



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION IV  
1600 EAST LAMAR BOULEVARD  
ARLINGTON, TEXAS 76011-4511

December 01, 2021

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

SUBJECT: WOLF CREEK GENERATING STATION – TEMPORARY INSTRUCTION  
2515/194 REPORT 05000482/2021011

Dear Mr. Reasoner:

On October 21, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Wolf Creek Nuclear Operating Corporation. On October 21, 2021, the NRC inspectors discussed the results of this inspection with you 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,

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

Docket No. 05000482  
License No. NPF-42

Enclosure:  
As stated

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WOLF CREEK GENERATING STATION– TEMPORARY INSTRUCTION 2515/194 REPORT  
05000298/2021011 – DATED DECEMBER 01, 2021

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NAME	<i>F. Thomas /RA/</i>	<i>R. Deese /RA/</i>	<i>N. Taylor /RA/</i>		
DATE	11/23/2021	11/24/2021	11/24/2021		

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**U.S. NUCLEAR REGULATORY COMMISSION  
Inspection Report**

Docket Number: 05000482  
License Number: NPF-42  
Report Number: 05000482/2021011  
Enterprise Identifier: I-2021-011-0029  
Licensee: Wolf Creek Nuclear Operating Corporation  
Facility: Wolf Creek Generating Station  
Location: Burlington, Kansas  
Inspection Dates: October 18, 2021 to October 22, 2021  
  
Inspectors: F. Thomas, Reactor Inspector  
R. Deese, Senior Reactor Analyst  
  
Approved By: Nicholas H. Taylor, Chief  
Engineering Branch 2  
Division of Reactor Safety

## **SUMMARY**

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a Temporary Instruction 2515/194 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 Temporary Instruction (TI) in effect at the beginning of the inspection unless otherwise noted. Currently approved Temporary Instructions with their attached revision histories are located on the public website at <https://www.nrc.gov/reading-rm/doc-collections/insp-manual/temp-instructions/index.html>.

Samples were declared complete when the TI 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. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), inspectors were directed to begin teleworking. In addition, regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the TI could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable TI. In some cases, portions of a TI were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the TI.

## **OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL**

### 2515/194 - Inspection of the Licensee's Implementation of Industry Initiative Associated With The Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01)

The inspectors reviewed the licensee's implementation of Revision 3 to the "Nuclear Energy Institute Voluntary Industry Initiative," (ADAMS Accession No. ML19163A176) dated June 6, 2019. This review included the licensee's application of risk screening techniques to determine that the risk associated with an open phase condition (OPC) event is significantly reduced through the implementation of detection circuits and the use of operator manual actions in lieu of automatic trip functions.

Sections 03.01.a, "Detection, Alarms and General Criteria," and 03.01.b, "Protective Actions," were previously inspected and documented in Inspection Report 05000482/2018011 with noted exceptions. Because the licensee has chosen to demonstrate compliance with Revision 3 of the Open Phase Condition Initiative using the Risk Informed Evaluation Method in lieu of the designs automatic protective functions, section 03.01.c, "Use of Risk-Informed Evaluation Method" is inspected in this report.

### Inspection of the Licensee's Implementation of Industry Initiative Associated With the Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01) (1 Sample)

Wolf Creek Nuclear Operating Corporation selected the open phase detection system designed and manufactured by Power System Sentinel Technologies, LLC (PSSTech) as the design vendor for Wolf Creek Nuclear Operating Corporation. Wolf Creek Nuclear Operating Corporation has chosen to rely on risk-informed operator manual actions to isolate a power supply affected by an OPC in lieu of enabling the open phase isolation systems (OPIS) automatic functions.

At the end of this inspection the OPIS system was monitoring and would initiate audible and visual alarms in the control room if a loss of phase condition is detected.

One offsite circuit consists of the #7 transformer feeding the ESF transformer XNB01, which, in turn powers the safety-related bus NB01. Transformer XNB01 may also be powered from the SL-7 supply. Another offsite circuit consists of the startup transformer (XMR01), which feeds ESF transformer XNB02, that provides power to the other safety-related bus, NB02. The licensee's open phase condition design solution added redundant PSSTech systems to the start-up transformer XMR01 and to the #7 transformer.

Based on discussions with Wolf Creek Nuclear Operating Corporation staff, review of design and testing documentation, and walkdowns of installed equipment, the inspectors had reasonable assurance that Wolf Creek Nuclear Operating Corporation is appropriately implementing the voluntary industry initiative at Wolf Creek Generating Station.

## INSPECTION RESULTS

Observation: Temporary Instruction 2515/194-03.01 - Voluntary Industry Initiative	2515/194
Based on discussions with Wolf Creek Generating Station staff, review of design and testing documentation, and walkdowns of installed equipment, the inspectors had reasonable assurance that Wolf Creek Nuclear Operating Corporation is appropriately implementing the voluntary industry initiative at Wolf Creek Generating Station. The inspectors verified the following criteria:	
<u>Detection, Alarms and General Criteria</u>	
<ol style="list-style-type: none"><li>1. [03.01(a)(1)] Open phase conditions are detected and alarmed in the control room.</li><li>2. [03.01(a)(2)] In scenarios where automatic detection may not be possible due to very low or no-load conditions, or when transformers are in a standby mode, automatic detection will occur as soon as loads are transferred to the standby source. Additionally, where automatic detection is not reliable, Wolf Creek Nuclear Operating Corporation has established monitoring requirements on a per shift basis, to look for evidence of an open phase condition.</li><li>3. [03.01(a)(4)] No Class 1E circuits were being replaced with non-Class 1E circuits in this design.</li><li>4. [03.01(a)(5)] The Final Safety Analysis Report was updated to discuss the design features and analyses related to the effects of any open phase condition design vulnerability.</li><li>5. [03.01(a)(6)] The open phase condition detection and alarm components are maintained in accordance with Wolf Creek Nuclear Operating Corporation procedures or maintenance program, and periodic tests, calibrations setpoint verifications or inspections (as applicable) have been established.</li></ol>	
<u>Use of Risk-Informed Evaluation Method</u>	
<ol style="list-style-type: none"><li>1. [03.01(c)(1)] The plant configuration matched the changes made to the probabilistic risk assessment model to address an open phase condition, and the logic of the probabilistic risk assessment model changes is sound.</li><li>2. [03.01(c)(2)] The procedures which validate that the open phase condition alarm would identify the proper indication to validate the open phase conditions at all possible locations.</li></ol>	

3. [03.01(c)(3)] Observations associated with procedure(s) and operator actions required to respond to an open phase condition alarm and potential equipment trip match the Human Reliability Analysis.
4. [03.01(c)(4)] Assumptions listed in the NEI 19-02 Appendix A evaluation and the sensitivity analyses listed in Section 5 of the evaluation were verified.
5. [03.01(c)(5)] Assumptions, procedures, operator actions, and Wolf Creek Nuclear Operating Corporation analyses specified above are consistent with the plant-specific design and licensing basis, including:
  - a. Initiating events considered in the analysis
  - b. Boundary conditions specified in Attachment 1 of the NEI Voluntary Industry Initiative, Revision 3
  - c. Operating procedures for steps taken to recover equipment from the effects of open phase conditions (or use of alternate equipment) was appropriate.
  - d. Where recovery was assumed in the probabilistic risk assessment analysis for tripped electric equipment, restoration of the equipment was based on analyses that demonstrate that automatic isolation trips did not result in equipment damage

No findings or exceptions were identified.

#### **EXIT MEETINGS AND DEBRIEFS**

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

On October 21, 2021, the inspectors presented the integrated inspection results to Mr. C. Reasoner, Sr. Vice President and Chief Nuclear Officer, and other members of the licensee staff.

**DOCUMENTS REVIEWED**

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	XX-E-039	Open Phase Analysis	0
		H-11-002-CN003	System MR Protective Relay Settings	10/23/2018
	Corrective Action Documents	CR	00107717, 00108350, 00108708, 00108712, 00109066, 00113077, 00113195, 00113853, 00114559, 00114648, 00114730, 00115355, 00116834, 00116853, 00119905, 00119950, 00120741, 00121737, 00123192, 00128627, 00128907, 00135656, 00141087, 00143192, 10001997, 10002131, 10002761, 10006086	
	Drawings	E-11005A	Emergency Diesel Generator Loading Data	17
		KD-7496	One Line Diagram	67
		SK7458_DC06	Wolf Creek 345kV Substation No. 7 Transformer Primary Diff. [Differential] Relaying	6
		SK7458_DC07	Wolf Creek 345kV Substation No. 7 Transformer Secondary Diff. [Differential] Relaying	6
		WIP-E-022-00039-008-A-1	Startup Transformer Protection, Control Panel Wiring	00
		WIP-E-12MR01-001-A-1	Startup Transformer Protection Logic Diagram	00
		WIP-E-13MR12-002-A-1	Schematic Diagram 13.8KV Non-Class 1E Power System Start-Up XFMR [Transformer] XMR01 Alarming	00
		7458-B-5116	Wolf Creek Substation 345KV General Alarm Interface Elementary Diagram	4
		7458-D-7052	Wolf Creek Substation Annunciator Panel (No. 16) Connection Diagram	10
		7458-D-7505	Wolf Creek Substation Terminal Board Cabinet No. 4 Connection Diagram	33
	Miscellaneous	LO1506201	Lesson Plan, Site Electrical Distribution – Initial Licensed Operator	004
		LO1732435	Lesson Plan, OFN AF-025, Unit Limitations – Initial Licensed Operator	019



Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		LTR-RAM-20-15	Transmittal of the Final Plant Response to an Open Phase Condition (OPC) Package	0
		OP8206201	Switchyard ALR [Alarm] Response Seminar	000
		PCR	74224	10/20/2021
		WCGS [Wolf Creek Generating Station] Standing Order 40	Transformer 7 OPD [Open Phase Detection] Interim Alarm Response	0
		89639	Scheduled Offering Roster - Switchyard ALR Response Seminar	01/16/2018
	Procedures	AI 23O-001	Functional Importance Determination	7A
		ALR 00-14D	S/U [Start-Up] XFMR [Transformer] Trouble	14
		ALR 810	Startup XFMR XMR01	9
		ALR 843	#7 Transformer Open Phase Detection Trouble	1
		OFN AF-025	Unit Limitations	57
		SYS NB-200	Transferring XNB01 Supply Between SL7 and #7 Transformer	21
	Self-Assessments	PSA-20-002	Documentation of Vendor Provided Open Phase Condition Evaluation	0
		QH-2021-2143	Wolf Creek Installed Open Phase Detection System (OPDS) Assessment Report	02/15/2021
	Work Orders		13-378853-056, 15-403881-007, 20-457953-000	