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

September 11, 2018

Mr. Adam C. Heflin
President and Chief Executive Officer,
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: ADDITION OF NEW TECHNICAL SPECIFICATION 3.7.20, "CLASS 1E ELECTRICAL EQUIPMENT AIR CONDITIONING (A/C) SYSTEM" (CAC NO. MF9961; EPID L-2017-LLA-0262)

Dear Mr. Heflin:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 219 to Renewed Facility Operating License No. NPF-42 for the Wolf Creek Generating Station, Unit 1 (WCGS). The amendment consists of changes to the technical specifications (TSs) in response to your application dated June 28, 2017, as supplemented by letters dated February 15, May 29, June 20, and August 30, 2018.

The amendment adds new TS 3.7.20, "Class 1E Electrical Equipment Air Conditioning (A/C) System," including (1) a Limiting Condition for Operation (LCO) statement, (2) an Applicability statement, during which the LCO must be met, (3) Actions to be applied when the LCO is not met, including Conditions, Required Actions, and Completion Times, and (4) Surveillance Requirements with a specified Frequency to demonstrate that the LCO is met for Class 1E electric equipment A/C system trains at WCGS.

The application of the TS definition of operability requiring that associated electrical TS LCOs be declared not met upon the determination of a Class 1E electrical equipment A/C train being nonfunctional, is overly restrictive and does not provide sufficient opportunity to restore the Class 1E electrical equipment A/C train to a functional status resulting in an unnecessary plant shutdown. The requirements of TS 3.7.20, in conjunction with the completed plant modifications and procedurally controlled manual actions, would allow one operable Class 1E electrical equipment A/C train to provide area cooling for both trains of Class 1E electrical equipment during normal and accident conditions, when in new TS 3.7.20, Condition A.

A copy of our related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

Balwant K. Singal, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosures:
1. Amendment No. 219 to NPF-42
2. Safety Evaluation

cc: Listserv

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

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION, UNIT 1

DOCKET NO. 50-482

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 219
License No. NPF-42

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

   A. The application for amendment to the Wolf Creek Generating Station, Unit 1 (the facility), Renewed Facility Operating License No. NPF-42 filed by the Wolf Creek Nuclear Operating Corporation (the Corporation), dated June 28, 2017, and supplemented by letters dated February 15, May 29, June 20, and August 30, 2018, 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, as amended, 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 license 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 Renewed Facility Operating License No. NPF-42 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. 219, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated in the license. The Corporation shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert J. Pascarelli, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License and
Technical Specifications

Date of Issuance: September 11, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 219 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-42

WOLF CREEK GENERATING STATION, UNIT 1

DOCKET NO. 50-482

Replace the following pages of the Renewed Facility Operating License No. NPF-42 and 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.

Renewed Facility Operating License

REMOVE	INSERT
4	4

Technical Specifications

REMOVE	INSERT
iii	iii
--	3.7-46
--	3.7-47

(5) The Operating Corporation, 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 or instrument calibration or associated with radioactive apparatus or components; and

(6) The Operating Corporation, 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 renewed operating license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations 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

The Operating Corporation is authorized to operate the facility at reactor core power levels not in excess of 3565 megawatts thermal (100% power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 219, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated in the license. The Corporation shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Antitrust Conditions

Kansas Gas & Electric Company and Kansas City Power & Light Company shall comply with the antitrust conditions delineated in Appendix C to this license.

(4) Environmental Qualification (Section 3.11, SSER #4, Section 3.11, SSER #5)*

Deleted per Amendment No. 141.

*The parenthetical notation following the title of many license conditions denotes the section of the supporting Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

3.7 PLANT SYSTEMS

3.7.20 Class 1E Electrical Equipment Air Conditioning (A/C) System

LCO 3.7.20 Two Class 1E electrical equipment A/C trains shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One Class 1E electrical equipment A/C train inoperable.	A.1	Initiate action to implement mitigating actions.	Immediately
	AND		
	A.2	Verify room area temperatures ≤ 90°F.	1 hour AND Once per 4 hours thereafter
	AND		
	A.3	Restore Class 1E electrical equipment A/C train to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours
C. Two Class 1E electrical equipment A/C trains inoperable.	C.1	Enter LCO 3.0.3.	Immediately

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.20.1	Verify each Class 1E electrical equipment A/C train actuates on an actual or simulated actuation signal.	18 months
SR 3.7.20.2	Verify each Class 1E electrical equipment A/C train has the capability to remove the assumed heat load.	18 months

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 219 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-42

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION, UNIT 1

DOCKET NO. 50-482

1.0 INTRODUCTION

By application dated June 28, 2017 (Reference 1), as supplemented by letters dated February 15, May 29, June 20, 2018, and August 30, 2018 (References 2, 3, 4, and 5, respectively), Wolf Creek Nuclear Operating Corporation (WCNOC, the licensee), requested the addition of a new Technical Specification (TS) related to the Wolf Creek Generating Station, Unit 1 (WCGS) operating license.

The license amendment request (LAR) proposes a new TS to address the operation of the room cooling for essential electrical equipment. Specifically, the proposed amendment would add TS 3.7.20, "Class 1E Electrical Equipment Air Conditioning (A/C) System," including (1) a Limiting Condition for Operation (LCO) statement, (2) an Applicability statement, during which the LCO must be met, (3) Actions to be applied when the LCO is not met, including Conditions, Required Actions, and Completion Times, and (4) Surveillance Requirements (SRs) with a specified Frequency to demonstrate that the LCO is met.

The application of the TS definition of operability requiring that associated electrical TS LCOs be declared not met upon the determination of a Class 1E electrical equipment A/C train being nonfunctional, is overly restrictive and does not provide sufficient opportunity to restore the Class 1E electrical equipment A/C train to a functional status resulting in an unnecessary plant shutdown. The requirements of TS 3.7.20, in conjunction with the completed physical modifications, would allow one operable Class 1E electrical equipment A/C train to provide adequate area cooling for both trains of Class 1E electrical equipment during normal and accident conditions.

In the current configuration, each Class 1E electrical equipment train is configured to cool its associated electrical equipment room only. As stated by the licensee in its letter dated August 30, 2018, the design modifications including testing, and procedurally controlled manual actions, to facilitate circulation of cool air from each of the Class 1E electrical equipment A/C system trains to the electrical equipment rooms associated with the opposite Class 1E electrical equipment A/C train considered necessary to the implementation of the proposed TS 3.7.20, have already been completed.

The supplemental letters dated February 15, May 29, June 20, and August 30, 2018, 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 October 3, 2017 (82 FR 46099).

2.0 REGULATORY EVALUATION

2.1 System Description

The Class 1E electrical equipment A/C trains at WCGS provide a suitable environment for the Class 1E electrical equipment. These A/C trains provide a temperature and humidity controlled environment for the engineered safety features (ESF) switchgear (SWGR) room components, direct current (DC), alternating current (AC) switchboard (SWBD) room components, and 125 volt DC (VDC) battery room components. The specific rooms (RMs), with RM numbers supplied by the Class 1E electrical equipment A/C trains, are shown in the table below:

SGK05A	SGK05B
SWBD RM NO. 1 (3408)	SWBD RM NO. 4 (3404)
SWBD RM NO. 3 (3414)	SWBD RM NO. 2 (3410)
Battery RM NO. 1 (3407)	Battery RM NO. 4 (3405)
Battery RM NO. 3 (3413)	Battery RM NO. 2 (3411)
ESF SWGR RM NO. 1 (3301)	ESF SWGR RM NO. 2 (3302)

The Class 1E electrical equipment A/C trains SGK05A and SGK05B are independent trains that provide cooling of recirculated air in the rooms associated with that train. Each train consists of a prefilter, self-contained refrigeration system (using normal service water or essential service water (ESW) system as a heat sink), centrifugal fans, instrumentation, and controls to provide for electrical equipment room temperature and humidity control. The Class 1E electrical equipment A/C trains operate during normal plant operations and emergency conditions. Each train is configured to cool only the equipment associated with its load group. The Class 1E electrical equipment A/C trains are operated in a continuous recirculation mode to maintain the ESF switchgear room, the 125 VDC battery rooms, and the DC switchboard rooms at a temperature of less than or equal to (≤) 90 degrees Fahrenheit (°F) as discussed in the WCGS Updated Safety Analysis Report (USAR) Section 9.4.1, "Control Building HVAC [Heating, Ventilation, and Air Conditioning"] (Reference 6).

The design basis of the Class 1E electrical equipment A/C system is to maintain temperature in the Class 1E electrical equipment rooms to assure operability of associated electrical equipment. Section 9.4.1.1.1, "Safety Design Basis Three," of the WCGS USAR, states that the Class 1E electrical equipment A/C system is designed so that the single failure of an active component coincident with a loss of offsite power (LOOP) will not impair the ability of the supported systems powered by the electrical equipment to fulfill their safety functions.

During normal or emergency operations, each Class 1E electrical equipment A/C train maintains the associated electrical equipment room temperatures and relative humidity at or below 90 °F and 70 percent, respectively. The Class 1E electrical equipment A/C trains are designed as Safety Class 3 and are in accordance with Seismic Category I requirements. The Class 1E

electrical equipment A/C trains are automatically started upon receipt of a control room ventilation isolation signal (CRVIS), by the loss-of-coolant accident (LOCA) sequencer, and by the shutdown sequencer. A CRVIS is initiated by the control room ventilation radiation monitors, fuel building ventilation isolation signal, containment isolation phase A signal, containment atmosphere radiation monitors, containment purge exhaust radiation monitors, or manually. The ESW system is actuated upon receipt of a safety injection signal, a low suction pressure on the auxiliary feedwater pumps, or LOOP.

2.2 Reason for Proposed New TS

In Section 2.4 of Attachment II to the licensee's application dated June 28, 2017 (Reference 1), the licensee provided a brief history of the WCGS TSs, with special attention to the background leading to the current request proposing the addition of new TS 3.7.20 for the Class 1E electrical equipment A/C trains.

WCGS has two Class 1E electrical equipment A/C trains, with each A/C train configured to only cool its associated electrical equipment room. The Class 1E electrical equipment A/C trains are not included in the TSs. However, the electrical equipment serviced by the Class 1E electrical equipment A/C trains are in TS 3.8.4, "DC Sources – Operating"; TS 3.8.7, "Inverters – Operating"; and TS 3.8.9, "Distribution Systems – Operating." Since a nonfunctional Class 1E electrical equipment A/C train renders the associated electrical equipment inoperable, the required actions in the associated electrical equipment TSs apply upon the loss of the A/C train. The completion time of 2 hours and 8 hours in TS 3.8.4 and TS 3.8.9 are very restrictive. The completion time for the required action for loss of one inverter in TS 3.8.7 is also 24 hours. The associated electrical equipment room contains two inverters per train. Since TS 3.8.7 does not contain a condition for loss of two inverters in a train, TS LCO 3.0.3 requires actions to be taken within 1 hour to place the plant in Mode 3 within 7 hours, in Mode 4 within 13 hours, and in Mode 5 within 37 hours when the associated Class 1E electrical equipment A/C train is nonfunctional.

WCGS included the Class 1E electrical equipment room A/C trains in the licensee controlled Technical Requirements Manual (TRM) in August, 2000 by incorporating a new Technical Requirement (TR) 3.7.23, "Class 1E Electrical Equipment Air-Conditioning (A/C)." If one Class 1E electrical equipment A/C train is nonfunctional, TR 3.7.23 allowed up to a 7-day delay period before declaring the supported Class 1E electrical equipment in that train inoperable and entering the applicable conditions and required actions of the TSs for the affected electrical equipment. The 7-day completion time was based on certain mitigating actions specified in TR 3.7.23, such as opening doors, de-energizing certain heat producing electrical equipment in the associated electrical rooms and verification of room temperatures. If both Class 1E electrical equipment A/C trains are nonfunctional, all the affected electrical equipment were to be declared nonfunctional.

The following key issues were later identified with the TRM approach:

- TS Section 1.1, OPERABILITY definition;
- Application of LCO 3.0.6, and;
- Single Failure Criteria.

Based on TS 1.1, OPERABILITY definition, the support system (Class 1E electrical equipment A/C trains) functionality is tied to the supported system (Class 1E electrical equipment)

OPERABILITY, except as provided per TS 3.0.6. The provisions of TS LCO 3.0.6 allow for the support system required actions to govern for the supported systems as follows:

> When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with the supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, an evaluation shall be performed in accordance with Specification 5.5.15, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

Explicit within the requirement is the understanding that the support system is covered by its own LCO within the TSs (i.e., non-TS support systems are not governed by LCOs). The addition of a TS for the support system function performed by the Class 1E electrical equipment A/C trains will allow LCO 3.0.6 to be applied such that supported system inoperability can be dealt within the conditions and required actions of the support system TS.

NRC inspections identified that the compensatory measures, which included temporary fans, did not have a safety-related power source with emergency diesel generator (EDG) backup. Therefore, room cooling for redundant trains of electrical equipment by the temporary fans would be disabled in the event of LOOP.

In Attachment II to the letter dated June 28, 2017, Section 2.4, "Need for Change," the licensee stated that based on the key issues discussed above, the licensee deleted TR 3.7.23 from the TRM. Currently, the functionality requirements imposed on the Class 1E electrical equipment A/C trains at WCGS are governed by procedures AP-26C-004, "Operability Determination and Functionality Assessment," and SYS GK-200, "Non-Functional Class 1E A/C Unit." If a Class 1E electrical equipment A/C train is nonfunctional, procedure AP-26C-004 requires declaring the supported electrical equipment inoperable and entering the applicable conditions and required actions of TS 3.8.4, TS 3.8.7, TS 3.8.9, and LCO 3.0.3. Compensatory measures are established per the guidance in procedure SYS GK-200 to restore the Class 1E electrical equipment to an OPERABLE but degraded status. The compensatory measures include installing seismically mounted temporary fans powered from a safety-related source.

In the application dated June 28, 2017, the licensee stated that some of the functional failures associated with the Class 1E electrical equipment A/C system occurred in the past 5 years. Examples of component failures include: loss of oil pressure, system blockage/non-radioactive contamination, and compressor damage. Equipment reliability has declined due to the non-availability of replacement compressors and parts for the impacted equipment. The WCGS design does not have an independent/redundant A/C train for SGK05A or SGK05B that would allow taking a cooling train out of service for planned maintenance or that would provide backup cooling due to a failure. Therefore, the proposed new LCO 3.7.20 will also provide a window for maintenance or repair activities associated with the A/C systems.

2.3 Proposed Change to the TSs

The proposed change would add a new TS 3.7.20, "Class 1E Electrical Equipment Air Conditioning (AC) System." to Section 3.7 "Plant Systems." The new TS and associated SRs are as follows:

3.7 PLANT SYSTEMS

3.7.20 Class 1E Electrical Equipment Air Conditioning (A/C) System

LCO 3.7.20 Two class 1E electrical equipment A/C trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Class 1E electrical equipment A/C train inoperable.	A.1 Initiate action to implement mitigating actions. AND A.2 Verify room area temperatures ≤ 90°F. AND A.3 Restore Class 1E electrical equipment A/C train to OPERABLE status.	Immediately 1 hour AND Once per 4 hours thereafter 30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours
C. Two Class 1E electrical equipment A/C trains inoperable.	C.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.20.1 Verify each Class 1E electrical equipment A/C train actuates on an actual or simulated actuation signal.	18 months
SR 3.7.20.2 Verify each Class 1E electrical equipment A/C train has the capability to remove the assumed heat load.	18 months

2.4 Design Modification that Supports New TS 3.7.20

In the application dated June 28, 2017 (Reference 1), the licensee stated that design changes are in process to modify the Class 1E electrical equipment A/C system and associated electrical equipment rooms to promote circulation of cool air from one Class 1E electrical equipment A/C train to rooms associated with both Class 1E electrical equipment trains. In the letter dated August 30, 2018, (Reference 5), the licensee stated that the necessary design modifications are completely installed and successfully tested. Specifically, the letter states: "[t]he purpose of this letter is to inform the NRC Staff that WCNOC has met the Regulatory Commitments listed in [Reference 3]," and "....[t]his letter contains no new commitments."

The completed modifications utilize electric-motor-powered recirculation fans to move cool air from the electrical equipment rooms with an operable A/C train to the equipment rooms with an inoperable A/C train. The warm air from the non-cooled rooms is transferred back to the return ductwork of the operable cooling train via the recirculation fans. This feature to cool all the electrical equipment rooms by any one Class 1E electrical equipment A/C train will be implemented only when the plant is in TS 3.7.20, Condition A (i.e., One Class 1E electrical equipment A/C train inoperable). The completed design modifications are necessary to achieve the capability for one cooling train to provide adequate cooling for both trains of electrical equipment during normal and accident conditions, when the plant is in Condition A of the proposed TS 3.7.20. In response to request for additional information (RAI) APHB-1, by letter dated May 29, 2018 (Reference 3), the licensee stated in part, that:

> The use of the recirculation subsystem to maintain OPERABILITY of both trains of Class 1E electrical equipment is not intended to deliver redundancy to the Class 1E Electrical Equipment A/C System. Rather, the recirculation subsystem provides a consistent, verifiable method of circulating the air between the two trains of Class 1E electrical equipment rooms. The mitigating actions proposed in new TS 3.7.20 maintain the Class 1E electrical equipment OPERABLE (but degraded) because, except for the loss of the active cooling function of one of the Class 1E electrical equipment A/C trains (a support system), the Class 1E electrical equipment itself is still fully OPERABLE.

The details of the design modifications are described in Section 3.1 of this safety evaluation (SE). In addition, a new proposed TRM, TR 3.7.20, "Class 1E Electrical Equipment Air Conditioning (A/C) Recirculation Subsystem," is further described in Section 3.7 of this SE.

2.5 Applicable Regulatory Requirements/Guidance

The NRC staff identified the following regulatory requirements and guidance as applicable to the proposed amendment to add a new TS 3.7.20. The proposed amendment adds TS LCO 3.7.20 with associated SRs.

2.5.1 Regulatory Requirements

Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 10 CFR 50.36(a)(1), requires an applicant for an operating license to include proposed TSs in the application in accordance with the requirements of 10 CFR 50.36, "Technical specifications." The regulation at 10 CFR 50.36(a)(1) requires in part that the applicant must include in the application:

> A summary statement of the bases or reasons for such specifications, other than those covering administrative controls ... but shall not become part of the technical specifications.

As required by 10 CFR 50.36(c)(2)(i), the TSs will include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Per the regulation at 10 CFR 50.36(c)(2)(i), when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the condition can be met.

The regulation at 10 CFR 50.36(c)(2)(ii) requires licensees to establish TS LCOs for each item meeting one or more of the listed criteria.

> (A) *Criterion 1.* Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.
>
> (B) *Criterion 2.* A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.
>
> (C) *Criterion 3.* A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.
>
> (D) *Criterion 4.* A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

The regulation at 10 CFR 50.36(c)(3), "Surveillance requirements," requires TSs to include items in the category of SRs, which 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.

The Commission's regulatory requirements related to the content of the AC power and station blackout (SBO) are set forth in 10 CFR 50.63, "Loss of all alternating current power." This regulation requires, in part;

1) Each light-water-cooled nuclear power plant licensed to operate under this part, each light-water-cooled nuclear power plant licensed under subpart C of 10 CFR part 52 after the Commission makes the finding under § 52.103(g) of this chapter, and each design for a light-water-cooled nuclear power plant approved under a standard design approval, standard design certification, and manufacturing license under part 52 of this chapter must be able to withstand for a specified duration and recover from a station blackout as defined in § 50.2. The specified station blackout duration shall be based on the following factors:

   i. The redundancy of the onsite emergency ac power sources;
   ii. The reliability of the onsite emergency ac power sources;
   iii. The expected frequency of loss of offsite power; and
   iv. The probable time needed to restore offsite power.

2) The reactor core and associated coolant, control, and protection systems, including station batteries and any other necessary support systems, must provide sufficient capacity and capability to ensure that the core is cooled and appropriate containment integrity is maintained in the event of a station blackout for the specified duration. The capability for coping with a station blackout of specified duration shall be determined by an appropriate coping analysis. Licensees are expected to have the baseline assumptions, analyses, and related information used in their coping evaluations available for NRC review.

Section 50.55a, "Codes and standards," of 10 CFR requires that the protection systems meet Institute of Electrical and Electronics Engineers (IEEE) 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations." Section 4.2 of IEEE 279-1971 discusses the general functional requirement for protection systems to assure they satisfy the single failure criterion and Section 4.6 of IEEE 279-1971 discusses channel independence and physical separation.

As described in 10 CFR 50.92, "Issuance of amendment," paragraph (a), in determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations which govern the issuance of initial licenses applicable and appropriate. The general considerations that guide the Commission include, as stated in 10 CFR 50.40(a), how the TSs provide reasonable assurance the health and safety of the public will not be endangered. Also, to issue an operating license, of which TSs are a part, the Commission must make the findings of 10 CFR 50.57, including finding the 10 CFR 50.57(a)(3)(i) finding that there is reasonable assurance that the activities authorized by the operating license can be conducted without endangering the health and safety of the public.

As stated in USAR, Section 3.1, "Conformance with NRC General Design Criteria," the design criteria for safety-related plant structures, systems, and components is in accordance with 10 CFR Part 50, Appendix A, "General Design Criteria [GDC] for Nuclear Power Plants."

The following GDC apply to the Class 1E electrical equipment A/C system:

Criterion (GDC) 2, "Design bases for protection against natural phenomena," states 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 the capability to perform their safety functions. The design bases for these structures, systems, and components shall reflect: (1) Appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena, and (3) the importance of the safety functions to be performed.

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 13, "Instrumentation and control," states that:

> Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

GDC 17, "Electrical power systems," states that:

> An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.
>
> The onsite electric power supplies, including the batteries, and the onsite electric distribution system shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights of way) designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.

Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.

2.5.2 Regulatory Guidance

The NRC staff identified the following regulatory guidance documents as being applicable to the proposed amendment.

- NUREG-1431, Revision 4.0, "Standard Technical Specifications, Westinghouse Plants," Volume 1, "Specifications," and Volume 2, "Bases" (References 7 and 8).

- Regulatory Guide (RG 1.22), Revision 0, "Periodic Testing of Protection System Actuation Functions" (Reference 9).

- Regulatory Guide (RG 1.93), Revision 1, "Availability of Electrical Power Sources" (Reference 10).

- The NRC staff's guidance for review of TSs is in Chapter 16, Revision 3, "Technical Specifications," of NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (Reference 11).

- The NRC staff reviews the human performance aspects of this LAR utilizing the review guidance in NUREG-0800, Chapter 18, Revision 3, "Human Factors Engineering" (Reference 12), and NUREG-1764, Revision 1, "Guidance for the Review of Changes to Human Actions" (Reference 13). Revision 1 of NUREG-1764, Appendix A, Table A.2, "Generic PWR [Pressurized-Water Reactor] Human Actions that are Risk-Important," lists human actions associated with the recovery of emergency AC or offsite power as potentially risk-important. The proposed addition of TS 3.7.20 and the completed modifications will enable redundant trains of Class 1E electrical systems to remain operable while one support system train is inoperable. The proposed changes involve human actions that mitigate equipment inoperability (Class 1E AC cooling system) that would result in the loss of a train of

emergency Class 1E AC power. Further, the proposed human actions in combination with the completed modifications breach the train separation barrier to allow the support system of the redundant train to cool components for both trains. However, the associated human actions are not complicated or involve actions incorporated into the plant procedures. Therefore, the NRC staff performed a Level II human factors review per the guidance in Section 4 of NUREG-1764. This review is provided in Section 3.8.3 of this SE.

3.0 TECHNICAL EVALUATION

In the application dated June 28, 2017 (Reference 1), and it supplements dated February 15 and May 29, 2018 (References 2 and 3, respectively), the licensee stated that a design change is in process to modify the Class 1E electrical equipment A/C system and associated electrical equipment rooms to promote circulation of cool air from one Class 1E electrical equipment A/C train to rooms associated with both Class 1E electrical equipment trains. The design modifications implemented under 10 CFR 50.59, "Changes, tests, and experiments," (Reference 5) will provide reasonable assurance that one cooling train will provide adequate cooling for both trains of electrical equipment during normal and accident conditions.

The NRC staff conducted an onsite audit on November 7 and 8, 2017, as per the audit plan issued on October 23, 2017 (Reference 14), in order for the NRC staff to gain a better understanding of the design change, licensee's calculations and other aspects of the LAR. The NRC staff's review effort continued from the NRC staff office and was completed on February 1, 2018. The results of the audit are documented in an audit summary issued on April 2, 2018 (Reference 15).

During the audit, the NRC staff performed a walkdown of the associated Class 1E electrical equipment area and discussed design drawings, calculations, computer-modeling of HVAC systems (GOTHIC) and the electrical power system, and training materials.

By letter dated February 15, 2018, the licensee supplemented the information provided in the application dated June 28, 2017, to clarify some audit related questions. The NRC staff issued RAIs (Reference 16) on items that required further clarification and requested the licensee to document additional supporting information. In the letters dated May 29 and June 20, 2018 (References 3 and 4, respectively) the licensee provided the requested information.

The NRC staff did not perform an independent verification of the modifications implemented under the 10 CFR 50.59 process. However, the NRC staff, where necessary, requested information related to the design modifications to obtain information necessary for making a safety conclusion regarding the acceptability of the proposed addition of TS 3.7.20.

3.1 Elements of Plant Modifications that Support TS 3.7.20

As described in Attachment II, Section 3.5, "Planned Modifications," of the application dated June 28, 2017 (Reference 1), the licensee provided specific elements of the design modifications to support the proposed TS change.

1. Computer Points

   Computer points are used to verify the DC switchboard rooms and ESF switchgear room temperatures are less than 87 °F and provide an alarm on the main control board. The

temperature limits established for these rooms is ≤ 90 °F (this includes an allowance for instrument error of ± 3 °F) with a current alarm setpoint of 87 °F. The alarm setpoint on the associated temperature indicators will be lowered to 83 °F. This will provide early indication of potential problems with a Class 1E electrical equipment A/C train.

2. Fans, Dampers, and Penetrations in Battery Rooms and Switchboard Rooms (Plant Elevation 2016 Feet (2016')

   Installation of two recirculation fans (with isolation dampers) and 10 wall or ceiling penetrations (with fire dampers) in the battery and switchboard Rooms. One fan and two isolation dampers will be aligned with each SGK05 cooling train 'A' and 'B'. The recirculation fans placed in Battery Rooms 2 and 3 discharge into common ductwork utilizing the isolation dampers to direct airflow to the opposing train. The remainder of the circulating airflow path/loop travels from room-to-room through a series of wall penetrations equipped with fire dampers. A return duct between Battery Rooms 1 and 4 carries the warm air back to Battery Room 1 or 4 (depending on which SGK05 train is functioning) where there is a return duct for the functional SGK05 cooling train.

3. Light-Emitting Diode (LED) lighting

   The licensee has replaced fluorescent or incandescent lamps with LED lights in the Class 1E electrical equipment rooms and ESF Switchgear rooms to reduce the heat load.

4. Fans, Dampers, and Penetrations in ESF Switchgear (Plant Elevation 2000 Feet)

   Installation of four recirculation fans with control dampers in the ESF switchgear rooms. Depending on the cooling train that is in operation, manual Operator action will be taken (TS 3.7.20, Required Action A.1) to open the motorized control damper and will result in the start of two recirculation fans (two fans associated with each cooling train). One recirculation fan is positioned to circulate cool air from the switchgear room with the operating cooling train to the switchgear room with the nonfunctioning cooling train. The second recirculation fan is positioned to draw warm air from the switchgear room with the nonfunctioning cooling train to the operating cooling train return register. Schematics of the circulating air flow path that is created depending on the train of recirculation fans in service, are described in the LAR.

   The design modifications would allow one Class 1E electrical equipment A/C train to provide adequate area cooling for both trains of Class 1E electrical equipment during normal and accident conditions while minimizing mitigating actions. The proposed TS 3.7.20 would allow LCO 3.0.6 to be applied such that support system inoperability is dealt within the Conditions and Required Actions of TS 3.7.20 (as long as safety function has not been lost).

Since the installation of the recirculation subsystem is considered a safety-related design modification, the appropriate Class 1E power is being utilized, appropriate qualification of equipment is being performed, and power and control cables meet the applicable separation and sizing requirements. Equipment such as fans, isolation dampers, fire dampers, grills, HVAC ductwork, associated power supplies, and power and control cables are qualified for safety-related application. The recirculation fans for the completed design modification will provide sufficient air flow for equipment rooms at elevations 2000 feet and 2016 feet of the

plant. The two operating flow data points are nominally 6500 cubic feet per minute (cfm) at 0.85 inches - water-gauge (in-wg) static pressure for plant elevation 2000 feet and 4700 cfm at 2.3 in-wg static pressure for plant elevation 2016 feet.

In the letter dated February 15, 2018 (Reference 2), in response to NRC staff concern 12, the licensee stated that:

> There are no flooding concerns between the Class 1E electrical equipment rooms. The ductwork between 2016' and 2032' levels will be sealed, due to these being separate fire areas. The duct/dampers between Class 1E electrical equipment rooms will be located on the walls higher than [expected flood levels in the rooms]. The Class 1E electrical equipment rooms on the 2016' [elevation] do not have any water-bearing piping in the rooms. On 2000' [elevation], the Engineered Safety Features (ESF) Switchgear Room No. 2 only contains water-bearing pipes, and the maximum postulated flood level in that room is 1.26", which is below the level of the fan/duct/dampers in that room.

The Class 1E electrical equipment A/C recirculation is further described in Section 3.8 of this SE.

In the letter dated August 30, 2018 (Reference 5), the licensee stated that all associated plant modifications and testing has been completed. Specifically, that includes all the Regulatory Commitment from Reference 3, which is summarized below:

- Computer points.
- Installation of safety-related components that includes recirculating fans, isolation dampers, fire dampers, transition grills, and HVAC ductwork including associated power supplies, power, and control cables.
- A post modification testing for the installation of the recirculation fans and associated equipment.
- Fireproofing and indicating lights.
- LED lighting.

3.1.1 Design Modification - Test Plan

In its letter dated February 15, 2018, in response to NRC staff concern 9, the licensee stated that:

> A post [design] modification test plan has been developed and is part of the design change for the installation of the recirculation fans and associated equipment. During a conference call on December 20, 2017, the NRC asked as part of audit Item 9 as to whether field testing will be performed to benchmark the GOTHIC calculation. The post [design] modification test plan includes testing of both trains of the Class 1E Electrical Equipment A/C System with a recirculation subsystem in service. This testing will verify air flows meet the acceptance criteria in Calculation GK-M-016 in the OPERABLE cooling train and air flows

from the recirculation fans in service for the inoperable cooling train for the normal operation lineup and the accident condition lineup. Other testing identified in the post design modification test plan includes but is not limited to:

- Verify proper operation of the new dampers and controls related to the recirculation fan and air flow control circuits upon the initiation of a Halon trip signal
- The recirculation fan motors are to be bump tested to confirm that the motor and fan rotate in the correct direction and baseline vibration test data taken for each motor
- Isolation dampers are to be tested for cycle time, limit switch indication, and smooth operation
- Fire dampers shall be drop tested for proper operation
- Actuation of each control damper and fan shall be verified when the applicable START button is pressed. Verify damper position and recirculation fan running indication is received at the Motor Control Center and airflow is as expected.

3.1.2 Design Modification - Fire Protection Analysis

In Attachment II, Section 3.3, "Fire Protection," of the application dated June 28, 2017 (Reference 1), the licensee stated that:

> In those areas where a halon system is employed (switchboard rooms and ESF switchgear rooms), the HVAC system(s) serving those areas are interlocked to provide the necessary isolation upon receipt of a halon actuation signal. A halon release in either of the ESF switchgear rooms automatically isolates the portion of the Control Building Supply Air System and the Control Building exhaust serving that area and stop the associated Class 1E electrical equipment AC train. A halon release in any one of the switchboard rooms automatically initiates isolation of that portion of the Control Building Supply Air System and Control Building Exhaust System serving that level and stops the respective Class 1E electrical equipment AC train.
>
> Several of the fire dampers associated with the recirculation fans are not tied to the halon system via electro-thermal links (ETLs) to isolate areas protected by halon. A spurious trip of the halon actuation system would cause these fire dampers to actuate, as well as to close the control dampers for the fans (and stopping the fans). This would prevent the recirculation fans from performing the function to circulate the cooled air from the OPERABLE Class 1E electrical equipment AC train. However, per current plant design, such a spurious halon actuation would also stop both Class 1E electrical equipment AC trains and close the fire dampers in the ventilation ductwork associated with the detected fire signal. This has been the normal plant design in order to isolate the rooms that experience a halon discharge and prevent dilution of the halon where the halon system actuates. In the event of a spurious halon actuation, Operations would be required to restart equipment that has been shut off, and to reposition any fire dampers that have actuated. WCGS has not experienced a spurious halon actuation since initial plant startup. Indication of a fire from two separate fire

> detection circuits are required to initiate a halon actuation, thus spurious actuation of the halon system is unlikely.

In the letter dated May 29, 2018 (see response to RAI APHB-3), the licensee stated, in part, that:

> During the final design process, halon interlock relays were installed that would secure the recirculation subsystem train should a Halon actuation occur in either train. This ensures that the halon boundary between rooms is maintained by securing the recirculation subsystem fans and closing the dampers. The halon interlock relays are required to be enabled prior to starting the recirculation subsystem fan. The required recirculation fan dampers and the fan will not start if the halon relays are not enabled.

Operator training is further described in Section 3.8.3.3 of this SE related to the new recirculation subsystem.

3.2 Class 1E Electrical Equipment - Environmental Conditions

In Attachment II, Section 3.1, "Normal and Design Basis Accident Environmental Conditions," of the application dated June 28, 2017 (Reference 1), the licensee stated, in part, that:

> USAR Section 3.11 (B), "Environmental Design of Mechanical and Electrical Equipment," provides information on the environmental conditions and design bases for which the mechanical, instrumentation, and electrical portions of the engineered safety features, the reactor protections systems, and other safety related systems are designed to ensure acceptable performance during normal and design basis accident environmental conditions.

Normal operating and accident environmental conditions are specified in USAR Tables 3.11(B) - 1 and 3.11(B) - 2, respectively. Revision 28 of the USAR placed the information in these tables in the Equipment Qualification Design Basis Document (EQSD-1) and is considered incorporated by reference.

The licensee further stated, in part that:

> The normal maximum operating temperature and relative humidity for the Class 1E electrical equipment rooms are] 90 °F and 70 percent, respectively, for all conditions except during loss of offsite power or a single nonfunctioning SGK05A or SGK05B unit concurrent with accident condition (LOCA) heat loading. During a loss of offsite power, when Class 1E equipment is powered by the [EDGs], Class 1E room temperatures may reach 92 °F, due to the possibility of the fan running slower because of variation in the diesel generator frequency/voltage. With a single nonfunctional SGK05A or SGK05B unit concurrent with accident condition (LOCA) heat loading as well as maximum outdoor ambient temperature, the room temperature in the rooms may increase to a maximum of 104 °F.
>
> During the initial licensing of WCGS, a review of equipment environmental qualification programs was performed to the positions in NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Equipment"

[Reference 17]. The Class 1 E electrical equipment was specified to mild environment conditions thus was exempted from the NUREG-0588 review program.

TRM TR 3.7.22, "Area Temperature Monitoring," provides requirements associated to allowable temperature limits in the vicinity of major equipment. This TR establishes temperature limits during normal operation for specific locations in various buildings. The temperature limits are related to the expected thermal-life for the hardware, which operates in the areas where the temperatures are monitored and controlled. The temperature limits established for the Class 1E electrical equipment rooms is ≤ 90 °F (the temperature limits include an allowance for instrument error of ±3 °F) with an alarm setpoint of 87 °F.

3.3 GOTHIC Calculations - Single Train Operating

In the application dated June 28, 2017 (Reference 1), the licensee described that calculations evaluated the capability of one train of the Class 1E Electrical Equipment A/C System to supply adequate cooling for both trains of the Class 1E electrical equipment when the plant is in proposed TS 3.7.20, Condition A, Required Action A.1.

3.3.1 Calculations - Methodology

In Attachment II, Section 3.2.1, "Methodology," of the application dated June 28, 2017, the licensee stated, in part that:

A GOTHIC model was developed for WCNOC by Numerical Applications (NAI). GOTHIC Version 8.0(QA) thermal-hydraulic analysis software package is used to develop the WCGS Control Building model developed in Calculation GK-M-016. GOTHIC is an integrated, general purpose thermal-hydraulics software package for design, licensing, safety and operating analysis of nuclear power plant containments and other confinement buildings. GOTHIC Version 8.0(QA) has been qualified under the NAI Quality Plan that complies with 10 CFR [Part] 50, Appendix B.

The GOTHIC model uses a subdivided volume approach for modeling rooms in the Control Building 2000', 2016', 2032' and 2073.5' levels (Control Building). The GOTHIC model includes a large portion of the Control Building, with the most detail in the model applying to the 2000' and 2016' levels of the Control Building. The Class 1E Electrical Equipment A/C System is explicitly detailed in the model. Other ancillary systems, such as the Normal Control Building Air Supply (SGK02), Normal Control Building Exhaust (CGK01A/B) and 2032' level (lower cable spreading room) and 2073.5' level (upper cable spreading room) are modeled to the extent necessary to give a reasonable approximation of the interaction to the Class 1E electrical equipment rooms. The lower and upper cable spreading rooms are modeled due to the interaction of the Control Building Pressurization System with the 2000', 2016', 2032', and 2073.5' levels, as well as the interaction with the non-safety normal Control Building Heating Ventilation and Air-Conditioning (HVAC) Systems.

Additional details include, control volumes (room and ductwork), flow paths, heat sinks, heat loads, components, boundary conditions, and outdoor air temperatures. Details of the GOTHIC modeling are described in Section 3.2.1 of Reference 1.

3.3.2 Calculations - Inputs and Assumptions

In the letters dated June 28, 2017, and June 20, 2018 (References 1 and 4, respectively), the licensee described that the calculations detail the ability of a single Class 1E electrical equipment A/C train to maintain the Class 1E equipment rooms below the maximum design temperature of 104 °F, with the mitigating actions under the proposed TS 3.7.20, Required Action A.1, in effect. In order to provide this cooling capability, recirculation fans and other required equipment must be manually started to circulate the cool air from the operating cooling train to the rooms of the out-of-service cooling train and return the heated air to be cycled through the train to be cooled.

There are four GOTHIC cases as part of this analysis. Attachment II, Section 3.2.2, "Input/Assumptions," of the application dated June 28, 2017, the licensee stated, in part, that:

> Case 1 of the calculation evaluates the SGK05A train out-of-service, under normal operating conditions and Case 2 evaluates the SGK05B train out-of-service, under normal operating conditions. Case 3 of the calculation evaluates the SGK05A train out-of-service, under post-LOCA operating conditions and Case 4 evaluates the SGK05B train out-of-service, under post-LOCA operating conditions. Post-LOCA operating conditions were chosen for Cases 3 and 4 as this provides the worst-case heat loading for the Class 1E electrical equipment rooms.

The heat loading into the rooms is a result of electrical heat loads in the transformers, cables and circuit breakers due to the equipment that is in operation. GOTHIC inputs and assumptions are provided in Table 3, "Base Gothic Inputs/Assumptions," of Attachment I to the letter dated June 20, 2018. The NRC staff reviewed the major inputs/assumptions for normal operation and post-LOCA operation cases and finds them reasonable and acceptable based on the following:

- Heat loading conditions are based on electrical Calculation GK-E-001, Revision 5. Fan operating points are specified in Specification M-622.1B, "Compensatory Fans and Motors for the Class 1E Air Conditioning System." The licensee stated that the post-design modification test plan includes testing of both trains Class 1E electrical A/C system with the recirculation subsystem in service and verification of the air flows used in the GOTHIC analysis. Recirculation system operation begins at time 3600 seconds (1 hour) for the normal operating case after entry to Condition A in proposed TS 3.7.20, which is reasonable based on the time to initiate the Required Action A.1 "Immediately." For the post-LOCA operation case, recirculation system initiation at time 0 seconds is appropriate as the system would be already operating at the time of the accident.

- Initial temperature of 72 °F in the Class 1E electrical equipment rooms during normal operation is supported by plant data. A temperature of 95 °F is considered as the initial condition for the post-LOCA cases. The proposed TS Required Action A.2 requires verifying room area temperatures are maintained at or below 90 °F. The 90 °F is the normal operation maximum temperature identified in the USAR for the Class 1E electrical equipment rooms. The licensee has elected to use an initial

> condition temperature of 95 °F based on the normal operation cases of the GOTHIC model. The normal operation cases show that some rooms could see an average room temperature of 95 °F with a single SGK05A/B train operating and maximum heat loading conditions. This elevated temperature for the post-LOCA model cases is utilized to provide additional conservatism and margin in the calculation.

Outdoor design temperature of 97 °F is from the plant design documents (Attachment II, Table 3 of Reference 1).

3.3.3 Calculations – Room-to-Room Differential Pressure

In Attachment II, Section 3.2.4, "Room-to-Room Differential Pressure," of the application dated June 28, 2017, the licensee stated, in part, that:

> Calculation GK-M-016 calculates the pressures of the rooms in the GOTHIC model, and uses that data to compare the differential pressure across the walls of adjacent rooms. The concrete masonry unit (CMU) wall calculation is evaluated for the effects of implementation of the [completed] modification to add ducts and fire dampers to allow recirculation of the air between the Class 1E electrical equipment rooms. The CMU wall calculation evaluated a maximum differential pressure on the walls of 5 pounds per square foot [psf].
>
> As expected, the maximum differential pressure occurs across the wall between the room being pressurized (Battery Room 2 [3411] or Battery Room 3 [3413]) by the recirculation fan in service and the corridor (Room 3412) between the battery rooms. The maximum differential pressure occurs approximately 10 seconds after the recirculation fan is started, and then decreases after that. The maximum differential pressure across any one wall, for any case, is [4.74][1] psf. The maximum differential pressure across the walls between Rooms 3301 and 3302.is less than 1 psf for all 4 cases. The modeled differential pressure is lower than the evaluated value of 5 psf, thus there is no concern with regards to the differential pressure. Additionally, most of the walls are significantly below this 5 psf evaluated value, creating margin in the CMU wall calculation.

3.3.4 Calculations - Hydrogen Generation and Concentrations

In Attachment II, Section 3.2.5, "Hydrogen Generation/Concentration," of the application dated June 28, 2017, the licensee stated, in part;

> The GOTHIC model includes a provision that allows the introduction a continuous gas supply into the model and track the distribution and concentration of the gas throughout the control volumes. This provision has been utilized in Calculation GK-M-016 to determine the amount of hydrogen that might accumulate in the rooms on the 2016' level while a recirculation fan train is operating. [The results indicate] that the hydrogen concentration in any one room does not approach the 2% lower flammability safety limit of hydrogen in oxygen.

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[1] Calculation GK-M-016 was later revised and updated pressures in the rooms are documented in the letter dated June 20, 2018 (Reference 4).

Based on the updated information in the letter dated June 20, 2018, the highest calculated hydrogen concentration by use of GOTHIC in any room does not exceed 0.0068 percent.

3.3.5 Calculations – Temperature Results

In Table 3 of the letter dated June 20, 2018, the licensee provided a summary of the 30-day maximum normal operation cases (Cases 1 and 2), post-LOCA operation cases (Cases 3 and 4), and the maximum (all four cases) temperature for each room with either SGK05A train or SGK05B train out of service. This room temperature summary was based on incorporating electrical heat load input changes in response to the NRC staff questions addressed in the letter dated May 29, 2018 (Reference 3).

This table combines the results for all 4 cases to report the maximum room temperature for each room. When the maximum temperature exceeds the 30-day temperature, this indicates that the room has reached a maximum at some point prior to the 30-day runout, and then decreased over the remaining time period of the model.

In summary, the maximum temperatures for normal operating cases ranged from 86 °F to 96 °F. For post-LOCA cases, the maximum temperatures varied from 97 °F to 101 °F (temperatures rounded off to nearest integer). Specifically, all room temperatures remain below 104 °F, (maximum calculated was 101.05 °F), which is the maximum room temperature listed in the design specifications for the Class 1E electrical equipment and is listed in EQSD-1 as the maximum room temperature for the Class 1E electrical equipment rooms with a single SGK05A/B train out of service and accident condition heat loading. For Case 3, all of the rooms associated with the SGK05A train and the failed SGK05B train are maintained below 104 °F for the duration of the case.

3.4 NRC Staff Evaluation - Supporting Analysis and Calculations

As stated in Section 3.3 of this SE, the licensee evaluated single train operations with the design modification operational. Calculations were used to analyze single train operations. Calculation methodology, inputs/assumptions, room-to-room differential pressures, hydrogen generation/concentrations, and temperature results were reviewed by the NRC staff.

Calculation GK-M-016, Revision 1, "Wolf Creek Control Building Loss of Class 1E A/C GOTHIC Room Heat Up Analysis with Installed Crosstie Fans and Louvers," was developed by the licensee to evaluate the capability of one train of the Class 1E electrical equipment A/C system to supply adequate cooling for both trains of the Class 1E electrical equipment. In the application dated June 28, 2017, the licensee states that Calculation GK-E-001, Revision 4, "Electrical Equipment Head Loads in ESF SWGR, DC SWBD, and Battery Rooms," provides details about the equipment that is powered from the safety-related buses in the Class 1E electrical equipment rooms. The calculation also provides details on electrical loads that are considered to be "Off" in a post-LOCA scenario when only one Class 1E electrical equipment A/C train is operating. The heat loading into the rooms is a result of electrical heat loads in the transformers, cables and circuit breakers due to the equipment that is in operation. The heat load contribution from electrical equipment is evaluated based on equipment that is operating, or would be turned off within 24 hours and 7 days after initiation of a LOCA event. This calculation forms the basis for the GOTHIC models used to evaluate equipment room temperatures.

As previously stated in Section 3.0 of this SE, the NRC staff conducted an onsite audit to gain a better understanding of the licensee's calculations and other aspects of the LAR. During the audit, the NRC staff discussed calculations, computer-modeling of HVAC systems (GOTHIC) and electrical power system, and training materials. By letter dated February 15, 2018 (Reference 2), the licensee supplemented the information provided in the application dated June 28, 2017, to clarify some audit related questions. The staff issued RAIs on items that required further clarifications as a result of the staff audit. In the letters dated May 29 and June 20, 2018, the licensee provided clarification to revised heat loading variations during LOOP, non-LOOP conditions, SBO and LOCA conditions with and without offsite power available.

During the audit, the NRC staff discussed assumptions and inputs considered in the development of Calculation GK-E-001, Revision 4. Specifically, the staff discussed inputs and factors that could impact the flow of current in electrical equipment during normal operation and postulated accident conditions. The staff did not review, Calculation GK-E-001 in its entirety. Based on the information provided in response to the RAIs, the staff concluded that assumptions and input parameters, used in the calculation, were reasonable for evaluating room heatup rates.

Attachment II, Section 3.2.2 of the application, provides an overview of postulated plant conditions used for room heatup calculations. In order to establish maximum electrical loading conditions that contribute to applicable room heatup calculations, the NRC staff requested additional information (RAI EEOB-1 (Reference 16)), on combinations of events and plant conditions that were considered for heat load calculations. Specifically, the staff requested details on the plant conditions, corresponding source of power and availability or unavailability of offsite power systems. In the RAI response letter dated May 29, 2018, the licensee stated that the evaluation of the heat loading variations during the LOOP and non-LOOP conditions, concurrent with normal operation as well as accident conditions, showed that the non-LOOP condition could result in approximately a 21 percent increase in heat load whereas the LOOP condition could result in approximately a 3 percent increase in heat load. After considering factors such as variations in system voltage and frequency, the licensee concluded that the non-LOOP condition provided the bounding condition for heat load calculations. The staff finds this response to be reasonable as, in general, the non-LOOP condition, concurrent with an accident signal, should have non-essential loads operating and accident loads started to mitigate the consequences of the accident.

During the audit, the NRC staff observed that conductor temperatures and voltage at equipment terminals used in Calculation GK-E-001, Revision 4 were non-conservative when compared with parameters used in related calculations used for electrical power system analyses. In RAI EEOB-2 (Reference 16), the staff requested details on heat load in the power system rooms assuming the grid voltage was at the minimum, the plant loads at a maximum for accident and non-accident conditions and plant equipment (cables, transformers, etc.) are operating at design temperatures. In response to RAI EEOB-2, by letter dated May 29, 2018 (Reference 3), the licensee stated that Calculation GK-E-001 had been revised and issued as GK-E-001, Revision 5. The licensee provided a summary of the inputs, assumptions, and results, as related to the staff request for information. The NRC staff noted that:

- The AC System load flow and voltage drop analysis is performed in Calculation XX-E-006. Calculation XX-E-006 uses a minimum switchyard voltage of 97 percent. Cable resistance is conservatively corrected to an assumed maximum temperature of 90 degrees Centigrade (°C) in Calculations XX-E-006 and GK-E-001.

For the Normal loading case in Calculation GK-E-001, the load flow values are taken from Appendix 16 of Calculation XX-E-006 and bounded by the inputs identified in the response to RAI EEOB-1 for the Normal case (N1). For this heat loading case it is assumed that both Class 1E electrical equipment A/C trains are operating and no load reductions are assumed. Conservative loading on each of the two Class 1E 4.16 kilovolt NB busses is assumed by continuous loading of two ESW, Component Cooling Water and Charging Pumps (from Appendix 38 of Calculation XX-E-006).

- The transformer test report shows that the transformers have a temperature rise of 88.9 °C. With a maximum ambient temperature of 40 °C, the transformer winding temperature at full load will be 128.9 °C (40 °C + 88.9 °C). For conservatism, the load losses are corrected to 135 °C.

- For the SBO loading case, the load flow values are taken from related appendices of battery calculation NK-E-001 and bounded by the inputs identified in the response to RAI EEOB-1 for the SBO case.

- The loading values used in the heat load calculation GK-E-001 are taken from Calculation XX-E-006 for the Normal (N1) and LOCA (PL 1) cases and therefore, the magnitude of the currents are the same as those in Calculation XX-E-006. For the post-LOCA with reduced loads case the loading values used are reduced by the loads associated with the equipment removals indicated in the response to RAI EEOB-1 under the post-LOCA condition.

- The current used to determine heat loss from cables is determined in the applicable sections of Calculation GK-E-001. The magnitude of the current is based on the loads in Calculation XX-E-006 with a 97 percent switchyard voltage. The cable resistances are corrected to a maximum temperature of 90 °C.

- Calculation GK-E-001 assumes no diversity factor for bus loads.

The NRC staff concludes that the summary of input data and assumptions, used for the new revision of heat load Calculation GK-E-001, are reasonable for evaluating the maximum current flow and consequential heat load from electrical equipment.

In RAI EEOB-3 (Reference 16), the NRC staff requested clarification on heat loss results when using just one HVAC unit (Train A or Train B) during the post-LOCA scenarios with equipment starting in both trains at time T=0 when an accident signal is actuated. In response to RAI EEOB-3 (Reference 3), the licensee provided a tabulated summary of LOCA condition heat loss results for Trains A and B and a comparison of heat loads for both trains when one of the trains is selected for long term shutdown cooling post LOCA with other HVAC trains not available. The LOCA condition heat loss results Table shows a maximum load of 42,618 watts for Train A and 46,795 watts for Train B resulting in a total load of 89,413 watts for two trains at T=0. The licensee stated that after comparing the LOCA condition heat loss results, the largest heat load losses for LOCA/post-LOCA full loading (accident and post-accident loading) are represented when Train B is selected for long term shutdown cooling. For a single HVAC train operation, the limiting case evaluation considers Train B components to provide the LOCA/post-LOCA loading as this provides the highest heat load (34,087 watts from Train A and 40,797 from Train B for a total of 74,884 watts at T=0) to the single operating Class 1E electrical equipment A/C train selected for long term cooling.

The WCGS USAR Section 1.2.1.8, "Meteorology" (Reference 6), states that the plant site experiences a wide seasonal range of temperatures - maximum of +117 °F and lowest temperature of -26 °F. The ambient temperature in the battery rooms, under any mode of operation, is required to be maintained between 60 °F and 90 °F. The SBO evaluation considers a period of 4 hours without heat input into the battery rooms. In RAI EEOB-4 (Reference 16), the NRC staff requested information on battery room temperatures for a postulated 30-day plant shutdown period with minimum heat load contribution from electrical equipment. In its response to RAI EEOB-4 in the letter dated May 29, 2018 (Reference 3), the licensee stated that the battery rooms are located above heated Switchgear Rooms A and B and below the Lower Cable Spreading Room which is also heated. The battery rooms do not have any exterior walls. The battery room temperatures are monitored every 8 hours and the licensee does not expect the battery room temperatures to drop below 60 °F.

Attachment II, Section 3.2.2, of the application dated June 28, 2017 (Reference 1) discusses accidents analyses and various types of line breaks considered in Chapter 15 of the USAR. Attachment II, Section 3.4, "Operator Actions," of the application, the licensee stated that Calculation GK-E-001 takes credit for equipment that can be turned off within 24 hours and 7 days after initiation of a LOCA event. Calculation GK-E-001 assumes that significant safety-related operating loads can be shed within 24 hours to reduce heat loads in the area. The calculation assumes that LOCA loads provide the bounding condition for heat generation. In RAI EEOB-5 (Reference 16), the NRC staff requested clarification on load shedding for events and accidents that may require operation of large loads for an extended duration. In its response to RAI EEOB-5, in the letter dated May 29, 2018, the licensee provided a summary of comparison of operating time for large loads required for large-break LOCA, a small-break LOCA and a main steam line break. Based on the time duration of operation of large loads such as a charging pump (589 KVA), residual heat removal pump (297 KVA), component cooling water pump (633 KVA), and ESW pump (1601 KVA), the staff concludes that from heat load perspective, large-break LOCA bounds the events considered in the safety analysis, as concluded by the licensee.

By letter dated May 29, 2018, in response to the NRC staff's request for adequate guidance in plant procedures associated with a non-functional Class 1E electrical equipment A/C, the licensee stated, in part, that:

> During Normal Operation, with a non-functional Class 1E electrical equipment A/C train, procedure SYS GK-200, "Non-Functional Class 1E A/C Unit," will be used for operation of the recirculation subsystem trains until proposed TS 3.7.20 is approved and implemented. Procedure SYS GK-200 provides the guidance for implementing the mitigating actions for starting the recirculation subsystem train, aligning the spare battery chargers, and verifying the Class 1E electrical equipment room temperatures. After TS 3.7.20 is approved and implemented, procedure SYS GK-201, "Mitigating Actions for an Inoperable SGK05 Train," which is similar to procedure SYS GK-200, will be used.
>
> When a single Class 1E electrical equipment A/C train is available and mitigating actions for an inoperable cooling train are in effect coincident with a DBA [design basis accident] LOCA, the emergency operating (EMG) procedures would be followed as written. The EMG procedures provide operator guidance for shedding components, such as Emergency Core Cooling System (ECCS) pumps, when conditions indicate that they are no longer required. The

components are shed prior to the times indicated in calculation GK-E-001 for one Class 1E electrical equipment A/C train operating [post-LOCA].

The NRC staff reviewed the information presented in the application and its supplements (References 1, 2, 3, and 4) related to calculations and analysis and finds that the WCGS calculations methodologies, assumptions, and results are reasonable. The reanalysis of heat loads was necessary and is reflected in Section 3.3.5 of this SE.

The NRC staff concludes that, based on the conservatism used in various calculations (heat loads GOTHIC analysis) and the resulting calculated margins obtained, this approach is acceptable, and that there is adequate margin for Class 1E electrical equipment A/C system in single train operation, assuming the Class 1E electrical equipment A/C recirculation subsystem is functional. Specifically, the NRC staff finds reasonable assurance that the Class 1E electrical equipment A/C recirculation subsystem will adequately support TS LCO 3.7.20, Required Action A.1 (part of TS mitigating actions) to provide adequate cooling to the opposite electrical trains for the 30-day completion time.

3.5 Proposed TSs

In the application dated June 28, 2017 (Reference 1), the licensee described that the proposed LCO 3.7.20 requires two Class 1E electrical equipment A/C trains be operable. The LCO Applicability includes Modes 1, 2, 3, and 4. The Applicability for the proposed LCO reflects the Applicability of TS 3.7.8 and its associated TS Bases, "Essential Service Water (ESW) System," the heat sink for the Class 1E electrical equipment A/C trains during post-accident operation and is consistent with the Applicability of the supported system TSs 3.8.4, 3.8.7, and 3.8.9.

Proposed TS 3.7.20 provides conditions and required actions for one Class 1E electrical equipment A/C train inoperable. Required Action A.1 of Condition A requires the initiation of action to implement mitigating actions with a Completion Time of immediately. Required Action A.2 requires verifying room area temperatures are ≤ 90 °F within 1 hour. The actions of Required Actions A.1 and A.2 assure that the initial conditions of Calculation GK-M-016 are met. The mitigating actions to be taken include opening the associated single train recirculating fans discharge damper and starting the recirculation fans corresponding with the Operable Class 1E electrical equipment A/C train and placing in service the spare battery chargers. Additionally, if the Control Building Pressurization System (CBPS) actuates (while in the single A/C train configuration) resulting in two trains of pressurization in operation, one train of pressurization is secured within 12 hours.

In the letter dated February 15, 2018 (Item 7.c) (Reference 2), related to mitigating actions, the licensee stated that:

> [P]roposed TS 3.7.20 was developed [after considering the format and content of Improved Standard Technical Specifications (ISTS) and the precedent set in Improved Technical Specification (ITS) of another plant]. In that regard, WCGS TS 3.7.10, "Control Room Emergency Ventilation System (CREVS)," and ISTS 3.7.10, "Control Room Emergency Filtration System (CREFS)," include a Required Action to implement mitigating actions. This specification does not include in the TS the specific mitigating action(s) to be implemented. As such, WCNOC believed it prudent to be consistent with the existing WCGS ITS and the ISTS precedent and identifies the specific mitigating actions in the TS Bases

> [discussed in Attachment II to Reference 1]. WCNOC would incorporate these mitigating actions into SYS GK-201, "Class 1E Compensatory Cooling," and the procedure provides the guidance for implementing the mitigating actions.

In Attachment II, Section 3.6, "Proposed Technical Specifications," of the letter dated June 28, 2017, the licensee stated, in part, that:

> Required Action A.2 of Condition A requires verifying the Class 1E electrical equipment room area temperatures are ≤ 90 °F [initially within one hour, and thereafter every 4 hours]. The 4 hour Completion Time is reasonable, based on operating experience, to verify room area temperatures and the minimal increase in room temperatures during this time period.

In addition, as stated in Attachment II, Section 3.6, of the licensee's application dated June 28, 2017 (Reference 1), Required Action A.3 of Condition A requires the Class 1E electrical equipment A/C train be restored to operable status in 30 days. The 30-day Completion Time is based on the capability of the remaining operable Class 1E electrical equipment A/C train to provide adequate area cooling for both trains of electrical equipment during normal and accident conditions (with mitigating actions implemented) and the low probability of an event occurring during this time period. Additionally, Calculation GK-M-016 determined that a single Class 1E electrical equipment A/C train, with the mitigating actions implemented, is capable of maintaining the temperature of the Class 1E electrical equipment rooms below the maximum design temperature limit of 104 °F for at least 30 days. A 30-day Completion Time is consistent with TS 3.7.11 "Control Room Air Conditioning System (CRACS)," that provides 30 days to restore an inoperable CRACS train to operable status. The CRACS maintains a suitable equipment environment for the Reactor Protection System cabinets, Engineered Safety Feature Actuation System cabinets, main control room indicators and controls, as well as control room personnel habitability. Condition A provides a sufficient time to perform corrective and preventive maintenance on a Class 1E electrical equipment A/C train. The licensee has stated that based on historical records (since 2012), approximately 15 days maximum are required for maintenance activities associated with the Class 1E electrical equipment A/C trains. A Completion Time of 30 days is reasonable and will allow maintenance activities to be completed without resulting in unnecessary plant transients. Procedure AP 22C-002, "Work Controls," specifies that TS equipment work shall not be scheduled to exceed 50 percent of the TS Completion Time. As such, scheduled maintenance activities typically would not exceed 15 days.

In the letter dated February 15, 2018 (Reference 2, Item 8), related to the justification of the 30-day TS Completion Time, the licensee stated, in part, that:

> The GOTHIC model was run for 30 days because after a design basis accident, the Essential Service Water System is required to be available/OPERABLE (i.e., in operation) for 30 days. Most normal corrective or preventive maintenance activities would not require a 30 day equipment out of service time. Standard WCNOC practice is to schedule Technical Specification Equipment Outages (TSEO) for 50% or less of the Completion Time allowed per TS. Therefore, for this equipment WCNOC would normally schedule maintenance that could be performed in 15 days or less [as discussed in Attachment II to Reference 1]. ... Major equipment replacement, such as replacement of the entire unit (condenser, compressor, control cabinetry, etc.) would likely take 30 days or more, and would probably be scheduled during a refueling outage.

If the Required Action and associated Completion Time of Condition A cannot be met, Condition B would require a plant shutdown to Mode 3 within 6 hours and to Mode 5 within 36 hours. If two Class 1E electrical equipment AC trains are inoperable, LCO 3.0.3 would be entered immediately under Condition C. This ensures that the plant is placed in a MODE that minimizes accident risk.

Attachment II, Section 3.6 of the application dated June 28, 2017 (Reference 1), the licensee stated, in part, that:

> New SR 3.7.20.1 requires, on an 18-month specified Frequency, that each Class 1E electrical equipment A/C train actuates on an actual or simulated actuation signal. The actuation signals include the CRVIS and actuations driven by the LOCA and shutdown sequencers. A CRVIS is generated by the inputs discussed in the LCO Bases for TS 3.3.7, "CREVS Actuation Instrumentation." Procedures STS KJ-001A/B, "Integrated D/G and Safeguards Actuation Test-Train A/B," currently verifies that the cooling trains are load shed and then sequenced back on under a simulated actuation signal.

The NRC staff finds the proposed SR and associated Frequency are consistent with similar SRs and Frequencies for ESF components that receive actuation signals and acceptable.

The licensee further states, in part, that:

> New SR 3.7.20.2 verifies that the heat removal capability of the Class 1E electrical equipment A/C trains is adequate to remove the heat load assumed during design basis accidents by a combination of monitoring and inspection methods. This SR consists of verifying the heat removal capability of the condenser heat exchanger by water flow measurement, pressure loss monitoring and visual inspection, visual inspection monitoring of the evaporator heat exchanger coils, ensuring the proper operation of major components in the refrigeration cycle, verification of unit air flow capacity, and verification that the tube plugging limits are met. The 18 month Frequency is appropriate since significant degradation of the Class 1E Electrical Equipment A/C System is not expected over this time period. The proposed SR and associated Frequency are similar to SR 3.7.11.1 for the CRACS.
>
> New SR 3.7.20.2 requires verifying each Class 1E electrical equipment A/C train (SGK05A/B) has the capability to remove the assumed heat load. The condenser heat exchangers on the cooling train employ ESW to remove heat from the refrigeration cycle. The ability of the system to reject the design heat load is directly dependent on the capacity of the condenser heat exchangers to reject the design coil load combined with compressor work input. Therefore, the heat rejected from the refrigeration cycle of the respective equipment is exchanged with the Ultimate Heat Sink.

3.6 Operator Actions Associated with Proposed TS 3.3.20

3.6.1 Operator Actions - Normal Operations

In the application dated June 28, 2017 (Reference 1), the licensee described that the proposed TS 3.7.20, Required Action A.1 requires the initiation of action to implement mitigating actions. The Completion Time on Required Action A.1 is immediately. Section 1.3 of the TSs defines "Immediately" as the required action that should be pursued without delay and in a controlled manner. The GOTHIC model assumes that the mitigating actions are completed within 1 hour.

Attachment II, Section 3.4, "Operator Actions," of the application dated June 28, 2017, describes three mitigating actions for normal operations associated with the proposed new TS 3.7.20, Required Action A.1 as follows:

1) Travel to the NB001/NB002 switchgear rooms on 2000' level of the Control Building to start the recirculation fans that corresponds to the SGK05A/B train that is inoperable. With SGK05A train inoperable, the recirculation fans in the B train rooms are started (Rooms 3302 and 3411). With SGK05B train inoperable, the recirculation fans in A train rooms are started (Rooms 3301 and 3413). The recirculation fans are electrically-operated, powered from the motor control centers located in the 2000' level switchgear rooms, with the capability to be supplied power by the diesel generators. Each recirculation fan has a control damper which is normally closed and will prevent backflow of air through the fan when the fan is not in operation. The only actions required by an Operator to start the fans is to locally switch on the fans at the motor control center. Actuation of the start circuitry will position the dampers accordingly and automatically start the fans when the control dampers are in the correct position.

2) If not already completed, NK025/NK026 spare battery chargers are transferred to supply battery charging to the Class 1 E batteries and NK021/NK024 battery chargers removed from service when NK025/NK026 are supplying the charging function. In order to help ensure that the heat loading on the 2016' level is adequate to minimize room heatup, the NK025/NK026 spare battery chargers are aligned to charge the batteries and NK021/NK024 chargers are de-energized. This action maintains the battery charging function, but moves the heat load for the chargers to the 2000' level of the Class 1 E electrical equipment rooms, which are larger and have more cooling air supplied than the rooms on 2016'. Because the charging function is maintained, there is no adverse consequence to performing this function.

3) In the event the Control Room Ventilation Isolation System (CRVIS) is actuated and starts the Control Building Pressurization System fans (CGK04A/B) while the recirculation fans are in operation, then one train of pressurization must be secured within 12 hours. This step is taken to maintain the heat loading in the Class 1E electrical equipment rooms as low as possible. The Control Building Pressurization System draws in outside air and heats the air in the charcoal filter to minimize radioactive nuclides in the air being mixed in the Control Building. Since only one

> train of pressurization is required to maintain the desired positive pressure in the Control Building, securing one train of pressurization air has no adverse effect during a CRVIS actuation. This also maintains one pressurization train in reserve in the event the operating pressurization train needs to be secured. If the Control Building Pressurization trains are not actuated (normally in standby) when a Class 1E electrical equipment A/C train is inoperable, then there is no action to take with respect to the Control Building Pressurization System.

The licensee's letter dated May 29, 2018 (Reference 3), provides the specific steps that will be incorporated into procedures to perform the actions above. Per Reference 3, an additional action is added to enable the halon interlock relays. The halon interlock relays secure the recirculation subsystem should the halon system activate while the recirculation fans are operating. Therefore, the recirculation subsystem design requires that the halon interlock relays be enabled before the recirculation subsystem fans and dampers will operate.

In the letter dated February 15, 2018 (Reference 2), the licensee described that the proposed TS 3.7.20 requires temperature monitoring of the Class 1E electrical equipment rooms once per 4 hours when in Condition A (Required Action A.2). If the plant computer is not available then the plant computer output monitors in the control room will not show available output. However, monitoring of room temperatures using local thermometers is an option and is expected to be utilized if the plant computer is not available. Since plant computer points are not available for every room to be monitored, the licensee expects to use local temperature monitoring in any case.

3.6.2 Operator Actions - Post-LOCA Operation

In the application dated June 28, 2017, the licensee described that if the cooling train is determined to be inoperable following initiation of a LOCA event, the starting of the recirculation fans for the inoperable cooling train would not be initiated. Plant operators would continue to shutdown the plant utilizing the operable Class 1E electrical equipment A/C train.

If the LOCA were to occur after the recirculation fans had been placed into service, then the recirculation fans would be left operating so that both trains of Class 1E electrical equipment would be cooled by the operable Class 1E electrical equipment A/C train.

In the letter dated May 29, 2018 (Reference 3), the licensee described that new procedure SYS GK-201, "Mitigating Actions for an Inoperable SGK05 Train," directs plant operators when to secure loads, which includes securing one train of CBPS.

3.7. Proposed TRM, TR 3.7.20, "Class 1E Electrical Equipment Air Conditioning (A/C) Recirculation Subsystem"

In the letters dated February 15 and May 29, 2018 (References 2 and 3, respectively), the licensee described that a new proposed TRM specification to address surveillance testing of the new proposed recirculation subsystem trains.

A recirculation subsystem train constitutes the equipment installed in the design modifications discussed in Section 3.3 of this SE. In the letter dated May 29, 2018 (Reference 3), Drawing WIP-M-12GK05-000-A-1, "Piping and Instrumentation Diagram Control Building H.V.A.C.," shows the proposed Class 1E Electrical Equipment Air Conditioning (A/C)

Recirculation Subsystem. For example, one subsystem train would consist of associated fans (CGK05A, CGK06A, and CGK07A), ducts, dampers, wall openings, controls, and electrical power to provide cooling between electrical rooms from one electrical division to the other. The opposite subsystem train would consist of associated fans (CGK05B, CGK06B, and CGK07B), ducts, dampers, and wall openings, controls, and electrical power to provide cooling between electrical rooms from the opposite electrical division to the other.

The TRM specifications will be instituted by the licensee to test the functionality of the newly installed contributory design aspects of the recirculation subsystem train. This will ensure that the equipment functions correctly and is able to perform its necessary support function to the Class 1E electrical equipment A/C system.

The proposed TRM (TR 3.7.20) would require two independent Class 1E electrical equipment A/C recirculation subsystem trains be functional in Modes 1, 2, 3 and 4, and available to be placed in service if a Class 1E electrical equipment A/C train is determined to be inoperable. The TRM required actions include restoring the nonfunctional recirculating subsystem train within 30 days. With two nonfunctional recirculating subsystem trains, the TRM required actions specify restoring one train in 7 days.

The TRM also includes technical surveillance requirements (TSRs) for the testing of the recirculation subsystem. The TSRs verify each recirculation subsystem train is available and each subsystem train actuated and provides recirculation air flow.

3.8 NRC Staff Evaluation – Proposed Technical Specifications, Design Modifications and Testing, Operations Actions, and Technical Requirements

The NRC staff evaluation of the proposed TS changes, supporting analysis and calculations, supporting design modifications, and proposed associated operations actions is shown below.

3.8.1 NRC Staff Evaluation of Proposed Technical Specification

The Class 1E electrical equipment A/C trains have emergency operation functions and also operate during normal plant operations. Each train is normally aligned to cool only the equipment associated with its emergency load group. The Class 1E electrical equipment A/C trains are operated in a continuous recirculation mode to maintain the ESF switchgear room, the 125 VDC battery rooms, and the DC switchboard rooms to a temperature of ≤ 90 °F. The WCGS design does not have an independent/redundant A/C train for each cooling train that would allow taking a cooling train out of service for planned maintenance or that would provide backup cooling due to a failure.

3.8.1.1 NRC Staff Evaluation of Proposed TS LCO 3.7.20 and Actions

The requested changes would add a new TS to address the operation of the Class 1E Electrical Equipment A/C System.

LCO 3.7.20 would state:

Two Class 1E electrical equipment A/C trains shall be OPERABLE.

LCO 3.7.20 APPLICABILITY would state:

MODES 1, 2, 3 and 4.

The Class 1E electrical equipment A/C trains consist of two independent trains that provide cooling of recirculated air in the rooms associated with that train. Each train consists of a prefilter, self-contained refrigeration system (using normal service water or ESW as a heat sink), centrifugal fans, and instrumentation and controls to provide for electrical equipment room temperature control.

The specific rooms supplied by the Class 1E electrical equipment A/C trains are:

SGK05A	SGK05B
SWBD RM NO. 1 (3408)	SWBD RM NO. 4 (3404)
SWBD RM NO. 3 (3414)	SWBD RM NO. 2 (3410)
Battery RM NO. 1 (3407)	Battery RM NO. 4 (3405)
Battery RM NO. 3 (3413)	Battery RM NO. 2 (3411)
ESF SWGR RM NO. 1 (3301)	ESF SWGR RM NO. 2 (3302)

In Modes 1 2 3 and 4, both trains of the Class 1E electrical equipment A/C system is normally operating. Both trains must be operable to ensure that the temperature in the protected rooms will not exceed equipment design limits.

ACTIONS

The proposed Condition A states that if one Class 1E electrical equipment A/C train is inoperable, initiate action to implement mitigating actions (immediately), and verify room area temperature ≤ 90 °F (1 hour and once per 4 hours thereafter), and to restore Class 1E electrical equipment A/C train to operable status within 30 days.

The proposed Condition B states that if the required action and associated completion time of Condition A is not met be in Mode 3 within 6 hours and be in Mode 5 within 36 hours.

The proposed Condition C states that if two Class 1E electrical equipment A/C trains inoperable to enter TS LCO 3.0.3, immediately.

The NRC staff reviewed the proposed TS LCO 3.7.20 and Actions and finds them acceptable based on the actions taken to mitigate a loss of one train of Class 1E electrical equipment A/C control building AC subsystem (30 days) or two trains of control building AC subsystem (plant shutdown).

With the unit in TS 3.7.20 Condition A, while in Modes 1, 2, 3, or 4, with one Class 1E electrical equipment A/C train inoperable, action must be initiated immediately to implement mitigating actions. The mitigating action taken (Required Action A.1) with one Class 1E electrical equipment A/C train inoperable includes starting the opposite train recirculating fans (includes opening discharge damper), placing in service the spare battery chargers, and one train of Control Building pressurization is secured within 12 hours if both trains are in operation.

Proposed Required Action A.2 requires verification of all affected room temperatures with a Completion Time of 1 hour. The room area temperature limit of ≤ 90 °F is based on the normal operating maximum steady-state environmental condition and a plant-specific calculation for a single Class 1E electrical equipment A/C train maintaining both Class 1E electrical equipment train rooms at a temperature of ≤ 104 °F during design-basis accident conditions. The plant specific calculation envelopes affected room area temperatures being ≤ 90 °F at the onset of the design basis accident. Verification of room temperature is continued once per 4 hours. If the room area temperatures are not within limits when verified once per 4 hours thereafter and inoperable Class 1E electrical equipment A/C train cannot be restored to operable status within 30 days, Condition B must be entered. The 4-hour Completion Time for verification of the room area temperatures is reasonable based on the minimal increase in room temperatures during this time period.

Required Action A.3 requires the Class 1E electrical equipment A/C train must be restored to operable status within 30 days. The 30 day Completion Time is based on the low probability of an event occurring during this time period, necessary maintenance or replacement timeline for A/C train/system components (Reference 1, Attachment II – Table 7), and the capability of the remaining operable Class 1E electric equipment A/C train to provide adequate area cooling for both trains of electrical equipment (with mitigating actions implemented).

With the unit in TS 3.7.20 Condition B, Required Action and associated Completion Time of Condition A not met in Modes 1 2 3, and 4, the unit must be placed in a Mode that minimizes accident risk. To achieve this status, the unit must be placed in Mode 3 within 6 hours and in Mode 5 within 36 hours. The allowed completion times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

With the unit in TS 3.7.20 Condition C, two Class 1E electrical equipment A/C trains inoperable in Modes 1, 2, 3, and 4, the Class 1E electrical equipment A/C system may not be capable of performing its intended function. Therefore, LCO 3.0.3 must be entered immediately.

Based on the discussion above, the NRC staff has evaluated the proposed TS change and determined that the proposed TS LCO correctly specifies the lowest functional capability or performance levels of equipment required for safe operation of the facility, in accordance with 10 CFR 50.36(c)(2)(i). There is reasonable assurance that the required actions to be taken when the proposed TS LCO is not met can be conducted without endangering the health and safety of the public since the unit will be placed in a shutdown status.

3.8.1.2 NRC Staff Evaluation of Proposed TS SR 3.7.20

The requested changes would add new TS Surveillance Requirements to address the operation of Class 1E electrical equipment A/C trains.

The proposed TS SR 3.7.20.1 includes verification that each Class 1E electrical equipment A/C train starts and operates on an actual or simulated actuation signal. The actuation signals include the CRVIS and actuations driven by the LOCA and shutdown sequencers. A CRVIS is generated by the inputs discussed in the LCO Bases for TS 3.3.7. The Frequency of 18 months is based on industry operating experience and is consistent with the typical refueling cycle.

The proposed TS SR 3.7.20.2 includes testing of the Class 1 electrical equipment A/C system condenser heat exchangers under design conditions is impractical. This SR verifies that the heat removal capability of the air conditioning units is adequate to remove the heat load assumed in the Class 1E electrical equipment A/C trains is adequate to remove the heat assumed in the affected rooms during design basis accidents. This SR consists of verifying the heat removal capability of the condenser heat exchanger (either through performance testing or inspection), ensuring the proper operation of major, components in the refrigeration cycle, verification of unit air flow capacity, and water flow measurement. This SR is performed in the same manner as SR 3.7.11.1 (CRACS). The 18-month Frequency is appropriate since significant degradation of the Class 1E electrical equipment A/C system is slow and is not expected over this time period.

NUREG-1431 (Reference 6) represents the evolution of the NRC staff's guidance on how to meet the requirements in 10 CFR 50.36 for Westinghouse plants. Licensees can deviate/depart from staff guidance as long as they provide acceptable justification. The NRC staff has determined that the proposed TSs deviate/depart from the guidance of NUREG-1431. The licensee provided justification for the deviations and departures from NUREG-1431. The staff evaluated the justifications and determined they were acceptable.

The NRC staff evaluated the proposed SR associated with the proposed new LCO 3.7.20 and concluded it is appropriate for ensuring the operability of the equipment specified in LCO 3.7.20. Specifically, Class 1E electrical equipment A/C system train actuations on an actuation signal and heat removal capability is to be verified with testing/calculation. Both SRs test frequencies are consist with other HVAC TS systems. The design heat loads or heat removal capacity is not expected to change over this time period since one division is always operating and is in service in Modes 1, 2, 3, and 4.

Based on the discussion above, the NRC staff concluded that the proposed SR is acceptable since it meets the requirements of 10 CFR 50.36(c)(3) for surveillances because it provides assurance that the necessary quality of systems and components will be maintained and the LCO will be met.

3.8.2 NRC Staff Evaluation of the Design Modifications and Testing

The licensee stated in Attachment II, Section 3.5 of its application dated June 28, 2017 (Reference 1), and Item 9 of the letter dated February 15, 2018 (Reference 2) that the following design modifications are proposed in the support of proposed TS 3.7.20:

Summary of the installation of safety-related components:

- 6 recirculation fans
  (4 fan on the plant 2000 feet level, rated at 6500 cfm)
  (2 fan on the plant 2016 feet level, rated at 4700 cfm)
- 8 isolation dampers
- 14 fire dampers

- 20 transition grills
- HVAC ductwork
- Associated power supplies (fans and dampers)
- LED lighting (Class 1E electrical and ESF switchgear rooms)
- Power and control cables

Since the installation of the additional cooling capability is considered a safety-related design modification, the appropriate Class 1E power is being utilized and the appropriate qualification of equipment is being performed.

A post-design modification test plan has been developed and is part of the design change for the installation of the recirculation fans and associated equipment. The post-design modification test plan includes testing of both trains Class 1E electrical equipment A/C system with a recirculation fan subsystem in service. This testing will verify air flows meet the acceptance criteria in calculation GK-M-016 in the operable cooling train and air flows from the recirculation fans in service for the inoperable cooling train for the normal operation lineup and the accident condition lineup. Other testing identified (but not all inclusive) in the post-design modification test plan includes:

- Verify proper operation of the new dampers and controls related to the fan and air flow control circuits upon the initiation of a halon trip signal.

- Installed ductwork will be leak tested using either the pressure decay method, constant pressure method, or bubble leak location method.

- The fan motors are to be bump tested to confirm that the motor and fan rotate in the correct direction and baseline vibration test data taken for each motor.

- Isolation dampers are to be tested for cycle time, limit switch indication, and smooth operation.

- Fire dampers shall be drop tested for proper operation.

- Actuation of each control damper and fan shall be verified when the applicable 'START' button is pressed. Verify damper position and fan running indication is received at the Motor Control Center and airflow is as expected.

In response to RAI SCPB-2, by letter dated May 29, 2018 (Reference 3), the licensee revised the Regulatory Commitments provided in the licensee's application dated June 28, 2017. In the letter dated August 30, 2018 (Reference 5), the licensee stated that the design modifications, in support of the proposed LAR described in References 1, 2, and 3, have been completed and tested.

The NRC staff reviewed elements of plant configuration, provided in the LAR, coupled with the TS LCO 3.7.20, Required Action A.1 and concluded that there is reasonable assurance that the completed Class 1E electrical equipment A/C recirculation subsystem will provide adequate cooling for redundant electrical trains to support safe shutdown of the plant in support of new TS 3.7.20.

Specifically, the proposed configuration of the Class 1E electrical equipment A/C recirculation subsystem will provide adequate cooling to the electrical equipment rooms during all modes of operation. The design provides automatic dampers actuation and prevent air short cycling between rooms and the dampers provide adequate train separation in the event of a fire.

3.8.3 NRC Staff Evaluation of Proposed Associated Operations Actions

The human actions associated with the compensatory measures described in the licensee's application dated June 28, 2017, were reviewed. As discussed in Section 2.5.2 of this SE, the LAR received a Level II human factors review per the guidance in Section 4 of NUREG-1764, Revision 1 (Reference 13).

3.8.3.1 General Deterministic Review

Attachment II, Section 3.5, "Planned Modifications," of the licensee's application dated June 28, 2017 (Reference 1), describes new wall and ceiling penetrations that will allow communication between the two independent trains of Class 1E electrical equipment rooms. The plant modifications completed in support of this LAR facilitate the compensatory actions to manually initiate the recirculation fans and cool both Class 1E electrical equipment trains with one Class 1E electrical equipment A/C system. The letter dated May 29, 2018 (Reference 3), states that only same-train components associated with each Class 1E electrical equipment train are used to power the recirculation subsystem and that no action from the opposite train is relied on to support the operating recirculation subsystem. Therefore, Class 1E electrical equipment A/C system train independence is maintained when the recirculation subsystem is placed in service.

Fire dampers are installed in the through-wall penetrations between trains per Section 3.3, "Fire Protection," in Attachment II of the application dated June 28, 2017 (Reference 1), that are designed to actuate (i.e., close) on a halon actuation signal or electro-thermal links and secure the Class 1E electrical equipment A/C systems for both trains. As stated in the response to RAI APHB-1 in the letter dated May 29, 2018 (Reference 3), the ductwork between the Class 1E electrical equipment room trains that serve the recirculation subsystem contain bubble-tight control dampers that are normally closed and will close upon the actuation of a halon system to seal the rooms in the event of halon discharge. Therefore, the existing plant design is configured so as to maintain train isolation and independence from the effects of fire. In addition, the licensee confirmed that the through-wall ducts located in the Class 1E electrical equipment rooms are located at room heights, or in the ceiling, such that flooding in one room is precluded from impacting another room.

Attachment II, Section 3.2.5, "Hydrogen Generation/Concentration," of the licensee's application dated June 28, 2017, described that calculations were performed to determine the potential level of hydrogen that may accumulate in the rooms while a recirculating fan is operating. The licensee's evaluation concluded that the hydrogen concentration in any one room does not approach the 2 percent lower flammability safety limit of hydrogen in oxygen. Based on response to RAI APHB-1, modifications proposed in support of this LAR and post-modification testing have been completed. The results of the post-modification testing validated that operation of the recirculation subsystem fan did not adversely impact other control building HVAC systems. This validation included the CBPS, which maintains a positive pressure in the control room during accident scenarios.

Therefore, the NRC staff finds that the human actions associated with implementation of the compensatory actions described in the licensee's submittals dated June 28, 2017 and May 29,

2018, will not adversely impact Class 1E electrical equipment A/C train separation or independence. Furthermore, the NRC staff finds that licensees proposed compensatory actions do not overly rely on human actions to maintain the integrity of the independent trains of the Class 1E electrical equipment rooms.

3.8.3.2 Human Action Analysis

The proposed operator actions are described in Attachment II, Section 3.4, "Operator Actions," of the licensee's application dated June 28, 2017 (Reference 4). As detailed in Section 3.6.1 above, the proposed changes involve human actions that mitigate equipment inoperability (Class 1E electrical equipment A/C system) that would result in the loss of a train of emergency Class 1E power. Three groups of mitigating actions associated with the proposed new TS 3.7.20, Required Action A.1, are proposed.

1. The first set of operator actions involves travel to the ESF switchgear room No. 1 to enable the halon interlock relays. The halon interlock relays secure the recirculation subsystem should the Halon system activate while the recirculation fans are operating. Therefore, the recirculation subsystem design requires that the halon interlock relays be enabled before the recirculation subsystem fans and dampers will operate (RAI APHB-3 (Reference 3)). The operator will then proceed to the NB001/NB002 switchgear rooms and manually start the recirculation fans associated with the with the operable Class 1 electrical equipment A/C system. The fan start circuitry will position the associated fan dampers and start the fans once the damper is in the correct position. These actions will be directed by a procedure.

2. The second set of operator actions involves transferring the spare battery chargers to supply the Class 1E batteries. Based on the response to RAI APHB-3, the licensee is implementing a new procedure that will direct plant operators to de-energize the normally aligned battery chargers and align the spare battery chargers to the Class 1E batteries.

   The Completion Time associated with the actions to place the recirculation fans in service and align the spare battery charges to the Class 1E batteries for proposed TS 3.7.20 Required Action A.1 is "immediately" once the Class 1E electrical equipment A/C train is declared inoperable. Section 1.3 of the WCGS TSs defines "immediately" as pursuing the Required Action without delay in a controlled manner. The GOTHIC model supporting the proposed TS assumes that these actions will be accomplished within 1 hour. This timing corresponds with proposed TS 3.7.20 Required Action A.2 to verify that the Class 1E electrical equipment room temperature is ≤ 90 °F within 1 hour. Reference 3 notes that the GOTHIC calculation results show that none of the Class 1E electrical equipment rooms approach 90 °F until at least 2 days after the loss of the trains Class 1E electrical equipment A/C train. Furthermore, as stated in the response to RAI APHB-2 (Reference 3), 90 °F is not the operability limit for the Class 1E electrical equipment; the Class 1E electrical equipment is qualified to a temperature of 104 °F. Therefore, ample margin is available with respect to the operator proposed actions to place the Class 1E electrical equipment room recirculation fan subsystem in service.

3. The third action is contingent on the actuation of a CRVIS while the switchgear room recirculation fans are operating. The CRVIS starts the CBPS pressurization fans (i.e., two trains CGK04A/B). If the CRVIS is actuated (and the associated CBPS pressurization fans start) while the switchgear room recirculation fans are operating,

then one train of the pressurization fans must be secured within 12 hours. As stated in the response to RAI APHB-3 in the licensee's letter dated May 29, 2018, securing one train of CBPS pressurization fans is accomplished by actuation of a hand switch located in the control room and a specific procedure is not considered necessary to complete this action. However, operators must be cognizant that this action is required to be completed within 12 hours following the start of the CBPS pressurization fans. Therefore, the licensee will implement a new procedure, SYS GK-201 to provide guidance to secure one train of CBPS pressurization fans if the CBPS actuates.

Should one of the Class 1E electrical equipment A/C trains be determined to be inoperable following initiation of a LOCA event, the starting of the recirculation fans for the inoperable cooling train would not be initiated. Plant operators would continue to shutdown the plant utilizing the operable Class 1E electrical equipment A/C train. If the LOCA were to occur after the recirculation fans had been placed in service, then the recirculation fans would be left operating. The licensee's GOTHIC model has been adjusted to incorporate the possibility of this post-LOCA configuration. Therefore, there are no operator actions, associated with the recirculation fans, specified for post-LOCA conditions.

As described above, the operator actions required to access and start the recirculation fans and align the spare battery chargers to supply power to the Class 1E batteries are non-complex and will be directed by plant procedure. Procedural guidance will also be implemented to provide cognizance to the control room operators for securing one train of the CBPS pressurization fans within 12 hours following a CRVIS, while the switchgear room recirculation fans are operating. In addition, the time available for operators to accomplish these actions includes ample margin. Therefore, based on the above evaluation, the NRC staff finds that the licensee's proposed LAR includes adequate and appropriate administrative controls to alert and direct the operators to perform the required compensatory actions within the associated time limitations.

3.8.3.3 Design of Human System-Interfaces, Procedures and Training

As stated in the response to RAI APHB-3 in the licensee's letter dated May 29, 2018 (Reference 3), the actions are incorporated into procedures associated with placing the recirculation fan subsystem in service will include the following:

- Enable Class 1E Halon relays.
- Start the applicable recirculation subsystem train.
- Verify indicating lights display dampers open and the recirculation fans running.
- Within one hour verify Class 1E electrical equipment room temperatures ≤ 90 °F and once every 4 hours thereafter.
- Verify recirculation fan air flows into affected rooms.
- Ensure INOPERABLE Class 1E electrical equipment A/C unit is secured.
- Align NK025/NK026 spare battery chargers.

As stated in the response to RAI APHB-3 in Reference 3, the actions are incorporated into procedures associated with transferring the spare battery chargers to supply the Class 1E batteries will include:

- Ensure power is available to the charger.
- Obtain transfer switch key.

- Ensure breaker is on.
- Realign DC circuits from charger to be secured to the spare battery charger.
- Reduce charger DC output voltage.
- Place energized charger in float-equalize mode.
- Align charger.
- Adjust charger output.

As described above, the licensee will implement procedures that direct operators to the appropriate equipment/control locations and provide instructions to start the recirculation fan subsystem and align the spare battery charges to supply power to the Class 1E batteries. Guidance will also be provided in a new procedure (SYS GK-201), to direct plant operators to secure one train of CBPS pressurization fans, if operating, within 12 hours. In addition, procedure SYS GK-201 will provide guidance regarding when to monitor Class 1E electrical equipment room temperatures to meet prosed TS 3.7.20 Required Action A.2. The procedure will include an Appendix listing the Class 1E electrical equipment rooms and facilitate recording instrument numbers and indicated temperatures.

As described above, plant procedures will provide sufficient detail and direction to enable operators to place the recirculation fans in service, align the spare battery chargers and implement the associated room temperature monitoring. The equipment and controls being operated consist of existing plant components and new components that are not novel or require unusual human system-interfaces (HSIs). In the letter dated May 29, 2018, the licensee stated that required training has also been initiated via the generation of training requests for licensed reactor and nuclear station operators regarding the new recirculation subsystem. Therefore, the NRC staff finds that the design of HSIs, procedures and operator training have been adequately considered.

3.8.3.4 Human Action Verification

Page 12 of 48 in Attachment II to the application dated June 28, 2017 (Reference 1), identifies various methods in which plant operators identify an inoperable Class 1E electrical equipment room A/C train in order to initiate placing the recirculation fan subsystem in service. These methods include operator rounds to monitor/log various cooling train parameters once every 12-hour shift to verify Class 1E electrical equipment A/C system operability. Monitored parameters include (not all inclusive) if the cooling unit is in operation, compressor oil pressure, compressor suction pressure, compressor oil differential pressure, compressor discharge pressure, filter differential pressure, AC amps, Freon level, and oil level. Computer points are used to verify the DC switchboard rooms and ESF switchgear room temperatures are less than 87 °F and provide an alarm on the main control board. As stated in the response to RAI APHB-3 (Reference 3), the WCGS TRM TR 3.7.22, "Area Temperature Monitoring," currently specifies a temperature limit of 87 °F for the plant computer points. The completed modification will lower the plant computer point limit to 83 °F to provide additional margin to the proposed TS 3.7.20 Required Action limit of ≤ 90 °F. The new 83 °F limit will also be applied to the verification of local temperature indicators.

As stated in the response to RAI APHB-2 (Reference 3), the Class 1E electrical equipment room areas are typically maintained at 66 °F to 68 °F. In addition, the GOTHIC calculation results show that the Class 1E electrical equipment room does not approach 90 °F until at least 2 days after the loss of the Class 1E electrical equipment A/C system. Therefore, the NRC staff

finds that the licensee has verified that ample time is available for operators to identify the failure of a train of Class 1E electrical equipment A/C train and allow an additional hour to place the recirculation fan subsystem in service before the 90 °F limit is reached.

As described in the response to RAI APHB-2, the licensee performed a time sensitive action validation to verify that plant operators can place the recirculation fan subsystem in service and align the spare battery charger to the Class 1E battery within 1 hour as assumed in the GOTHIC model calculation. The licensee performed the validation using WCGS procedure AI 21-016, "Operator Time Critical Action Validation," for implementation of draft procedure SYS GK-200 for placing the recirculation subsystem in service. The results of the validation confirmed that the operators were capable of starting the recirculation subsystem train, aligning the spare battery chargers, and verifying the Class 1E electrical equipment room temperatures in less than 45 minutes. Thus, the results of the validation demonstrated that the required actions can be performed within the 1 hour assumed GOTHIC analysis time with a 15 minute (or 25 percent) margin.

As stated in the letter dated May 29, 2018, the licensee will implement a new procedure, SYS GK-201, to provide guidance to secure one train of CBPS pressurization fans, if the CBPS actuates. This action is accomplished via a hand switch in the control room and must be completed within 12 hours following the start of the CBPS pressurization fans. Given the simplicity of the operator action and the relatively long timeframe available to complete the action, no validation of this action is necessary.

Based on the evaluation above, the NRC staff finds that the licensee has verified and validated that plant operators can identify the inoperability of the Class 1E electrical equipment A/C system and implement the specified mitigating actions within the time constraints associated with proposed TS 3.7.20 Required Actions A.1 and A.2.

3.9 NRC Staff Technical Conclusion and Summary

Based on its review of the licensee's submittals (References 1, 2, 3, 4, and 5), the NRC staff concludes that proposed TS 3.7.20 is acceptable. The proposed TS LCO 3.7.20 contains requirements for operability of two Class 1E electrical equipment A/C trains, which provide for the lowest functional capability or performance level of equipment required for safe operation of the facility, and therefore, meets the LCO requirements of 10 CFR 50.36(c)(2)(i).

The proposed TS for the Class 1E electrical equipment A/C trains satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii), since a TS LCO must be provided for a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The Class 1E electrical equipment A/C trains provide essential cooling to components important to safety such as AC electrical buses, DC batteries, and DC buses.

Further, the proposed TS 3.7.20 SRs are acceptable since it meets the requirements of 10 CFR 50.36(c)(3) because the SR provides assurance that the function of the systems will be maintained.

The NRC staff evaluated the proposed WCGS changes to the TSs against each of the unit applicable design requirements listed in Section 2.5.1.1 of this SE. The NRC staff finds that the proposed changes for Modes 1, 2, 3 and 4 operations, as they relate to the new TS 3.7.20,

remain consistent with GDC 2, 4, 13, and 17 of 10 CFR Part 50, Appendix A, as they relate to the WCGS design requirements. The results of the NRC staff evaluations specific to each GDC is as follows:

- The NRC staff finds the above discussion acceptable to meet GDC 2 since the proposed new TS 3.7.20 utilizes existing installed equipment for the Class 1E electrical equipment A/C system. The installed Class 1E electrical equipment A/C system meets the GDC 2 requirements for protection against natural phenomena specified in the WCGS USAR. This equipment is designed to American Nuclear Society (ANS) Safety Class 3 and Seismic Category I requirements. WCGS USAR Section 9.4.1.3, "Safety Evaluation," (Reference 6) states that the safety-related portions of the control building HVAC systems are located in the control and auxiliary buildings and these buildings are designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other appropriate natural phenomena. Also, the safety-related portions of the control building HVAC systems are designed to remain functional after a safe shutdown earthquake.

- The NRC staff finds the above discussion acceptable to meet GDC 4 since the proposed new TS 3.7.20 utilizes existing installed equipment for the Class 1E electrical equipment A/C system. The installed Class 1E electrical equipment A/C system meets the GDC 4 requirements for environmental and dynamic effects specified in the WCGS USAR. This equipment is designed to ANS Safety Class 3 and Seismic Category I requirements. WCGS USAR Section 3.1.3 states that the safety-related structures, systems, and components are designed to accommodate the effects of, and to be compatible with, the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including LOCAs. These structures, systems, and components are 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.

- The NRC staff finds the above discussion acceptable to meet GDC 13. Instrumentation and controls related to this proposed new TS 3.7.20 would include the existing instrumentation related to monitoring of Class 1E Electrical Equipment A/C System variables and resultant area room temperatures. No new instrumentation and controls are being added with respect to this proposed TS addition.

- Based on the above evaluation, the NRC staff finds the proposed changes to the WCGS TS provides reasonable assurance of the continued availability of the required electrical power to shut down the reactor and to maintain the reactor in a safe condition after an anticipated operational occurrence or a postulated design-basis accident, when in Condition A of the proposed TS 3.7.20. Furthermore, the staff concludes that the proposed TS changes requested in accordance with 10 CFR 50.36, meet the intent of GDC 17. Therefore, the staff finds the proposed changes acceptable.

Additionally, the proposed TS changes were reviewed for technical clarity and consistency with the existing WCGS requirements for customary terminology and formatting. The NRC staff found that the proposed changes were consistent with Chapter 16 of NUREG-0800.

The proposed TS for the Class 1E electrical equipment A/C trains satisfies Criterion 3 of 10 CFR 50.36. Criterion 3 states that a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

The NRC finds that operator actions are needed in support of this proposed TS and the NRC staff finds reasonable assurance that with operator actions, as noted above, the Class 1E electrical equipment A/C recirculation subsystem will adequately support the TS LCO 3.7.20.

Upon the issuance of the proposed TS, the exception to LCO 3.0.2 allowed by LCO 3.0.6 can be applied in a situation when one subsystem of the Class 1E electrical equipment A/C trains is inoperable.

3.10 Summary

Based on the above evaluation, the NRC staff concludes that the proposed TS changes are in accordance with 10 CFR 50.36, 10 CFR 50.63, 10 CFR 50.55a, and 10 CFR 50.92 and meets the intent of requirements specified by GDC 2, 4, 13, and 17. Therefore, the staff finds the proposed changes acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Kansas State official was notified of the proposed issuance of the amendment on August 1, 2018. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes SRs. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on October 3, 2017 (82 FR 46099). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The 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.

7.0 REFERENCES

1. McCoy, J. H., Wolf Creek Nuclear Operating Corporation, letter to U.S. Nuclear Regulatory Commission, "Docket No. 50-482: License Amendment Request for Addition of New Technical Specification 3.7.20, 'Class 1E Electrical Equipment Air Conditioning (A/C) System,'" dated June 28, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17186A082).

2. McCoy, J. H., Wolf Creek Nuclear Operating Corporation, letter to U.S. Nuclear Regulatory Commission, "Docket No. 50-482: Supplement to License Amendment Request for Addition of New Technical Specification 3.7.20, 'Class 1E Electrical Equipment Air Conditioning (A/C) System,'" dated February 15, 2018 (ADAMS Accession No. ML18058A743).

3. McCoy, J. H., Wolf Creek Nuclear Operating Corporation, letter to U.S. Nuclear Regulatory Commission, "Docket No. 50-482: Response to Request for Additional Information Regarding the License Amendment Request for Addition of New Technical Specification 3.7.20, 'Class 1E Electrical Equipment Air Conditioning (A/C) System,'" dated May 29, 2018 (ADAMS Accession No. ML18156A129).

4. McCoy, J. H., Wolf Creek Nuclear Operating Corporation, letter to U.S. Nuclear Regulatory Commission, "Docket No. 50-482: Supplement to Request for Additional Information Regarding the License Amendment Request for Addition of New Technical Specification 3.7.20, 'Class 1E Electrical Equipment Air Conditioning (A/C) System,'" dated June 20, 2018 (ADAMS Accession No. ML18178A166).

5. Smith, S.L, Wolf Creek Nuclear Operating Corporation, letter to U.S. Nuclear Regulatory Commission, "Docket No. 50-482: Fulfillment of Regulatory Commitments for One Class 1E Electrical Equipment Air Conditioning Train to Provide Cooling for Both Trains of Electrical Equipment during Normal and Accident Conditions, Addition of Technical Specification 3.7.20," dated August 30, 2018 (ADAMS Accession No. ML18248A256).

6. Wolf Creek Generating Station, Updated Safety Analysis Report, Revision 31 (Package ADAMS Accession No. ML18093A810).

7. U.S. Nuclear Regulatory Commission, "Standard Technical Specifications Westinghouse Plants," NUREG-1431, Revision 4.0, Volume 1, Specifications, dated April 2012 (ADAMS Accession No. ML12100A222).

8. U.S. Nuclear Regulatory Commission, "Standard Technical Specifications Westinghouse Plants," NUREG-1431, Revision 4.0, Volume 2, Bases, dated April 2012 (ADAMS Accession No. ML12100A228).

9. U.S. Nuclear Regulatory Commission, "Periodic Testing of Protection System Actuation Functions," Regulatory Guide 1.22, Revision 0, dated February 1972 (ADAMS Accession No. ML083300530).

10. U.S. Nuclear Regulatory Commission, "Availability of Electric Power Sources," Regulatory Guide 1.93, Revision 1, dated March 2012 (ADAMS Accession No. 090550661).

11. U.S. Nuclear Regulatory Commission, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," NUREG-0800, Chapter 16, "Technical Specifications," Revision 3, dated March 2010 (ADAMS Accession No. ML100351425).

12. U.S. Nuclear Regulatory Commission, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," NUREG-0800, Chapter 18, "Human Factors Engineering," Revision 3, dated December 2016 (ADAMS Accession No. ML16125A114).

13. U.S. Nuclear Regulatory Commission, "Guidance for the Review of Changes to Human Actions," NUREG-1764, Revision 1, September 2007 (ADAMS Accession No. ML072640413).

14. Singal, B. K., U.S. Nuclear Regulatory Commission, letter to Adam C. Heflin, Wolf Creek Nuclear Operating Corporation, "Wolf Creek Generating Station – Regulatory Audit Plan for November 7-8, 2017, Site Audit in Support of the License Amendment Request to incorporate New Technical Specification 3.7.20 (CAC No. MF9961; EPID L-2017-LLA-0262)," dated October 23, 2017 (ADAMS Accession No. ML17291A008).

15. Singal, B. K., U.S. Nuclear Regulatory Commission, letter to Adam C. Heflin, Wolf Creek Nuclear Operating Corporation, "Wolf Creek Generating Station, Unit 1 – Regulatory Audit Summary Regarding License Amendment Request to Incorporate New Technical Specification 3.7.20 (CAC No. MF9961; EPID L-2017-LLA-0262)," dated April 2, 2018 (ADAMS Accession No. ML18073A089).

16. Singal, B. K., U.S. Nuclear Regulatory Commission, letter to Adam C. Heflin, Wolf Creek Nuclear Operating Corporation, "Wolf Creek Generating Station, Unit 1 – Request for Additional Information Re: License Amendment Request for Addition of New Technical Specification 3.7.20, 'Class 1E Electrical Equipment Air Conditioning (A/C) System' (CAC No. MF9961; EPID L-2017-LLA-0262)," dated April 6, 2018 (ADAMS Accession No. ML18074A310).

17. U.S. Nuclear Regulatory Commission, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," NUREG-0588, Revision 1, dated July 1981 (ADAMS Accession No. ML031480402).

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Date: September 11, 2018

SUBJECT: WOLF CREEK GENERATING STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: ADDITION OF NEW TECHNICAL SPECIFICATION 3.7.20, "CLASS 1E ELECTRICAL EQUIPMENT AIR CONDITIONING (A/C) SYSTEM" (CAC NO. MF9961; EPID L-2017-LLA-0262) DATED SEPTEMBER 11, 2018

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ADAMS Accession No. ML18219A564 *via memo **via e-mail

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