, and management oversight resources available to focus on the modifications without the demands of a concurrent unit outage.

During either CREATCS train A or train B chiller replacement, the affected CREATCS train will be inoperable. However, all affected train components remain functional except the chilled water pump and the chiller unit. The licensee plans to connect a temporary chiller system to the inoperable CREATCS train AHU to provide cooling to the air circulating through the inoperable CREATCS train ductwork. The inoperable CREATCS train will operate in its normal configuration when the source of the chilled water is changed to the temporary chiller unit. The inoperable CREATCS train AHU will be operating during its chiller replacement, using the temporary chiller system to maintain acceptable temperatures in the MCR. The temporary chiller system is sized to accomplish this function. The operable CREATCS train will be maintained in its standby configuration.

TVA projects that the replacement of the CREATCS chillers will be done in two phases but not necessarily in the following order:

I. The Train A CREATCS chiller will be removed from service and replaced with a new chiller system of similar design. Both the Train A CREATCS chiller and the Train A Shutdown Board Room (SDBR) chiller will be replaced concurrently. Concurrent replacement is necessary due to the existing plant configuration on elevation 737 feet of the Auxiliary Building. The existing CREATCS chiller must be removed first, followed by the existing SDBR chiller. Installation will be in reverse order with the new SDBR chiller

being installed, followed by the new CREATCS chiller. Once the new CREATCS chiller is in place, work will concentrate on completion and testing of the CREATCS chiller prior to completion of the SDBR chiller.

While the Train A CREATCS chiller is being replaced, the associated AHU remains functional and the temporary, non-safety related, full-capacity chilled water system (chiller and pump) will be connected to the Train A AHU. The temporary chilled water system will be placed in service to provide cooling for the MCR. The operable CREATCS Train B will be in standby and would provide cooling should the temporary chilled water system become unavailable. LAR Table 1, "Train A CREATCS Replacement Schedule," estimated the total time for MCR Train A chiller replacement to be 55.7 days.

II. The Train B CREATCS chiller will be removed from service and replaced with a new chiller system of similar design. Due to the physical configuration, removal of the Train B CREATCS chiller does not impact the Train B SDBR chiller. While the Train B CREATCS chiller is being replaced, the associated AHU remains functional and the temporary chilled water system (chiller and pump) will be connected to the Train B AHU. The temporary chilled water system will be placed in service to provide cooling for the MCR. The operable CREATCS Train A will be in standby and would provide cooling should the temporary chilled water system become unavailable. LAR Table 2, "Train B CREATCS Replacement Schedule," estimated the total time for MCR Train B chiller replacement to be 38.4 days.

CREATCS chillers are TS support equipment, governed by TS 3.7.11, "Control Room Emergency Air Temperature Control System (CREATCS)"; whereas the SDBR chillers are non-TS support equipment. Current TS 3.7.11 requires the restoration of an inoperable CREATCS train to operable status within 30 days. Since the CREATCS chiller replacement activities in both Phases I and II are projected to take longer than 30 days, TVA is requesting a "one-time" TS change to increase the allowed outage time (AOT) to 60 days, applicable for a period of 12 months, from May 1, 2022, to May 1, 2023.

Post-modification testing (PMT) of each newly installed CREATCS chiller will be performed before declaring the train operable. To facilitate PMT, TVA proposed a footnote for the Completion Time of TS 3.7.11 Condition E to allow for monitoring temperatures in lieu of immediate entry into LCO 3.0.3.

TVA provided the following justification for this TS change:

> Following replacement of a CREATCS chiller, the PMT is performed, during which the modified CREATCS train remains inoperable. During the PMT, the operable CREATCS train handswitch (located in the MCR) may be placed in pull to lock, rendering the operable CREATCS train inoperable. This is to prevent the modified CREATCS train PMT steps from adversely affecting the operable train. This impact is due to the automatic start signals from the modified train requiring the operable train to start inappropriately and repeatedly. … Delayed entry into LCO 3.0.3 is needed to allow stabilization of the water and air flow from the modified CREATCS train during PMT.

3.1 Evaluation of Temporary Chiller System

In the LAR, TVA described the following system sizing, precautions and compensatory actions that will be taken during the implementation of the two phases.

3.1.1 Temporary Air Conditioning Equipment

In Section 3.2, "MCR Temporary Chilled Water Equipment Description," of the Enclosure to the LAR, TVA stated that a temporary nonsafety-related chiller system will be installed and used to support MCR cooling during the CREATCS chiller replacements, and that the temporary system is capable of providing adequate cooling to maintain the MCR within its normal temperature band.

In Section 3.2.1, "MCR Temporary Air Conditioning Equipment Description," of the Enclosure, TVA stated that the temporary chiller equipment is non-safety related, but appropriate measures will be taken to minimize the potential for failure of the temporary chiller system and the control room envelope (CRE) boundary. In particular, TVA stated that the temporary hoses, pipe, and fittings are qualified for adequate pressure to protect against rupture and pipe whip, and that the valves at the penetrations are qualified for seismic retention to maintain the integrity of the control room envelope boundary. However, the NRC staff determined that TVA did not provide sufficient information in the LAR to substantiate the above two statements.

During the regulatory audit, the NRC staff examined information related to the design and the qualification of the temporary hoses, pipe, and fittings as well as valves at the penetrations (ADAMS Accession No. ML21012A084). The NRC staff determined that additional information was needed to verify that the temporary hoses, pipe, and fittings are qualified for adequate pressure to protect against rupture and pipe whip and that the valves at the penetrations are qualified for seismic retention to maintain the integrity of the control room envelope boundary. The NRC staff noted that the temporary chiller equipment installation, though non-safety related, supports the safety function of MCR cooling during the CREATCS chiller replacements. Therefore, the NRC staff issued a request for additional information (RAI) requesting the licensee to: (1) provide details on the qualification of the temporary hoses, pipe, and fittings for adequate pressure and any other applicable loads to protect against rupture and pipe whip, (2) describe the rupture and pipe whip effects that have been considered, and (3) describe how the valves at the penetrations will be qualified for seismic retention to maintain the integrity of the CRE boundary including a description of the seismic effects that would be considered (ADAMS Accession No. ML20322A441).

By letter dated December 16, 2020 (ADAMS Accession No. ML20351A424), TVA provided its response to the above RAI. TVA stated that the temporary chiller system hoses, adapters, pipe, and fittings at the penetrations for the CRE boundary are rated to a minimum of 125 pounds per square inch gauge (psig) while the system pressure for the temporary system at the penetrations on the control building side is 72.56 psig, which is less than 125 psig. Therefore, the component ratings bound the maximum system pressure of the temporary chiller system. TVA also stated that the licensing basis threshold for a system to be considered a high energy line is 275 psig and 200°F. Therefore, the temporary chiller system is not a high energy line system, and evaluation and qualification of the system piping for pipe rupture and pipe whip is therefore not required.

TVA stated that the temporary chiller piping system has been evaluated for internal pressure, deadweight, and seismic loading conditions, and meets the requirements of Seismic

Category I(L), which is defined in Watts Bar UFSAR, Section 3.2.1 (ADAMS Accession No. ML19336A066). In particular, those fluid containing elements which are included in Seismic Category I(L) are seismically qualified to meet the intent of position 2 regarding design interface between seismic Category I and non-seismic Category I plant features as delineated in Regulatory Guide 1.29, "Seismic Design Classification for Nuclear Power Plants."

TVA also described how the piping and support including the weld as well as the valve were seismically analyzed. TVA stated that conservative dead weight values were seismically accelerated using the seismic response spectra from TVA report CEB-80-27, Revision 5, "Watts Bar Nuclear Plant Dynamic Earthquake Analysis of the Auxiliary Control Building and Response Spectra for Attached Equipment," to generate forces and moments for evaluation of piping, baseplates, and anchorage. In the licensee's piping analysis, a stress intensification factor of 2.3 was utilized to accurately consider the threaded connection and the resulting stresses were determined to be acceptable in accordance with the requirements of the applicable UFSAR design criteria. TVA also stated that a ball valve for the temporary chiller system is located in the piping prior to it entering the CRE boundary and will not be installed in the highest stressed location. Therefore, the computed stresses for the temporary chiller piping system envelope the stresses at the ball valve.

The NRC staff finds that the licensee's response adequately demonstrates that (1) the temporary chiller system is not a high energy line system and evaluation and qualification of the system piping for pipe rupture and pipe whip is not required, (2) the temporary chiller piping system has been evaluated for internal pressure, deadweight, and seismic loading conditions, and meets the pertinent design requirements of Seismic Category I(L) as defined in the Watts Bar UFSAR, Section 3.2.1, and (3) the temporary hoses, pipe, fittings, and valve are qualified for adequate pressure and the seismic retention to maintain the integrity of the CRE boundary.

During the regulatory audit, the NRC staff observed that provisions exist in both Watts Bar temporary modification (i.e., "T-mod") work packages to control the spraying effects of leakage in the event either the supply or return hoses develop a leak during the time the temporary chiller is supplying cooling water to the inoperable but functional AHU. The staff also confirmed that the temporary connections are routed in the same area that contains the plant chiller water piping. This area has been evaluated against the possibility of flooding caused by leakage of the existing chiller water piping. The staff confirmed that the operating flow volume of the temporary chilled water supply is bounded by the value of the existing plant chiller water piping. Therefore, the NRC staff finds that the flooding effect of potential pipe leakage from the temporary chiller water system in the MCRHZ is bounded by the current flooding analysis.

3.1.2 System Sizing

The design basis limit for the MCR is 104 °F. The temporary chiller water package has a nominal cooling capacity of 150 tons. During the regulatory audit, the NRC staff observed that the 150-ton (minimum) capacity of the temporary chiller skid exceeds the individual design capacity of each CREATCS AHU.

During both phases of the CREATCS train A and train B chiller replacement, the only change to the AHUs serving the rooms of the MCRHZ is to disconnect the permanent chiller water lines and reconnect the temporary chiller water lines from the temporary chiller water package. The existing ducts to and from the AHUs and the system dampers will not be affected during either phase of implementation.

Based on this information, the NRC staff finds that the air flows from the AHUs will be unaffected and the temporary chiller water package working in conjunction with each AHU is capable of meeting the cooling requirements of the MCRHZ during plant normal operations.

3.1.3 Temporary Chiller Water Skid Power Supplies

TVA stated that the temporary chiller system and chiller water pump will be powered from nonsafety-related 480 volt (V) alternating current (AC) sources located within the station area. Should the onsite power source for the temporary chiller system be lost, the temporary equipment can be restarted and placed back into service powered by the backup diesel generator (DG). The temporary chiller water system has a 320 kilowatt (kW) skid-mounted DG dedicated so that it can operate independently of site power. TVA determined that the DG is sufficient to meet the chiller system load demand (e.g., compressor, chiller water pump, instrumentation and controls).

During the regulatory audit, the staff observed that the temporary, dedicated DG fuel oil tank's capacity provides a 12-hour run time for the chiller skid without fuel oil replenishment, which is an adequate time to take replenishing measures from alternate sources.

3.1.4 Temporary Chiller Skid Location

During the regulatory audit, the NRC staff examined documents that identified the temporary chiller package's potential locations in the yard and the water lines that will run from the chiller package to the inoperable but functional affected AHU. The temporary chiller package will be located at either of two potential locations: (a) due west of the auxiliary building or (b) northwest of the Unit 1 containment. Both locations will locate the temporary chiller skid approximately 250 feet from both the auxiliary building fresh air intake and the closest of the two MCR fresh air intakes. Final connection of the chiller water lines to the AHU will occur when the CREATCS chiller to be replaced is taken out of service. In the event that nonsafety-related 480 VAC source is lost and the skid's DG is required to operate to power the temporary chiller, the NRC staff determined that based on the distance of the skid from the fresh air intakes that any DG exhaust fumes emitted from the skid would be sufficiently dilute so as not to provide a threat to MCR habitability or auxiliary building accessibility. This determination was based on review of Table 5.5.1, "Air Intake Minimum Separation Distance," and Informative Appendix F, "Separation of Exhaust Outlets and Outdoor Air Intakes," Table F2-2, "Minimum Dilution Factors," of ANSI/ASHRAE Standard 62.1-2013 "Ventilation for Acceptable Indoor Air Quality."

3.2 Control Room Habitability

3.2.1 Control Room Envelope Integrity

The CREATCS and the MCRHS provide for the safe uninterrupted occupancy of the MCRHZ during an accident and subsequent recovery period. In tandem the two systems maintain the MCRHZ and satisfy in part the requirement of GDC 19 that:

> 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.

The MCRHZ includes the rooms on Elevation 755' of the Control Building. The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control both units during normal and accident conditions. For Watts Bar, the terms CRE and MCRHZ can be used interchangeably. This area encompasses the MCR and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural events, and accident conditions. The CRE boundary is the combination of walls, floor, roof, ducting, doors, penetrations, and equipment that physically form the CRE. The operability of the CRE boundary must be maintained to ensure that the in-leakage of unfiltered air into the CRE will not exceed the in-leakage assumed in the licensing basis analysis of design basis accident (DBA) consequences to CRE occupants.

TVA stated:

> The CRE will remain established with the sizing of the piping connections used in the penetrations into the Control Building mechanical equipment room to connect the chilled water loop supplied by the temporary chiller. The piping penetrations will be procedurally tracked to ensure that the CRE breach margin is not exceeded. No post-accident missions outside of the MCR would be necessary to start up the operable CREATCS in the event of an accident during the period of installation *[i.e., … chiller replacement]* and use of the temporary chilled water system.

During the regulatory audit, the NRC staff observed that during both phases of the chiller replacements, the supply and return chilled water hoses from the temporary chiller skid to the respective inoperable but functional AHU will be routed through two floor CRE penetrations of the mechanical equipment room. The mechanical equipment room is part of the MCRHS area which includes all rooms on plan Elevation 755' of the Control Building. The staff observed that the required combined area to accommodate these two breaches, can be procedurally controlled within the constraints of the licensing basis analysis pertaining to DBA consequences to CRE occupants.

As stated in Section 9.4.1 of the UFSAR (ADAMS Accession No. ML19176A145), the MCRHZ area isolation signal can be generated by a safety injection signal, high radiation, or smoke concentration in the normal outside air intake. Upon the actuation of a MCRHZ area isolation signal, the following conditions occur:

- Automatic isolation valves in the AHU outside air intake ducts close and the emergency air cleanup system operates to recirculate a portion of the MCR air conditioning system return air through high efficiency particulate air (HEPA) filters and charcoal adsorbers; and

- The Control Building emergency pressurizing air supply fans operate to supply a reduced quantity of outside air to the MCR to keep the MCRHZ area pressurized. The intake air is routed through the emergency cleanup system. The non-safety related ventilation fans in the Control Building that could impact the MCR pressurization and leakage characteristics will cease to operate, and the isolation valves and dampers in the related ductwork communicating with outside close.

During air cleanup system operation, a portion of the MCR air conditioning system return air is continuously routed through one or both air cleanup units and then to the system return air plenum. The cleaned air is thus recirculated to the MCR by the air-conditioning system.

Since TVA plans to procedurally limit the size of the two breaches to the CRE within the constraints of the licensing basis analysis, the operability of the MCRHZ will be unaffected by operation of the temporary chilled water system.

TVA stated that there are no changes planned to the ductwork, AHU characteristics, or the various system air flows serving the MCRHZ during either phase of the chiller replacements. Furthermore, the temporary cooling system and associated devices will be designed such that safety-related features of the operable CREATCS train will not be prevented from performing its safety function. During both phases of the chiller replacements, plant components and their setpoints that could impact the ability of the operable CREATCS train to respond to accident conditions will not be altered by the connection of the temporary chiller system to the inoperable but functional AHU. Furthermore, no changes to the emergency air cleaning system will be required to implement either phase of the CREATCS chiller replacements and there will be no impact to post-accident dose analysis.

3.2.2 Protection from Hazardous Chemical Releases

Section 6.4.4.2 of the UFSAR (ADAMS Accession No. ML19336A067) states that no hazard to control room habitability is posed by any of the chemicals stored on site, offsite within a 5-mile radius, or transported by the site by barge, rail, or road within a 5-mile radius. The guidelines in RG 1.78 address the in-leakage of hazardous materials. Since TVA plans to procedurally limit the size of the two breaches to the CRE within the constraints of the licensing basis analysis, the modification package employed to facilitate use of the temporary chiller skid will not impact the operability of any penetration associated with the MCRHZ.

As noted in SE Section 3.1.4, the NRC staff concluded that based on the distance of the skid from the fresh air intakes, any DG exhaust fumes emitted from the skid would be sufficiently dilute so as not to provide a threat to MCR habitability or auxiliary building accessibility.

RG 1.78 states the MCR should be appropriately protected from hazardous chemicals that may be discharged as a result of equipment failures, human errors, or events and conditions outside the control of the nuclear power plant. RG 1.78 Section B “Discussion” reads in part:

> The guide also provides guidance on performing detailed evaluations of control room habitability and on screening criteria, including the distance between the release source and the control room, the frequency of shipments (to calculate release frequency from a mobile source), the quantity and duration of a release, toxicity of released chemicals, meteorological conditions (for dispersion calculations), and the rate of air infiltration into the control room. The guide covers both toxic and asphyxiating chemicals, but recognizes that the asphyxiating chemicals should only be considered if their release results in displacement of a significant fraction of the control room air.

Based on details contained in the LAR and the NRC staff’s onsite audit, the staff concluded that apart from the potential for diesel engine exhaust fumes (which the staff determined to be sufficiently dilute at the point of intake, as discussed above), no new and unique toxic or asphyxiating chemicals will be introduced that pose a threat to MCR habitability at the Watts Bar

site. Therefore, the NRC staff finds that the MCR will continue to satisfy the recommendations of RG 1.78.

3.2.3 MCRHZ Temperature Control

Watts Bar UFSAR Section 9.4.1.3 states, “All MCR equipment operates normally at an ambient temperature of 75°F [degrees Fahrenheit (°F)]. Abnormal excursions of short duration (12 hours or less) to 104°F maximum and 60°F minimum may occur without adverse effects on the equipment.”

The LAR proposed a one-time change to the footnote for the TS 3.7.11, Condition E, completion time to allow a 4-day delayed entry into LCO 3.0.3. The licensee stated that 4 days is a reasonable timeframe to perform maintenance to restore an inoperable CREATCS train to an operable status based on a review of Maintenance Rule unplanned unavailability data for the CREATCS chillers from March 2015 to March 2020.

The proposed TS change states that MCR temperature will be monitored every hour to verify that it is less than or equal to 90 °F, and that if the temperature goes above 90 °F, or the duration without a train of CREATCS being operable exceeds 4 days, immediate entry into LCO 3.0.3 is required. LCO 3.0.3 requires that the reactor shall be placed in MODE 3 within 7 hours; MODE 4 within 13 hours; and MODE 5 within 37 hours.

LAR Section 3.4.2 states in part:

> The 90°F temperature limit provides adequate margin between the normal MCR operating temperature of 75°F and a limit that ensures that the equipment operability limit of 104°F is not exceeded. By maintaining the MCR temperature at or below 90°F, the operability requirements for safety-related functions provided by equipment and instrumentation in the MCR, as well as habitability needs for operating personnel, is satisfied.
>
> To support the one-hour frequency for temperature monitoring TVA evaluated the effect of a loss of cooling on the MCR temperature by performing an analysis of the heatup of the MCR and surrounding areas. The analysis assumed normal operating heat loads, normal average initial room temperatures, summertime maximum outdoor temperatures, one [air handling unit] AHU operating, and no chillers in operation. The calculation demonstrates that the temperature increase from 75°F (normal MCR operating temperature) to 104°F takes approximately 5.3 hours. This temperature response does not credit the temporary chiller system cooling.

During the regulatory audit, the NRC staff examined the evaluation referenced above. Calculation MDQ00003120090157, Revision 7, “Main Control Room Floor (EL. 755.0) Transient Temperature Analysis,” contains Figure H.4, “Cases H1 through H3 Main Control Room Temperatures,” which shows the calculated MCR transient temperatures. Figure H.4 supports the passage above and indicates that with normal heat loads (i.e., non-LOCA), the time to heat up the MCR to 104 °F from approximately 75 °F for the worst case (i.e., Case H1) is 5.28 hours. This figure also indicates that the MCR would reach 106 °F after 7 hours and 118 °F after 24 hours, absent a cooling water supply.

In an RAI, the staff noted that the MCR could reach the 104 °F limit for MCR operability and the safety-related equipment operability/integrity could be challenged well before reaching MODE 3 within 7 hours. The staff requested additional justification of the measures, mitigation, or procedures that TVA will implement to assure a safe shutdown of both Watts Bar units after the loss of both trains of CREATCS when the MCR temperature starts at (i.e., reaches or exceeds) 90 °F.

The licensee acknowledged in its RAI response that it is required to achieve MODE 5 within 37 hours from entry into TS LCO 3.0.3. TVA stated that based on the figures in Calculation MDQ00003120090157, Revision 7, the MCR temperature would continue to rise slowly over this time. The licensee further stated that the actions and measures to assure a safe shutdown of both Watts Bar units after the loss of both trains of CREATCS when the MCR temperature starts at 90 °F include:

- Requesting for priority maintenance to restore the inoperable CREATCS train and reviewing the operation of the temporary non-safety related chiller system to ensure that it continues to supply chilled water to the MCR HVAC system;

- Compensatory actions to remove heat from the MCR; and

- if necessary, implementing existing procedures to abandon the MCR and shutdown both Units from outside the MCR.

More specifically, TVA stated that:

> To provide ventilation to the MCR with a loss of both trains of the CREATCS, the actions initially designed for smoke removal from the MCR can be used. There is no permanent equipment dedicated to smoke removal functions. However, equipment such as the battery room exhaust fans, spreading room exhaust fans, and toilet and locker room exhaust fans can be used with combinations of dampers and/or doors and portable ducts, and fans to evacuate smoke (or heated air) from the Control Building spaces. Operators can manually start any one of the toilet and locker room, battery room, and spreading room exhaust fans, align dampers, and open doors to remove air. The normal ventilation exhaust systems can generally be used to duct smoke directly outside. However, upon loss of power to the permanent fans, loss of air supply to dampers, and closure of fire/smoke dampers, portable ductwork and fans powered by portable generators, can be used to direct smoke through doorways or hatches to the outside of the building via the Turbine Building. In addition, natural venting may be used in some areas for smoke removal. These smoke removal actions would also be useful in removing heated air from the MCR.
>
> In the unlikely event that the operators determined that the units could not be effectively controlled from the MCR, the units can be safely maintained and shutdown, if necessary, from the Auxiliary Control Room (ACR) in accordance with the plant Abnormal Operating Instructions. WBN [Watts Bar] has an auxiliary control system to address situations requiring MCR abandonment. This system is located outside of the Control Building and is physically independent of the control building. The design provides appropriate means to isolate the necessary safe shutdown equipment and control features from the Control Building. The system is provided to satisfy General Design Criteria (GDC) 19 in

> Appendix A to 10 CFR 50 and 10 CFR 50 Appendix R Section III.G.3 and III.L. In order to meet GDC 19 requirements, the auxiliary control system instrumentation and controls are physically remote from, and their circuits are electrically separated from, their counterparts in the MCR. In order to meet Appendix R requirements, the auxiliary control system is both physically and electrically independent of the Control Building. Neither GDC 19 nor Appendix R requires redundant auxiliary control systems (e.g., a Train A and Train B auxiliary control systems). This system and the associated operating procedure allow control of the units from Mode 3 to cold shutdown (Mode 5).
>
> Therefore, with these actions and design attributes in place, both units can be safety [sic] brought to a Mode 5 condition if all cooling is lost in the MCR and the MCR heats up beyond 90 °F while in TS 3.7.11, Condition E.

Based on the information provided by TVA, the NRC staff concludes that implementation of either phase of the CREATCS chiller replacements will neither impact the ability to isolate the MCRHZ nor the ability of the emergency air cleanup system to function as designed. Therefore, the requirements of GDC 19 will continue to be satisfied.

3.3 Orderly Shutdown of Watts Bar

In the LAR, TVA stated, in part:

> During the proposed modification, appropriate actions will be implemented to ensure the CREATCS will be available to provide adequate environmental conditions for equipment operation and protection, and personnel comfort in the common MCR during normal, accident, and post-accident recovery conditions. The use of compensatory actions includes the installation of a temporary chiller system able to maintain MCR conditions in addition to the remaining operable CREATCS train.

The staff notes that based on its review of the figures presented in Calculation MDQ00003120090157, Revision 7 during the audit, the ability to perform the safety functions of Watts Bar structures, systems, and components important to safety within the CRE, could be impaired if MCR temperatures rise above 104 °F. However, the licensee has established adequate compensatory measures so that both units can be safely brought to a MODE 5 condition as delineated in Section 3.2.3 of this safety evaluation. In addition to these measures, the auxiliary control system, per the provisions of GDC 19, can be used, if necessary, to achieve shutdown.

Therefore, consistent with the requirement of GDC 5, in the event of an accident in one unit there is reasonable assurance of an orderly shutdown and cooldown of the remaining unit.

3.4 Evaluation of Human Factors

3.4.1 Evaluation of Operator Actions

The following subsections discuss the NRC staff's evaluation of changes the licensee has proposed for personnel affected by the proposed amendments.

3.4.1.1 Operators Actions for TS 3.7.11, Condition A

The chiller replacement for Train A and Train B will be done in phases to ensure that one CREATCS train will be operable and on stand-by for MCR cooling should the temporary system become unavailable. The stand-by train is designed to automatically start after a 30-second delay for the following events: (1) high air inlet temperature to the operating AHU, (2) low discharge airflow from the operating AHU, and (3) low differential pressure across the operating chilled water pump. Because the chilled water pump will be out of service during the modification of the affected train, the licensee stated that the start signal for only the low differential pressure will be defeated to avoid an "undesirable continuous start signal." The automatic start signal for the other 2 events will remain the same. Also, the licensee stated that failure of the operating train for any of those cases listed above will alert operators in the MCR via an alarm.

The licensee stated that qualified personnel will be trained on the operation and maintenance of the temporary chiller system, including the backup power supplies. The temporary chiller system will have supply and return hoses that are connected to the associated equipment outside of the Control Building, that will travel to the AHUs in the Control Building. In the event that the temporary chiller water line ruptures and actions are needed to isolate the piping to prevent flooding inside the Control Building areas, there will be two manual isolation valves, one for each penetration through the CRE boundary, for that purpose. The licensee does not intend to station a person solely for this task because in the event of a water line rupture, the total volume within the temporary chilled water system is bounded by existing moderate energy line break internal flooding design evaluations.

The NRC staff reviewed TVA's proposed personnel actions for the replacement of the Watts Bar, Units 1 and 2, CREATCS chillers. The MCR operator actions are acceptable because they remain unaffected. Moreover, the licensee identified qualified personnel who will be trained to maintain and operate the temporary chiller system. The NRC staff reviewed the proposed actions of these personnel and finds them to be acceptable because the licensee has appropriately considered actions for both normal and abnormal operating conditions.

3.4.1.2 Operator Actions for TS 3.7.11, Condition E

In the event both CREATCS trains become inoperable in MODES 1, 2, 3, or 4, TS 3.7.11, Condition E requires immediate entry into TS LCO 3.0.3 (i.e., the unit must be placed in MODE 3 within 6 hours and MODE 5 within 36 hours). In the event both CREATCS trains become inoperable and the MRC temperature exceeds 90 °F, both units would enter TS LCO 3.0.3 and start the controlled shutdown in accordance with existing plant operating procedures. As stated above, because Watts Bar, Units 1 and 2, share a control room, the required shutdown applies to both units.

The actions that the operators would perform for a dual-unit shutdown are the same as any entry into TS LCO 3.0.3. Moreover, there are existing actions operators may take should the operators attempt to remove heat from the MCR. The licensee describes in its response to the NRC staff's RAI that the actions for smoke removal would be useful in removing heated air from the MCR. These actions include the combined usage of exhaust fans, dampers, doors, and portable ducts, to remove heated air or smoke from accessible areas such as the battery room, [cable] spreading room, and toilet and locker room. In the event of loss of power to the permanent fans, loss of air supply to dampers, and closure of fire/smoke dampers, the operators can use portable ductwork and fans powered by portable generators to direct the

heated air or smoke, through doorways or hatches to the outside of the building via the Turbine Building. Lastly, natural ventilation is available in some areas. In the event it becomes necessary to abandon the MCR entirely, the operators have the ability to control the MCR from the Auxiliary Control Room in accordance with the plant abnormal operating procedures (AOPs). The Auxiliary Control Room is a physically independent location outside of the Control Building and meets the criteria of GDC 19 in Appendix A to 10 CFR Part 50.

The proposed footnote states that operators will monitor the MCR temperature every hour and verify that the temperature is less than or equal to 90 °F, for up to 4 days in lieu of immediate entry into LCO 3.0.3. The temperature limit for MCR equipment operability is 104 °F, and the normal MCR operating temperature is 75 °F. The licensee provided a calculation of the time that it will take for the MCR and surrounding areas to heat up before the heat-up starts to affect the operability of equipment and challenge operator comfort. The licensee suggests that the calculated time is sufficient enough that operators will be well aware of the heat-up prior to reaching 90 °F, specifically stating, “the MCR temperature data is measured and displayed from readily available equipment in the MCR and operators will have awareness of temperature trending relative to the 90°F limit.”

The NRC staff reviewed TVA’s proposed operator actions related to the proposed change to Watts Bar, Units 1 and 2, TS 3.7.11, Condition E, and finds them to be acceptable because (1) actions that the operators would perform for a dual-unit shutdown are the same as any entry into TS LCO 3.0.3, (2) there are existing actions that the operators may take to remove heat from the MCR, and (3) there are AOPs to allow for continuous control of the MCR in the case that the MCR temperature cannot be controlled.

3.4.1.3 Conclusion for Operator Actions

The NRC staff reviewed TVA’s proposed operator actions associated with changes to the Watts Bar, Units 1 and 2, TSs, and finds them to be acceptable because the licensee has sufficient procedures in place to maintain control room habitability such that it meets the criteria of GDC 19 in Appendix A to 10 CFR Part 50. The licensee has also appropriately considered the operator actions to ensure the safe shutdown of the units. Additionally, TVA recognizes that there should be qualified and appropriately trained individuals who will operate and maintain the temporary chiller in both its normal capacity and in abnormal conditions, as discussed in Section 3.4.2 of this safety evaluation.

3.4.2 Evaluation of Personnel Training for the Proposed Modification to the CREATCS Chillers.

The licensee stated that a qualified person will be in charge and trained on the operation of the temporary CREATCS chillers. There will be procedures available to that person that will provide the requirements and procedures for equipment startup, operation, and temperature monitoring. The licensee has considered the actions for that individual in normal and abnormal conditions. For example, the licensee identified that during the modification to the CREATCS chillers, if there was an event where power is lost, the temporary chiller will be manually started by that individual using the emergency diesel generator (EDG). Concurrently, the operable train will be started automatically with the EDG and is capable of maintaining the MCR temperature at acceptable levels for this event. There is no additional training allocated for MCR operators, as their actions for the proposed modification are either nominal or already exist.

The licensee has appropriately identified the need for an independent person, will train that individual, and provide the tools necessary to operate and maintain the temporary chiller in all conditions. The NRC staff finds these actions to be an appropriate level of training during the period of the modification to the CREATCS chillers.

3.4.3 Conclusion for Human Factors

The NRC staff reviewed the human performance aspects of TVA's request to change TS 3.7.11 for Watts Bar, Units 1 and 2, to support the modifications to the MCR CREATCS chillers. The staff finds the proposed operator actions and training to be acceptable because the licensee has appropriately considered the actions of both the MCR operators and the qualified individual in charge of the temporary chiller to ensure that control room habitability can be maintained in accordance with the criteria of GDC 19 in Appendix A to 10 CFR Part 50.

3.5 Evaluation of Proposed Change to Technical Specifications

The staff reviewed the licensee's request against the requirements and guidance in Section 2.3.

The licensee provided an evaluation of the proposed change in Section 3 of the LAR. In Section 3.7 of the LAR, the licensee concluded that a one-time change of the TS 3.7.11 COMPLETION TIME is acceptable and stated:

> The proposed one-time LAR in support of the modifications to the CREATCS trains is acceptable based on the compensatory measures and the low probability of an event requiring MCR isolation, the consideration that the remaining train can provide the required protection, and that alternate non-safety related cooling means are available.

The licensee provided a list of compensatory measures in Section 3.6 of the LAR that consist of the following:

- A temporary, non-safety related chiller system with a temporary DG to provide power to the temporary chiller system will be installed and operated as described in the LAR.
- Instructions for operation of the temporary cooling equipment will be provided to plant personnel.
- During replacement of the CREATCS chillers, TVA will employ a graded approach to defense-in-depth and protected equipment strategies based on the operating status of the affected unit. The risk of the activity will be assessed and managed, including the use of physical barriers as needed. Additionally, TVA procedures preclude work on or near protected equipment and limit access to the area to emergency situations and non-intrusive monitoring of running equipment per operator rounds.
- During replacement of the CREATCS chillers, no elective maintenance will be performed on TS related support equipment for the operable CREATCS chiller except for any required TS SRs.

Page E1-8 of the licensee's December 16, 2020, letter, provided further clarification that the compensatory measures would apply when Condition E is entered during modification activities planned for the upgrade of the CREATCS chillers.

The proposed footnote for Condition A Completion Time stipulates that the allowance for a 60-day inoperability for one CREATCS train is only authorized for one entry per train during modification activities planned for the upgrade of the CREATCS chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023. The footnote further stipulates that the 60-day Completion Time is also contingent on implementation of compensatory measures as described in TVA letter CNL-20-012, dated May 19, 2020.

The proposed footnote for Condition E Completion Time allows monitoring temperatures in lieu of immediate entry into LCO 3.0.3, requires entry into LCO 3.0.3 if temperatures exceed 90 °F, or the duration without a train of CREATCS being OPERABLE exceeds 4 days. The footnote can only be applied during modification activities planned for the upgrade of the CREATCS chillers beginning no earlier than May 1, 2022, and ending no later than May 1, 2023, and is also contingent on implementation of compensatory measures as described in TVA letter CNL-20-012, dated May 19, 2020.

In Section 3.4.2 of the LAR, the licensee provided a detailed justification for the proposed 4-day allowance for continued operation while in Condition E of TS 3.7.11. The licensee described why both CREATCS chiller trains would be inoperable and stated:

> During the PMT, the operable CREATCS train handswitch (located in the MCR) may be placed in pull to lock, rendering the operable CREATCS train inoperable. This is to prevent the modified CREATCS train PMT steps from adversely affecting the operable train. This impact is due to the automatic start signals from the modified train requiring the operable train to start inappropriately and repeatedly. For example, during testing of the modified train, there may be cooling water flow and/or air flow anomalies that would signal the operable train to start unnecessarily. During the time the operable CREATCS train is placed in pull to lock, the train is inoperable due to the inability to automatically start based on a signal from the modified CREATCS train being tested. However, while in TS 3.7.11, Condition E for this condition, operators in the MCR are able to restore the non-modified CREATCS train quickly by changing a single handswitch position. Delayed entry into LCO 3.0.3 is needed to allow stabilization of the water and air flow from the modified CREATCS train during PMT. This type of entry into TS 3.7.11, Condition E may be used more than once, but would only be used in direct support of PMT and only when the potential for anomalous water and/or air flow in the modified CREATCS train is possible.

The NRC staff reviewed the proposed TS and the licensee's justifications for the changes in the LAR and in the supplement dated December 16, 2020. The staff determined that the proposed TS changes represent a departure from the format and content for STS found in NUREG-1431 because such footnotes do not appear in the associated Completion Times. Per Chapter 16 of NUREG-0800, such departures require special attention to determine whether proposed differences are justified by uniqueness in plant design or other considerations so that 10 CFR 50.36 is met.

While a uniqueness in plant design does not exist, the staff determined the differences are justified by other considerations. Specifically, the NRC staff reviewed the licensee's detailed evaluation of the systems, planned activities, and restrictions on the use of the extended Completion Times and found them acceptable. Therefore, the staff determined the licensee's justification for the one-time change to the Completion Times for TS 3.7.11 Required Actions A and E is sufficient to justify the inclusion of a footnote in the TS for the associated Completion Times.

Technical Conclusion

Section 50.36(b) of 10 CFR requires TSs to be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto. The licensee provided an evaluation and justification of the proposed changes to Watts Bar, Units 1 and 2, TS 3.7.11.

The NRC staff reviewed the proposed changes as well as the licensee's justifications for the changes. The licensee has met the requirements of 10 CFR 50.36(a)(1) because a summary statement of the reasons for the TS was provided. The staff determined the regulatory requirements of 10 CFR 50.36(b) will continue to be met because the technical specifications will continue to be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto. The staff determined that the regulatory requirements of 10 CFR 50.36(c)(2) will continue to be met because the LCO will continue to describe the lowest functional capability or performance level of equipment required for safe operation of the facility and the remedial actions permitted by the TSs until the LCOs can be met have been deemed acceptable to the staff. Finally, while the format and content of the proposed changes do not fully conform to the guidance in NUREG-1431, the licensee provided adequate justification for differences between the STS and the proposed changes. Therefore, the NRC staff determines the proposed changes are 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 on November 18, 2020. 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 amendment involves no significant hazards consideration published in the *Federal Register* on July 14, 2020 (85 FR 42442), and there has been no public comment on such finding. 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 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: May 5, 2021

SUBJECT: WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT NOS. 145 AND 51 FOR ONE-TIME CHANGE TO TECHNICAL SPECIFICATION 3.7.11 TO EXTEND THE COMPLETION TIME FOR MAIN CONTROL ROOM CHILLER MODIFICATIONS (EPID L-2020-LLA-0114) DATED MAY 5, 2021

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