



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

April 2, 2018

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

**SUBJECT: 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)**

Dear Mr. Heflin:

By letter dated June 28, 2017 (Agencywide Documents Access and Management System Accession No. ML17186A082), Wolf Creek Nuclear Operating Corporation (the licensee) submitted a license amendment request to incorporate new Technical Specification (TS) 3.7.20, "Class 1E Electrical Equipment Air Conditioning (A/C) System," into the Wolf Creek Generating Station, Unit 1 (WCGS) TSs. The new TS 3.7.20 will include the Limiting Conditions for Operation (LCO) statement, Applicability during which the LCO must be met, Actions (with Conditions, Required Actions, and Completion Times) to be completed when the LCO is not met, and surveillance requirements with a specified frequency to demonstrate that the LCO is met for the Class 1E electrical equipment A/C trains at WCGS.

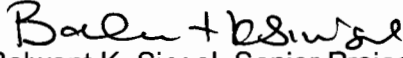
To support its review of the license amendment request, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a regulatory audit at the WCGS site from November 7 to November 8, 2017, to verify information submitted by the licensee and the supporting calculations. During the status briefing meeting at the site on November 8, 2017, it was decided to keep the audit open to provide more time to the NRC staff to review additional information furnished by the licensee during the audit. The NRC staff completed its audit efforts from NRC headquarters in Rockville, Maryland, and conducted a final status meeting via teleconference on February 1, 2018. The regulatory audit summary is enclosed.

A. Heflin

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If you have any questions, please contact me at 301-415-3016 or via e-mail at Balwant.Singal@nrc.gov.

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

Enclosure:
Regulatory Audit Summary

cc: Listserv

REGULATORY AUDIT SUMMARY FOR NOVEMBER 7-NOVEMBER 8, 2017, AUDIT
IN SUPPORT OF THE REVIEW OF LICENSE AMENDMENT REQUEST
TO INCORPORATE NEW TECHNICAL SPECIFICATION 3.7.20
WOLF CREEK NUCLEAR OPERATING CORPORATION
WOLF CREEK GENERATING STATION, UNIT 1
DOCKET NO. 50-482

Background

By letter dated June 28, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17186A082, Wolf Creek Nuclear Operating Corporation (WCNOC, the licensee), submitted a license amendment request (LAR) requesting for approval of a new Technical Specification (TS) related to room cooling for essential electrical equipment for Wolf Creek Generating Station, Unit 1 (WCGS).

The proposed amendment would add new TS 3.7.20, "Class 1E Electrical Equipment Air Conditioning (A/C) System," to the WCGS TSs. New TS 3.7.20 will include the Limiting Conditions for Operation (LCO) statement, Applicability during which the LCO must be met, Actions (with Conditions, Required Actions, and Completion Times) to be applied when the LCO is not met, and surveillance requirements (SRs) with a specified Frequency to demonstrate that the LCO is met for the Class 1E Electrical Equipment A/C System trains at WCGS.

The U.S. Nuclear Regulatory Commission (NRC) staff is performing a review of the proposed TS changes. Due to the complexity of the proposed TS changes, supporting calculations, and computer-based modelling, the staff determined that face-to-face interactions with the licensee staff could help understand complex technical issues and gain better understanding of the licensee's calculations and other aspects of the LAR. Hence, the NRC staff planned a regulatory audit. The audit was planned with an aim to improve the efficiency of the review and to minimize the need for multiple rounds of clarification calls and request for additional information (RAIs). The NRC staff issued the audit plan by letter dated October 23, 2017 (ADAMS Accession No. ML17291A008).

The NRC staff conducted the regulatory audit in accordance with the Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195).

Face-to-face interactions at the site also allowed the NRC staff to review and assess physical aspects of the LAR at the site through field walkdowns.

Audit Dates and Location:

The onsite portion of the regulatory audit was held at the WCGS from November 7 to November 8, 2016. The remainder of the audit was conducted by the NRC staff from the NRC headquarters facility located in Rockville, Maryland, and via teleconference calls between the

NRC staff and the licensee. A final status meeting was conducted by teleconference on February 1, 2018.

Tables 2 and 3 provide the list of attendees in the entrance and status briefing meetings held on site. Table 4 provides the list of attendees for the final status meeting held via teleconference call on February 1, 2018.

Audit Team Members (NRC Staff):

The onsite audit team consisted of:

- Larry Wheeler, Audit Team Lead, Containment and Plant Systems Branch, Technical Reviewer
- Gurcharan Matharu, Electrical Engineering Operating Reactor Branch, Technical Reviewer
- Balwant Singal, Wolf Creek Project Manager, Plant Licensing Branch IV

Support staff and management from NRC headquarters consisted of:

- Robert Dennig, Containment and Plant Systems Branch, Branch Chief
- Nageswara Karipineni, Containment and Plant Systems Branch, Technical Reviewer
- Pete Snyder, Technical Specifications Branch, Technical Reviewer

The licensee's staff who participated in key discussions, are listed in Tables 2, 3, and 4 of this summary.

Audit Summary:

The purpose of this regulatory audit was to determine if calculations performed by the licensee support the bases for the proposed changes to the TSs. The areas of focus during the audit were the calculation methodologies, assumptions, and results used to reach conclusions in the LAR.

A walk down of the WCGS control building rooms, where the Class 1E equipment is located, was conducted during the onsite visit to help the NRC staff understand the electrical room configuration associated with the heating, ventilation, and air conditioning (HVAC) system, with the existing and proposed configurations to support TS changes.

Table 1 provides a list of open items identified during the audit with a short summary description of how these items were addressed. The final status meeting was conducted by teleconference on February 1, 2018.

The following key documents were reviewed during the audit:

1. Calculation No. GK-06-W, Revision 7, "SGK05A/B Class 1E Electrical Equipment Rooms A/C Units, Single Unit Operation Capability."
2. Calculation No. 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."

3. Calculation No. GK-E-001, Revision 4, "Electrical Equipment Heat Loads in ESF SWGR [Engineered Safety Feature Switchgear], DC SWBD [Direct Current Switchboard], and Battery Rooms."
4. Calculation No. XX-E-006, Revision 7, "AC [Alternating Current] System Analysis."
5. Calculation No. NK-E-001, Revision 4, "125 VDC [Volts Direct Current] Class 1E Battery Sizing, Voltage Drop and Short Circuit Studies."
6. System Description, M-10GK, Revision 7, "Control Building Ventilation System."
7. Calculation GK-370, Revision 4, "Battery Rooms Hydrogen Concentration."
8. Calculation GK-M-007, Revision 0, "Battery Rooms, Switchboard Rooms, Switchgear Room Temperature During Winter Concurrent with Station Black Out Conditions."
9. Mechanical/Nuclear Design Criteria for Wolf Creek Generating Station, M-000, Revision 16.
10. Lesson Plan, Control Building HVAC System.
11. Drawings, "Duct General Assembly Drawings by PMT, Inc.," N2155 series.
12. Drawings, "P&IDs [Piping and Instrumentation Diagrams], Control Building," M12GK series.
13. Physical arrangement drawings of the areas of the Class 1E Electrical Equipment AC System and associated areas of cooling.

In summary, the audit enhanced the NRC staff's understanding of the Class 1E configuration, existing HVAC systems, calculations, and computer based model (GOTHIC) used in support of the LAR.

**Table 1
Open Items Identified During the Audit Requiring Additional Review**

Item No.	Description	Status	Supplement/Potential RAI
1	Based on air flow patterns utilizing the new fans/duct, the back of the motor control centers (MCCs) may not have adequate flow. Does the model show air flow patterns on the back of the MCCs?	Item is closed based on NRC staff review of GOTHIC files.	None.
2	Cables are designed for a maximum conductor temperature of 90 degrees Centigrade (°C), does the model show this as heat input into the rooms.	Closed. Addressed under Item No. 3.	None.
3	<p>The major contributors to heat load are transformers and cables. The licensee appears to have non-conservative assumptions related to the heat load calculations:</p> <p>a. Heat generated is calculated as I^2R where I is the current and R is the resistance. R increases as temperature increases.</p> <p>b. Cables are designed to operate at 90 °C. With room temperatures approaching 90 degrees Fahrenheit (°F) +, the cables may be operating at or above design temperature of 90 °C. Hence the "R" value of cables should be computed at appropriate conductor temperature. The licensee has calculated "R" at 40 °C.</p> <p>c. At the onset of an event (loss-of-coolant accident (LOCA)), the pressures in the reactor coolant system may be low and pumps may operate at runout conditions. Hence, the motors associated with the pumps may be operating above nominal rating resulting in higher current. The licensee has used motor load at nominal rating.</p> <p>d. The corresponding load on the transformers need to be confirmed. The current in transformer should account for maximum load plus losses.</p>	To be addressed by future RAIs.	NRC staff plans to issue RAI.

Item No.	Description	Status	Supplement/Potential RAI
4	<p>The batteries have minimum and maximum operating temperature limits. The battery will give the best results when working in a room temperature between 60 °F and 80 °F, but will function satisfactorily when operating in temperatures outside the allowable band. High temperatures increase the performance, but decrease the life of the cells; low temperatures reduce the performance. The NRC staff needs assurance from the licensee as to temperatures expected in the battery rooms during extreme winter or extreme summer conditions with loss of heating/cooling. The NRC staff would like to ensure that proper battery temperatures are assumed in the battery sizing calculations.</p> <p>It may be noted that the planned or unplanned 30-day outage may be in the middle of winter. If the plant is in operational Modes 1, 2, and 3, the emergency core cooling system (ECCS) will not be operating and heat load in the areas of concern may be minimal. If an accident occurs and 24 hours later, the load shedding reduces heat input into the rooms, will the batteries remain 'operable' after a few days into the event?</p> <p>The NRC staff would like to understand the low end design temperature related to operability of the safety-related batteries at WCGS and how is the area temperature controlled procedurally. Should this be described in the TSs, TS Bases, or WCGS Updated Safety Analysis Report?</p>	To be addressed by future RAIs.	NRC staff plans to issue RAI.
5	<p>Maximum hydrogen (H₂) discharge occurs during battery charging/discharging cycles. At the onset of an event, the batteries supply maximum DC loads (almost maximum load capability) within the first few minutes and will recharge when power is restored. The licensee did NOT appear to have calculated the H₂ discharge for this postulated scenario.</p> <p>The NRC staff needs to review Gothic calculation to determine how H₂ generation was calculated when the batteries are in recharging mode and how the H₂ is distributed within the rooms as the HVAC is in recirculation mode only.</p>	Item is closed based on NRC staff review of GOTHIC files.	None.

Item No.	Description	Status	Supplement/Potential RAI
6	<p>Several class 1E rooms have simple glass thermometers, some have temperature sensors with input to the plant computer. It appears that the temperature sensors are supplied with nonsafety-related power. What kind of indication is received on the plant computer if there was loss of power to the temperature sensors? Are there procedures in place to take alternate actions to monitor locally the room temperatures, every 8 hours or shift?</p>	<p>The proposed TS 3.7.20 requires temperature monitoring of the Class 1E electrical equipment rooms once every 4 hours when in Condition A, and local monitoring of the temperatures using the thermometers is an option and would be utilized if the plant computer is not available.</p>	<p>The licensee plans to supplement the application without an RAI.</p>
7	<p>Does the GOTHIC analysis use ECCS pump runout conditions, or some other condition?</p>	<p>Addressed by Item No. 3.</p>	<p>None.</p>
8	<p>Questions related to proposed LCO 3.7.20:</p> <p>a. Should room temperature less than (<) 90 °F be part of the LCO? b. Should all the temperature of all the rooms be part of the LCO? c. Should mitigating actions be part of the LCO?</p> <p>TS Bases provides for mitigating actions to ensure temperatures remain below the temperature of 90 °F specified by the proposed TS.</p> <p>Should the mitigating actions be part of the TS SRs.</p>	<p>Addressed by Item No. 17.</p>	<p>None.</p>
9	<p>Based on the review of TSs for other nuclear plants, the NRC staff believes that the Required Action A.3 (of the proposed TS 3.7.20) Completion Time of 30 days appear to be too long. Completion Time of 30 days is primarily based on the time needed to complete normal maintenance of the chiller/HVAC system. The licensee needs to provide a stronger justification in support of a 30-day Completion Time.</p>	<p>This item is closed based on the information provided by the licensee. Compressor replacement on SGK05A, Class 1E Electrical Air Conditioning Unit, which required modification to the suction and discharge tubing, took approximately 20 days and 21 hours.</p>	<p>The licensee plans to supplement the application without an RAI.</p>

Item No.	Description	Status	Supplement/Potential RAI
10	Regulatory commitment provided in Attachment VI to letter dated June 28, 2017, lacks details of the safety classification (e.g. class 1E power, seismic qualifications, testing requirements) for the additional equipment being installed as part of the associated modifications.	This item is closed. The licensee indicated that the new equipment will meet the requirements of a safety-related equipment and plans to revise the LAR to a post modification test plan. The revised LAR will also clearly state that the LAR will be implemented only after the associated plant modifications are complete. The regulatory commitment will also be revised as needed.	The licensee plans to supplement the application without an RAI.
11	Based on the results of the GOTHIC analysis, in some cases room temperatures exceed 90 °F. However, a temperature of less than or equal to (\leq) 90 °F is being used as a reference point in the proposed TS for operability. Based on discussions with the licensee, temperature of 90 °F appears to be the maximum allowable to ensure that accident conditions do not result in exceeding a temperature of 104 °F for equipment qualification. Is the limit of 90 °F acceptable?	Based on discussions with the licensee, a temperature limit of 90 °F is conservative and consistent with the normal operation maximum design temperature. Hence, this item is closed. Additional supporting discussion is provided in Section 3.2.2 (page 19 of 48) of Attachment I to letter dated June 28, 2017.	None.

Item No.	Description	Status	Supplement/Potential RAI
12	<p>Need clarification on duration and types of accident(s) evaluated for heat load in the areas impacted. Specifically:</p> <ol style="list-style-type: none"> 1. The accident may occur at any given time after loss of one train of HVAC. Does the temperature in areas of concern increase after initial loss of one train. 2. The heat load calculations appear to reduce electrical loads within 24 hours. This may be reasonable for large break LOCA when some pumps are turned off. Need confirmation that this calculation is bounding for all accidents and events discussed in accident analysis (different break sizes, steam line breaks, anticipated operational occurrences etc.). 	<p>For the purposes of the audit, this item is closed. To be addressed by a future RAI.</p>	<p>NRC staff plans to issue RAI.</p>
13	<p>Are there any internal flooding concerns between rooms containing electrical equipment? Are there any concerns of flooding of the battery rooms from the cable spreading rooms with the new floor and ceiling openings?</p>	<p>This item is closed. Based on information provided by the licensee, there are no flooding concerns between rooms.</p>	<p>The licensee plans to supplement the application without an RAI.</p>
14	<p>Given the response to Item No. 11, will the LCO 3.7.20, Required Action A.2 be adjusted to remove the 90 °F verification with one train inoperable?</p>	<p>The licensee plans to keep the Completion Time of 1 hour for Required Action A.2 for initiating the room temperature monitoring.</p>	<p>None.</p>
15	<p>Updated Safety Analysis Report, Section 9.4 provides details on control building ventilation design basis and states that periods of control building isolation can be maintained for approximately 3 days before purging is required to prevent local hydrogen concentration from approaching 2.0 volume percent. Does the GOTHIC calculation have fresh air isolated at 3 days and is this as an assumption in the new calculation.</p>	<p>The licensee confirmed that the nonsafety-related control building supply and exhaust systems are turned off for the accident condition Cases 3 and 4 for the entire 30-day run period and is documented in the plant calculations. Based on the NRC staff review of the calculations, the staff did not have any more questions and this item is closed.</p>	<p>None.</p>

Item No.	Description	Status	Supplement/Potential RAI
16	Are ESF Switchgear room unit heaters part of the GOTHIC heat load calculations. How are the ESF Switchgear room heaters controlled?	The licensee clarified that the room heaters are not assumed to be on since a thermostat controls room temperature when the room temperature drops below 60 °F. Since the calculation is based on high room temperature conditions, the heaters are not assumed to be operating.	None.
17	Calculation GK-M-016, Page 115, shows temperatures greater than (>) 95 °F for Cases 1 and 2. Is the new proposed Required Action A.2, to verify room area temperature of ≤ 90 °F, too restrictive and would require a station shutdown.	The licensee indicated that the calculation uses multiple conservative heat load assumptions for determining room temperatures and does not expect the room temperatures to exceed 90 °F. The licensee considered this as primarily a risk management issue. Hence, this item is closed.	The licensee plans to supplement the application without an RAI.
18	The new safety-related fans and associated dampers proposed to be installed under modification associated with this LAR are not clearly addressed in the SRs for new TS 3.7.20.	The licensee has proposed to develop a new Technical Requirements Manual (TRM) specification associated with the recirculation subsystem proposed by the modification and include SRs for the new fans and dampers in the TRM.	The licensee plans to supplement the application without an RAI.

Note: The licensee has supplemented the application by letter dated February 15, 2018 (ADAMS Accession No. ML18058A743), to address items listed in the audit summary that do not require issuance of the formal RAIs.

Table 2
NRC Audit - Attendees
November 7, 2017 (Site Entrance)

L. Wheeler	NRC-NRR
G. Matharu	NRC-NRR
B. Singal	NRC-NRR
N. Karipineni*	NRC-NRR
D. Dodson	NRC – Region IV
F. Thomas	NRC – Region IV
J. McCoy	WCGS
J. Isch	WCGS
R. Birk	WCGS
W. Muilenburg	WCGS
L. Stevens	WCGS
R. Hobby	WCGS
T. Fugate	WCGS
K. Hinterweger	WCGS
B. Schafer	WCGS
J. Pankaskie	WCGS
B. McDaniel	WCGS
J. Mahan	WCGS
E. Colemire	WCGS
B. Crow	WCGS
B. Richardson	WCGS
A. Stueve	WCGS
R. Benham	WCGS

*by phone

Table 3
NRC Audit -Attendees
November 8, 2017 (On Site, Status Briefing)

L. Wheeler	NRC-NRR
G. Matharu	NRC-NRR
B. Singal	NRC-NRR
F. Thomas	NRC – Region IV
V. Kanal	WCGS
J. Isch	WCGS
W. Muilenburg	WCGS
L. Stevens	WCGS
R. Hobby	WCGS
K. Hinterweger	WCGS
B. Schafer	WCGS
J. Pankaskie	WCGS
E. Ray	WCGS
B. McDaniel	WCGS
A. Jamar	WCGS
A. Alahmed	WCGS
S. Almajdoubah	WCGS
I. Boussag	WCGS
R. Benham	WCGS

Table 4
NRC Audit -Attendees
February 1, 2018 (Exit; Teleconference)

Larry Wheeler	NRC-NRR
Gurcharan Matharu	NRC-NRR
Balwant Singal	NRC-NRR
Pete Snyder	NRC-NRR
Nageswara Karipineni	NRC-NRR
John Hughey	WCGS
August Stueve	WCGS
William Muilenburg	WCGS
Brian Schafer	WCGS
Kyle Hinterweger	WCGS
Steve Wideman	WCGS
Jason Pankaskie	WCGS

SUBJECT: 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

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 GSingh, NRR/DE/EICB
 JHughey, NRR/DRA/APHB

ADAMS Accession No.: ML18073A089

***via e-mail**

****Memo dated 3/15/18**

OFFICE	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/LA	NRR/DE/EEOB/BC*
NAME	BSingal	PBlechman	JQuichocho (RMathew for)
DATE	3/15/18	3/15/18	3/20/18
OFFICE	NRR/DSS/SCPB/BC**	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM
NAME	RDennig	RPascarelli	BSingal
DATE	3/15/18	3/30/18	4/2/18

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