UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

December 2, 2022

Mr. Cleve Reasoner, Chief Executive Officer
and Chief Nuclear Officer
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION – LICENSE RENEWAL PHASE 1 INSPECTION REPORT 05000482/2022012

Dear Mr. Reasoner:

On October 21, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Wolf Creek Generating Station. On October 20, 2022, the NRC inspectors discussed the results of this inspection with Mr. Jaime McCoy, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Signed by Taylor, Nicholas
on 12/02/22

Nicholas H. Taylor, Chief
Engineering Branch 2
Division of Operating Reactor Safety

Docket No. 05000482
License No. NPF-42

Enclosure:
As stated

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WOLF CREEK GENERATING STATION – LICENSE RENEWAL PHASE 1 INSPECTION REPORT 05000482/2022012 DATED DECEMBER 2, 2022

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DOCUMENT NAME: Wolf Creek Generating Station - License Renewal Phase 1 Report
ADAMS ACCESSION NUMBER: **ML22333A713**

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number:	05000482
License Number:	NPF-42
Report Number:	05000482/2022012
Enterprise Identifier:	I-2022-012-0007
Licensee:	Wolf Creek Nuclear Operating Corporation
Facility:	Wolf Creek Generating Station
Location:	Burlington, KS
Inspection Dates:	October 17 to October 21, 2022
Inspectors:	M. Chisolm, Reactor Inspector G. Pick, Senior Reactor Inspector C. Smith, Senior Reactor Inspector
Approved By:	Nicholas H. Taylor, Chief Engineering Branch 2 Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a License Renewal Phase 1 inspection at Wolf Creek Generating Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

No findings or violations of more than minor significance were identified.

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

71003 - Post-Approval Site Inspection for License Renewal

The inspectors evaluated the material condition of Wolf Creek Generating Station (Wolf Creek) in October 2022 while the plant was shut down for Refueling Outage R25. This allowed the inspectors to evaluate the material condition of inaccessible areas prior to entry into the period of extended operation and to evaluate the licensee implementation of aging management activities. The period of extended operation is the additional 20 years beyond the original 40-year licensed term and begins after midnight on December 11, 2025.

In addition, the inspectors evaluated whether the licensee: (1) completed the necessary actions to comply with the license condition and commitments related to aging management; and (2) implemented programs that agreed with those approved in the safety evaluation report and described in the updated final safety analysis report. NRC issued the safety evaluation report in NUREG-1915, "Safety Evaluation Report Related to the License Renewal of Wolf Creek Generating Station" (ML083090483). Specific activities evaluated during this inspection are described in the following paragraphs.

Post-Approval Site Inspection for License Renewal (1 Sample)

The inspectors evaluated the aging management programs and commitments described below and walked down selected areas of the facility while performing this phase 1 license renewal inspection.

A1.18 Buried Piping and Tanks Inspection and Commitment 9

The Buried Piping and Tanks Inspection aging management program manages loss of material of buried components. The program includes components in the essential service water, emergency diesel engine fuel oil storage and transfer, auxiliary feedwater, borated refueling water storage, and the fire protection systems. The licensee established procedures to visually inspect the condition of protective coatings and wrappings found on carbon steel, gray cast iron or ductile iron components and assess the condition of stainless-steel components with no protective coatings or wraps.

Commitment 9 specified:

The Buried Piping and Tanks Inspection program is a new program that will be implemented prior to the period of extended operation. Within the 10-year period prior to entering the period of extended operation, an opportunistic or planned inspection will be performed. With respect to the external environment buried stainless steel part of the required buried pipe inspection program the 10-year period is changed to 12 years and 19 days prior to entering the period of extended operation. An opportunistic Inspection of the refueling water storage tank stainless steel buried piping was performed on February 26, 2013, which has been credited for this inspection sample. Upon entering the period of extended operation, a planned inspection within 10 years will be required unless an opportunistic inspection has occurred within this 10-year period.

The inspectors confirmed that the licensee had completed the replacement of their buried and underground essential service water piping in February 2015 during refueling outage RF20. The inspectors verified during review of records that the licensee had maintained their cathodic protection greater than 91 percent availability. The licensee adopted License Renewal Interim Staff Guidance LR-ISG-2015-01, “Changes to Buried and Underground Piping and Tank Recommendations,” in 2015. The inspectors verified that the licensee had implemented the following actions appropriately as specified in the license renewal interim staff guidance:

- For the fire protection buried piping, the licensee continuously monitored that the jockey pump maintained the discharge header pressure at 125 psig.
- For the underground carbon steel emergency diesel engine fuel oil storage tanks, the licensee has no planned inspections because the tanks were protected with a cathodic protection system.
- Although the inspection of the stainless steel refueling water storage tank occurred outside the 10-year period prior to entering the period of extended operation, the piping had been buried greater than 30 years, which met the other condition when reviewing the buried portion of the piping.
- The licensee inspected a 10-foot section of emergency diesel engine fuel oil carbon steel piping. This inspection met the inspection sample requirements for both the auxiliary feedwater and emergency diesel engine fuel oil buried piping.

The team noted the licensee planned to modify the cathodic protection system rectifiers in 2023 to allow for interruption capability that provides for more accurate measurements of protection provided by the system.

Based on review of the procedures and records, and discussions with licensee personnel, the inspectors concluded this aging management program would manage the aging effects as described in the safety evaluation report and the updated final safety evaluation report.

A1.21 Flux Thimble Tube Inspection

The Flux Thimble Tube Inspection aging management program performs wall thickness eddy current testing (ECT) of all flux thimble tubes that form part of the reactor coolant system pressure boundary at a frequency based upon actual plant-

specific wear data and wear predictions.

The interval between flux thimble tube inspections is established such that the estimated wear will not exceed the established acceptance criteria before the next inspection. The licensee performs ECT, a form of non-destructive examination, to measure the flux thimble wall thickness and to determine wear rates. The frequency of inspection is based on the methodology in Westinghouse WCAP-12866.

There are a total of 58 flux thimble tubes. From past flux thimble ECT results, 41 of the 58 flux thimble locations have shown detectable wear. All 41 of the thimble tubes with detectable wear were replaced with a chrome-plated stainless-steel material that is resistant to wear. The other 17 flux thimbles have not shown wear in the history of the plant.

Based on review of the procedures and records, and discussions with licensee personnel, the inspectors concluded this aging management program would manage the aging effects as described in the safety evaluation report and the updated final safety evaluation report.

A1.25 Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (XI.E2) and Commitment 13

The Instrumentation Circuits aging management program manages the effects of aging of electrical cables and connections used in instrumentation circuits with sensitive, high-voltage, low-level current signals exposed to adverse localized environments caused by temperature, radiation, or moisture.

Commitment 13 specified:

> A review of the calibration surveillance test results will be completed before the period of extended operation and every 10 years thereafter.

The team determined that the licensee changed their method of managing the effects of aging. The licensee revised the updated safety analysis report commitment to test the cables every 10 years rather than a 10-year review of the calibration surveillance results. However, the inspectors verified that the licensee completed electrical and component diagnostic testing every 18 months, which exceeded the 10-year frequency specified in their commitment. The inspectors reviewed the cable testing methodology to ensure that the licensee managed the aging effects of electrical cable and connections.

The inspectors identified no issues during the review of this aging management program. The inspectors determined, through review of documentation, the licensees' current program was sufficient to manage the aging effect of electrical cables and connectors during the period of extend operation.

A1.36 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (XI.E6) and Commitment 20

The Electrical Cable Connections aging management program manages aging

effects related to loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation.

Commitment 20 specified:

> Prior to the period of extended operation, the licensee will implement: (1) the infrared thermography testing procedure will be enhanced to require an engineering evaluation when test acceptance criteria are not met. This engineering evaluation will include identifying the extent of condition, the potential root cause for not meeting the test acceptance, and the likelihood of recurrence, and (2) A one-time inspection of a representative sample of low voltage, low current, or low load connections will be performed.

The inspectors reviewed procedures, work orders, and corrective actions related to the performance of thermographic scans. The licensee performed the inspections at frequencies between 6 months and 5 years with a majority occurring at 12-month intervals. This increased frequency exceeds the requirement of once every 10 years as stated in USAR Chapter 18, Appendix A, Section A1.36. During the review, the inspectors identified a minor violation related to a failure to include thermography scans in associated work orders as specified in their procedures.

From review of implementing activities, the inspectors determined that the licensee established activities that would manage the effects of aging during the period of extended operation.

Review of Administrative Commitments

Commitment 26

Commitment 26 specified:

> Following issuance of the renewed operating license in accordance with 10 CFR 50.71 (e), WCNOC will incorporate the USAR supplement into the WCGS USAR as required by 54.21 (d).

The inspectors verified that the licensee had included the supplement documented in the license renewal application into their updated final safety analysis report in Appendix A as specified in this commitment.

Commitment 28

Commitment 28 specified:

> Implementation of new programs may require additional action items not included in this list. WCGS is committed to including new program elements in the corrective action program.

During review of this commitment, the inspectors determined that the licensee had not taken all the actions required by the commitment. Specifically, the licensee

determined that Commitment 28 applied during the licensing process and could be closed once they received the operating license.

The inspectors reviewed correspondence and did not find any information that indicated the commitment only applied during the licensing process. The inspectors determined that the licensee should have included this requirement in procedure AP 23I-003, “License Renewal Implementation,” Revision 0. The licensee documented the need to update the program in Condition Report 10018896 to ensure that a programmatic requirement exists in addition to the specified use of the corrective action program in each of the aging management program documents.

Plant Condition Monitoring Walkdowns

The inspectors walked down normally inaccessible areas of the facility looking at the structures, systems, and components for signs of aging, such as corrosion on piping and supports, corrosion of cable trays, water intrusion, cracking, and spalling of concrete.

Specific structures, systems, and components walked down and evaluated during this inspection included:

- Containment – multiple elevations
    - Containment liner
    - Reactor cool pump motor removal
    - Containment cooling units
- Essential service water system
- Main steam isolation valve and feedwater isolation valve galleries

During the walk downs of the areas, the inspectors did not identify any signs of aging that affected the structures, systems, or components.

INSPECTION RESULTS

No findings were identified.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On October 20, 2022, the inspectors presented the License Renewal Phase 1 inspection results to Mr. Jaime McCoy, Site Vice President, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71003	Corrective Action Documents	Condition Report	00135804, 00135988	
71003	Corrective Action Documents Resulting from Inspection	Condition Report	10018797, 10018801, 10018802, 10018803, 10018805, 10018807, 10018869, 10018874, 10018875, 10018876, 10018895, 10018896, 10018953, 10018961	
71003	Drawings		Aerial View of Essential Service Water Piping	
71003	Drawings	6466E62	Bottom Mounted Instrumentation Chrome Plated Flux Thimble	02
71003	Drawings	C-0U5020	Underground Utilities	15
71003	Drawings	E-0091, Sheet 1	Cathodic Protection Plan	26
71003	Drawings	M-189-50BG-03-23	Chemical and Volume Control Excess Letdown Line	2
71003	Drawings	M-189-50BG-05-24	Chemical and Volume Control Auxiliary Spray Line	2
71003	Engineering Evaluations	SWO 17-425112-002	Justification of Inspection of Buried Stainless Steel Piping to Meet License Renewal Commitment 9 (RCMS 2006-006)	0
71003	Miscellaneous	RCMS 2006-217	Commitment #20	
71003	Miscellaneous	Report 2000013.400R0	Wolf Creek Interval Survey and Recommendations	2/16/2021
71003	Miscellaneous	Report on ECAD Testing at the Wolf Creek Generating Station	NIS Testing March 2021 – Refuel 24	3/1/2021
71003	Miscellaneous	Report on ECAD Testing at the Wolf Creek Generating Station	NIS Testing September 2016 – Refuel 21	10/1/2016
71003	Miscellaneous	WCLR-05-NB	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in	0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Instrumentation Circuits B2.1.25 NUREG-1801 Program XI.E2 Aging Management Program and Commitment #13 (RCMS 2006-210)	
71003	Miscellaneous	WCLR-10	Flux Thimble Tube Inspection B2.1.21 NUREG-1801 Program XI.M37 Aging Management Program	3
71003	Miscellaneous	WCLR-33-NB	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements B2.1.36 NUREG-1801 Program XI.E6 Aging Management Program Notebook	0
71003	Miscellaneous	WCLR-34	Buried Piping and Tanks Inspection B2.1.18 NUREG 1801 Program XI.M34	2
71003	Procedures	AP 23I-003	License Renewal Implementation	0
71003	Procedures	I-ENG-005	Infrared Thermography	11
71003	Procedures	RXE 03-006	Incore Flux Thimble Wear Assessment	02
71003	Work Orders		17-427675-000, 18-444214-000, 18-444876-000, 19-453900-000, 20-459446-000, 20-465829-000, 21-470986-000, 22-476993-000	