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

October 12, 2018

Ken J. Peters, Senior Vice President
and Chief Nuclear Officer
Attention: Regulatory Affairs
Vistra Operations Company LLC
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT – NRC INSPECTION OF TEMPORARY INSTRUCTION 2515/194, INSPECTION REPORT 05000445/2018012 AND 05000446/2018012

Dear Mr. Peters,

On September 13, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Comanche Peak Nuclear Power Plant, Units 1 and 2. On September 13, 2018, the NRC inspector discussed the results of this inspection with Mr. Tom McCool, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspector did not identify any finding or violation of more than minor significance.

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 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Gregory E. Werner, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-445 and 50-446
License Nos. NPF-87 and NPF-89

Enclosure:
Enclosure: Inspection Report 5000445/2018012
and 05000446/2018012
w/ Attachment: TI 2515/194 Inspection
Documentation Request

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000445 and 05000446
License Numbers:	NPF-87, NPF-89
Report Numbers:	05000445/2018012 and 05000446/2018012
Enterprise Identifier:	I-2018-012-0018
Licensee:	Vistra Operations Company, LLC
Facility:	Comanche Peak Nuclear Power Plant, Units 1 and 2
Location:	Glen Rose, Texas
Inspection Dates:	September 10, 2018, to September 13, 2018
Inspector:	S. Graves, Senior Reactor Inspector
Approved By:	Gregory E. Werner Chief, Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a Temporary Instruction 2515/194, "Inspection of the Licensees' Implementation of Industry Initiative Associated with the Open Phase Condition Design Vulnerabilities in Electric Power Systems (NRC Bulletin 2012-01)," at Comanche Peak Nuclear Power Plant, Units 1 and 2, 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 were identified.

Additional Tracking Items

None.

INSPECTION SCOPE

This inspection was conducted using Temporary Instruction 2515/194 (ADAMS Accession No. ML17137A416), issue date October 31, 2017. The inspector reviewed the licensee's implementation of Nuclear Energy Institute voluntary industry initiative in compliance with Commission guidance. The inspector discussed the licensee's open phase condition system design and ongoing implementation plans with plant staff. The inspector reviewed licensee and vendor documentation, and performed system walkdowns to verify that the installed and planned equipment was supported by the design documentation. The licensee had not completed the installation and testing of all related equipment by the end of the inspection.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

Temporary Instruction 2515/194 - Inspection of the Licensees' Implementation of Industry Initiative Associated With the Open Phase Condition Design Vulnerabilities in Electric Power Systems (NRC Bulletin 2012-01)

The objective of Temporary Instruction 2515/194 is to verify that licensees have appropriately implemented the Nuclear Energy Institute Voluntary Industry Initiative (ADAMS Accession No. ML15075A454) dated March 16, 2015, including updating their licensing basis to reflect the need to protect against open phase conditions.

Temporary Instruction 2515/194-03.01 - Voluntary Industry Initiative (Part 1)

Vistra Operations Company, LLC selected the open phase detection system designed and manufactured by Power System Sentinel Technologies, LLC, as the design vendor for Comanche Peak Nuclear Power Plant. At the end of this inspection the licensee had installed one complete system on startup transformer XST1, but had not completed final testing. Startup transformer XST2A installation was in progress with testing scheduled. System installation on the other two startup transformers, XST1A and XST2, was in progress. The licensee is scheduled to transition each Power System Sentinel Technologies system to a monitoring mode of operation (tripping functions disabled) as individual installations are completed, followed by transition to full operation (tripping functions enabled) in December 2019. The licensee was preparing design modifications and associated documentation for this transition, however they were not complete at the time of inspection. The licensee documented activities associated with this design change and installation in action items under condition report CR-2016-005840.

INSPECTION RESULTS – OBSERVATIONS/ASSESSMENT

Based on discussions with licensee staff, review of available design and testing documentation, and walkdowns of installed and prepared equipment, the inspector had reasonable assurance the licensee is appropriately implementing, with noted exceptions discussed below, the voluntary industry initiative.

The inspector determined by design document review, walkdowns, staff discussions, and observation that:

Detection, Alarms and General Criteria		TI 2515/194-03.01 - Voluntary Industry Initiative (Part 1)
(1)	Open phase conditions will be detected and alarmed in the control room for each unit on the common annunciator panel.	
(2)	Detection circuits will be sensitive enough to identify an open phase condition for all credited loading conditions.	
(3)	No Class-1E circuits were being replaced with non-Class 1E circuits in the design.	

Protective Actions Criteria		TI 2515/194-03.01 - Voluntary Industry Initiative (Part 1)
(1)	The transformers were susceptible to an open phase condition and the licensee was implementing design changes to mitigate the effects.	
(2)	With an open phase condition present and no accident condition signal, the Power System Sentinel Technologies system would not adversely affect the function of important-to-safety systems, structures, or components. The licensee's open phase condition design solution added a set of additional tripping inputs in parallel with existing transformer isolation controls. This addition added a new tripping condition (open phase) to the previously analyzed electrical faults which result in isolation of one startup transformer. The credited plant response was unaffected and would be the same regardless of the conditions that generated the isolation of the transformer.	

No findings were identified.

The inspector identified the following exceptions to the Temporary Instruction criteria resulting from the incomplete design modifications:

Detection, Alarms and General Criteria Exceptions	TI 2515/194-03.01 - Voluntary Industry Initiative (Part 1)
(1) The licensee's design installation was in progress on the four startup transformers. Vendor recommended trip and alarm setpoints were established, and one set of detection and alarm circuitry had been installed, waiting for final testing with others in progress or planned. After installation, the licensee planned to gather data in a monitoring mode of operation to ensure the open phase condition design and protective schemes would minimize misoperation or spurious actions in the range of voltage unbalance normally expected in the transmission system. Because actual demonstration of this criterion requires the system to be in operation with final trip setpoints established, the inspector was not able to fully verify this criterion. After discussions with licensee staff, walkdown of control room panels where the open phase condition alarm had been connected and design document and test results reviewed, the inspector had reasonable assurance that the actuation circuit design would not result in lower overall plant operation reliability. The licensee currently has the ability to read phase-to-phase voltages and line voltages on the transformer lines. The inspector did not identify any issues of concern. (2) The Final Safety Analysis Report had not been updated to include information related to open phase conditions at the conclusion of the onsite inspection. The licensee provided a copy of action item TR-2016-005840-44, written to track review of open phase protection system impacts to the Final Safety Analysis Report. The inspector held discussions with senior licensee staff related to the guidelines for licensing basis document updates and the voluntary industry initiative items. The licensee expected to update their Final Safety Analysis Report after completion. The inspector did not identify any issues of concern.	

Protective Actions Criteria Exceptions	TI 2515/194-03.01 - Voluntary Industry Initiative (Part 1)
(1) The open phase condition design solution will use the existing isolation and power scheme for safety-related accident loads; only a new tripping condition (open phase) is being added to the electrical faults which result in isolation of one preferred source of power. A loss of voltage, including a loss of voltage caused by isolation of the preferred source due to an open phase condition, on the affected safety-related bus results in the affected trains electrical loads being automatically transferred to the onsite emergency power source. While no changes to this configuration were planned due to the inclusion of the Power System Sentinel Technologies system, actual demonstration of this criterion requires the system to be in full operation (2) At the time of this inspection, the licensee had not finalized documentation for periodic tests, calibrations, setpoint verifications, or inspection procedures for open phase protection system components. The inspector held discussions with licensee staff and identified that the vendor guidance, including periodic tests, setpoint verification, and equipment maintenance and inspection would be integrated into plant procedures and processes. The licensee entered this issue into their corrective action program as action item TR-2016-005840-14, to develop preventive maintenance and testing strategies for the open phase protection system. Licensee	

	staff also explained that existing equipment in the transformer control circuit was part of the licensee's maintenance rule program (10 CFR 50.65), with an expectation that the open phase equipment would also be reviewed for inclusion in the program. The license entered this into their corrective action program as action item TR-2016-005840-20. The licensee also captured inspector observations and questions related to additional inspection criteria for the transformers neutral cable, neutral bushing, and ground connection integrity. These issues were entered into the corrective action program as action items TR-2016-005840-45, -46, -47, and -48. Existing plant equipment will continue to be maintained according to the licensee's current preventative maintenance program. The inspector did not identify any issues of concern.

EXIT MEETINGS AND DEBRIEFS

On September 13, 2018, the inspector presented the Temporary Instruction 2515/194 inspection results to Mr. T. McCool, Site Vice President, and other members of the licensee staff. The inspector verified no proprietary information was retained or documented in this report.

DOCUMENTS REVIEWED

Drawings Number	Title	Revision
SK-001-16-000005-02-01	138 KV Startup Transf XST1 Lockout Relay 86-2/ST1 Schematic Diagram	01
E1-0002	Transformers XST1, XST1A, XST2 and XST2A Cable Block Diagram	CP-2
E1-0002	Main One Line Meter and Relay Diagram	CP-27
E1-0002	Main One Line Meter and Relay Diagram	CP-16
8.2.4	Electrical Network Interconnections	
3918D853SB	Elementary Diagram TR, 138KV Startup Transformer	4
OPP-ELE-B101, Sheets 1-17	Electrical Drawings	
OPP-ELE-B201, Sheets 1-17	Electrical Drawings	

Design Documents Number	Title	Revision
FDA-2016-000005-02-01	Final Design Authorization - Install Open Phase Detection System for XST1	1
FDA-2016-000005-03-02	Conformed Specification	2
FDA-2016-000005-04-00	Final Design Authorization - Install Open Phase Detection System for XST2	0
FDA-2016-000005-05-00	Final Design Authorization - Install Open Phase Detection System for XST1A	0
FDA-2016-000005-06-00	Final Design Authorization - Install Open Phase Detection System for XST2A	0
VDRT-5575487	Factory Acceptance Test Reports for XST1 Open Phase Protection System	
VDRT-5599260	Factory Acceptance Test Reports for Open Phase Protection System	
DBD-EE-038, Section 6.2.2 Updates	Offsite Power System - Accessories and Alarms	24 and Pending
DBD-EE-051, Section 5.1.1	Protection Philosophy – Unit Connected Equipment and Startup Transformers	45 and Pending

Miscellaneous Document Number	Title	Revision
CPES-E-1138	Conformed System (Device) Requirements Specification	2

Procedures Number	Title	Revision
ALM-0140	Alarm Procedure X-ALB-14	11

Vendor Documents Number	Title	Revision
IEGR-DD-1701	Open Phase Protection (OPP) System Non-Class 1E OPP Protection Settings, Comanche Peak NPP XST1 & XST1A	0.0.5
IEGR-DD-1741	Open Phase Protection (OPP) System Non-Class 1E OPP Protection Settings, Comanche Peak NPP XST2 & XST2A	0.0.3
ITST-TP-1877	Open Phase Protection (OPP) System Site Acceptance Test (SAT) Plan for One Channel of a Dual Channel System for Comanche Peak	0.0.0
ITST-TP-1878	Open Phase Protection (OPP) System Site Acceptance Test (SAT) Plan for Dual Channel System for Plant Comanche Peak	0.0.0

TI 2515/194 Inspection Documentation Request

Please provide the following documentation (Items 1 – 8) to the lead inspector prior to the onsite inspection date, preferably no later than August 27, 2018. Whenever practical, please provide copies electronically (IMS/CERTREC is preferred). Please provide an index of the requested documents which includes a brief description of the document and the numerical heading associated with the request (i.e., where it can be found in the list of documents requested).

Sam Graves, Inspector
RIV/DRS/EB2
1600 E. Lamar Blvd.
Arlington, TX 76011
817-200-1102
Samuel.graves@nrc.gov

1. Copies of any calculations, analyses, and/or test reports performed to support the implementation of your open phase condition (OPC) solution. If, in your implementation, OPCs are not detected and alarmed in the control room please include documentation that:

    a. Demonstrates the OPC will not prevent functioning of important-to-safety SSCs; AND

    b. Detection of an OPC will occur within a short period of time (e.g., 24 hours).

2. Copies of any modification packages, including 10 CFR 50.59 evaluations if performed, used for or planned for the implementation of your OPC solution.

3. Copies of periodic maintenance, surveillance, setpoint calibration, and/or test procedures implemented or planned, for your OPC solution.

4. Copies of your licensing basis changes to Updated Final Safety Analysis Report (UFSAR) and/or Technical Specifications (TS), as applicable, which discuss the design features and analyses related to the effects of, and protection for, any open phase condition design vulnerability. If these documents have not been updated, provide documentation of your plans to do so.

5. Copies of any procurement specifications and acceptance testing documents related to the installation of your OPC solution.

6. Copies of any site training the inspector will need to accomplish to gain access to areas with, or planned, major electrical equipment used in your OPC solution (i.e. switchyard).

7. Provide documentation showing that with an OPC occurrence <u>and no</u> accident condition signal present, either:

    a. An OPC does not adversely affect the function of important-to-safety SSCs, OR

    b. TS LCOs are maintained or the TS actions are met without entry into TS LCO 3.0.3 AND
        i. Important-to-safety equipment is not damaged by the OPC, AND
        ii. Shutdown safety is not compromised

8. With OPC occurrence and an accident condition signal present:

    a. Provide documentation showing that automatic detection and actuation will transfer loads required to mitigate postulated accidents to an alternate source and ensure that safety functions are preserved, as required by the current licensing bases, OR

    b. Provide documentation showing that all design basis accident acceptance criteria are met with the OPC, given other plant design features. Accident assumptions must include licensing provisions associated with single failures. Typically, licensing bases will not permit consideration of the OPC as the single failure since this failure is a non-safety system.

Please provide the following documentation to the inspector when they arrive onsite. Whenever practical, please provide copies electronically, except for drawings. Drawings should be provided as paper copies of sufficient size (ANSI “C” or “D”) such that all details are legible.

9. A brief presentation describing your electric power system design and typical electrical transmission and distribution system alignments; OPC design schemes installed to detect, alarm and actuate; bus transfer schemes; and maintenance and surveillance requirements. This presentation should be a general overview of your system. Please schedule the overview shortly after the entrance meeting.

10. Plant layout and equipment drawings for areas that identify: (a) the physical plant locations of major electrical equipment used in your open phase condition solution; (b) the locations of detection and indication equipment used in the open phase condition sensing circuits.

11. If OPC actuation circuits are required, provide documentation that demonstrates continued coordination with the other protective devices in both the offsite electrical system (within Comanche Peak’s area of responsibility) and the onsite electrical systems.

12. Access to locations in which open phase condition equipment is installed or planned (i.e. switchyard, etc.)

13. Copies of documentation or testing that demonstrates your OPC solution minimizes spurious actuation or misoperation in the range of voltage imbalance normally expected in the transmission system that could cause undesired separation from an operable off-site power source.

This document does not contain new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing information collection requirements were approved by the Office of Management and Budget, Control Number 31500011. The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid Office of Management and Budget control number.

This document 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 10 CFR 2.390, “Public Inspections, Exemptions, Requests for Withholding.”

COMANCHE PEAK NUCLEAR POWER PLANT – NRC INSPECTION OF TEMPORARY INSTRUCTION 2515/194, INSPECTION REPORT 05000445/2018012 AND 05000446/2018012– OCTOBER 12, 2018

DISTRIBUTION

KKennedy, ORA
SMorris, ORA
TVegel, DRP
RLantz, DRP
MShaffer, DRS
JClark, DRS
JJosey, DRP
RKumana, DRP
MHaire, DRP
RAlexander, DRP
AAthar, DRP
LReyna, DRP
RRemigio, DRP
VDricks, ORA
MWatford, NRR
MHerrera, DRMA
R4Enforcement
DCylkowski, ORA
GGeorge, DRS
PJayroe, DRS
JWeil, OWFN
AMoreno, OWFN
CCook, OEDO
BMaier, ORA

Electronic Distribution for Comanche Peak Nuclear Power Plant

ADAMS ACCESSION NUMBER: ML18285A725

☒ SUNSI Review: By: STG | ADAMS: ☒ Yes ☐ No | ☐ Non-Publicly Available ☒ Publicly Available | ☒ Non-Sensitive ☐ Sensitive | Keyword: NRC-002

OFFICE	SRI:EB2	C:EB2	C: PBA	C:EB2		
NAME	SGraves	GWerner	MHaire	GWerner		
SIGNATURE	***/RA/***	***/RA/***	***/RA/***	***/RA/***		
DATE	***10/05/2018***	***10/10/2018***	***10/11/2018***	***10/12/2018***		

OFFICIAL RECORD COPY