



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200  
ATLANTA, GEORGIA 30303-1200

May 1, 2020

Ms. Cheryl A. Gayheart  
Regulatory Affairs Director  
Southern Nuclear Operating Co. Inc.  
3535 Colonnade Parkway  
Birmingham, AL 35243

SUBJECT: REISSUE – VOGTLE ELECTRIC GENERATING PLANT UNITS 1 & 2 – NRC  
TEMPORARY INSTRUCTION 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) REPORT 05000424/2019012  
AND 05000425/2019012

Dear Ms. Gayheart

On September 25, 2019, the US Nuclear Regulatory Commission (NRC) issued the Temporary Instruction 2515/194 – Inspection of the Licensees Implementation of Industry Initiative Associated with the Open Phase Condition Design Vulnerabilities in Electric Power Systems Report, ADAMS Accession Number ML19268A063. In reviewing this report, we identified two areas that required two editorial changes to the Inspection Results. Specifically, that “The inspectors also determined that the Technical Specification Bases was not affected by this VII.” was added to statement 4 of Observation: Detection, Alarms, and General Criteria - TI 2515/194-03.01 – VII (Part 1,) and that statement 2 of Observation: Detection, Alarms, and General Criteria Exceptions - TI 2515/194-03.01 – VII (Part 1) was removed entirely. We request that the cover letter and report be replaced with the Enclosures and to this letter.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 “Public inspection, exemptions, requests for withholding” of the NRC’s “Agency Rules of Practice and Procedure,” a copy of this letter will be available electronically for public inspection in the NRC Public Document Room, of the Publicly Available Records (PARS) component of NRC’s ADAMS; accessible from the NRC Website at <https://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Please contact me at 404-997-4519 with any questions you have regarding this letter

Sincerely,

**/RA/**

Bradley J. Davis, Chief  
Construction Inspection Branch 2  
Division of Construction Oversight

Docket Nos. 05000424 and 05000425

License Nos. NPF-68 and NPF-81

Enclosure:

1. Reissued Vogtle Cover Letter
2. Reissued Inspection Report 05000424/2019012  
and 05000425/2019012

cc w/ encl: Distribution via LISTSERV

SUBJECT: REISSUE – VOGTLE ELECTRIC GENERATING PLANT UNITS 1 & 2 – NRC  
TEMPORARY INSTRUCTION 2515/194 INSPECTION OF THE LICENSEE'S  
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POWER SYSTEMS (NRC BULLETIN 2012-01) REPORT 05000424/2019012  
AND 05000425/2019012 dated May 1, 2020

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**ADAMS Accession Number: ML20122A261**

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DATE	4/20/2020	4/29/2020	4/20/2020		

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**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200  
ATLANTA, GEORGIA 30303-1200

September 25, 2019

Ms. Cheryl A. Gayheart  
Regulatory Affairs Director  
Southern Nuclear Operating Co., Inc.  
3535 Colonnade Parkway  
Birmingham, AL 35243

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT UNITS 1 & 2 – NRC TEMPORARY  
INSTRUCTION 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) REPORT 05000424/2019012  
AND 05000425/2019012

Dear Ms. Gayheart:

On August 15, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Vogtle Electric Generating Plant Units 1 & 2 and discussed the results of this inspection with Mr. Jesse Thomas and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors 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/**

Bradley J. Davis, Chief  
Construction Inspection Branch 2  
Division of Construction Oversight

Docket Nos. 05000424 and 05000425  
License Nos. NPF-68 and NPF-81

Enclosure:  
As stated

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SUBJECT: VOGTLE ELECTRIC GENERATING PLANT UNITS 1 & 2 – NRC TEMPORARY INSTRUCTION 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) REPORT 05000424/2019012 AND 05000425/2019012 dated September 25, 2019

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\*See previous page for concurrence

**ADAMS ACCESSION NUMBER: ML19268A063**

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

Docket Numbers: 05000424 and 05000425

License Numbers: NPF-68 and NPF-81

Report Numbers: 05000424/2019012 and 05000425/2019012

Enterprise Identifier: I-2019-012-0016

Licensee: Southern Nuclear Operating Co., Inc.

Facility: Vogtle Electric Generating Plant Units 1 & 2

Location: Waynesboro, GA

Inspection Dates: August 12, 2019 to August 16, 2019

Inspectors: J. Kent, Construction Inspector

Approved By: Christopher J. Even, Chief  
Construction Inspection Branch 2  
Division of Construction Oversight

Enclosure

## **SUMMARY**

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a NRC TEMPORARY INSTRUCTION 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) at Vogtle Electric Generating Plant Units 1 & 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 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

### 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)

This inspection was conducted using Temporary Instruction 2515/194 (ADAMS Accession No. ML17137A416), dated October 31, 2017. The inspectors reviewed the licensee's implementation of Nuclear Energy Institute (NEI) voluntary industry initiative (VII) in compliance with regulatory requirements and current licensing bases. The inspectors discussed the licensee's OPC system design and ongoing implementation plans with plant staff. The inspectors reviewed licensee documentation, vendor documentation, and performed system walkdowns to verify that the installed equipment was supported by the design documentation. The inspectors verified that the licensee had completed the installation and testing of equipment, installed and tested alarming circuits both local and in the control rooms, and analyzed potential impacts associated with the design implementation on the current licensing basis.

### 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)

- (1) Temporary Instruction 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 objective of Temporary Instruction 2515/194 is to verify that licensees have appropriately implemented the NEI VII (ADAMS Accession No. ML15075A454), dated March 16, 2015, including updating their licensing basis to reflect the need to protect against OPCs.

### Temporary Instruction 2515/194-03.01 - VII (Part 1)

Vogtle Electric Generating Plant selected the open phase detection system designed and manufactured by Power System Sentinel Technologies, LLC. At the end of this inspection the system remained in the monitoring mode of operation to facilitate continued data gathering of the system for evaluation of alarm and trip setpoints. The equipment was installed on the Reserve Auxiliary Transformers (RAT) 1NXRA, 2NXRA, 1NXRB, and 2NXRB and the swing Standby Auxiliary Transformer (SAT) ANXRA. Vogtle Electric Generating Plant currently is scheduled to transition the open



phase detection system to full implementation (tripping functions enabled) by December 31, 2019.

## INSPECTION RESULTS

Observation: Detection, Alarms, and General Criteria; TI 2515/194-03.01 – VII (Part 1)	2515/194
<ol style="list-style-type: none"> <li>1. OPCs will be detected and alarmed in the control room on the common annunciator panel.</li> <li>2. Detection circuits will be sensitive enough to identify an OPC for all credited loading conditions for installed equipment.</li> <li>3. No Class-1E circuits were being replaced with non-Class 1E circuits in the design.</li> <li>4. The UFSAR has been updated to discuss the design features and analyses related to the effects of, and protection for, any OPC design vulnerability. The inspectors also determined that the Technical Specification Bases was not affected by this VII.</li> </ol> <p>No findings were identified.</p>	

Observation: Protective Actions Criteria; TI 2515/194-03.01 – VII (Part 1)	2515/194
<ol style="list-style-type: none"> <li>5. Five transformers were susceptible to an OPC as identified in this VII during all modes of operation. The licensee installed detection and mitigating equipment for these affected transformers.</li> <li>6. With an OPC present and with or without an accident condition signal, the open phase design would not adversely affect the function of important-to-safety systems, structures, or components. The licensee's OPC design solution added Power System Sentinel Technologies, LLC systems on the Reserve Auxiliary Transformers (RAT) 1NXRA, 2NXRA, 1NXRB, and 2NXRB and the swing Standby Auxiliary Transformer (SAT) ANXRA. The tripping function, when enabled, will provide an additional input to the associated transformer lockout relays. The credited plant response is not negatively affected and will be the same regardless of the conditions that generated the lockout of the transformer.</li> </ol> <p>No findings were identified.</p>	

Observation: Detection, Alarms, and General Criteria Exceptions; TI 2515/194-03.01 – VII (Part 1)	2515/194
<p>The inspectors identified the following minor exceptions to the Temporary Instruction criteria resulting from the operating status of the design modification. The licensee's design was operating in the monitoring mode with already established setpoints and gathering data to verify the OPC design and protective schemes would minimize mis-operation, or spurious actions in the range of voltage unbalance normally experienced in the transmission system. The licensee developed engineering calculations to demonstrate coordination of the OPC detection and tripping setpoints for the actuation circuit that does not result in lower overall plant operation reliability. This calculation was presented in X3CA53, Vogtle Nuclear Power Plant Open Phase Detection System Setpoint Calculation, Version 3.0.</p>	

Observation: Protective Actions Criteria Exceptions; TI 2515/194-03.01 – VII (Part 1)	2515/194
<p>The inspectors identified the following minor exceptions to the Temporary Instruction criteria resulting from the operating status of the design modification.</p>	

(1) The licensee's OPC design solution uses Power System Sentinel Technologies, LLC to detect, alarm, and provide an input to the associated transformer lockout relays. Upon an initiation of the transformer lockout relays, the associated transformer train that is affected is tripped and isolated.

The tripping function input to the transformer lockout relays remained deactivated during the onsite system implementation inspection and was not able to be demonstrated to perform the designed function. The licensee did perform commission testing to demonstrate Main Control Room (MCR) annunciator panel illumination and tripping function signal was present at the local transformer lockout relay. The licensee is currently tracking the tripping function initiation under Technical Evaluation (TE) 1049641. Once enabled, the OPP system will have the ability to isolate an affected RAT or the SAT with an OPC detected on the high voltage side of the transformer at any operating condition when the transformers are energized.

Due to the configuration of Vogtle Electric Generating Plant electrical distribution system while at low power, a loss of phase on one transformer would only affect one train of equipment, and loads required to mitigate postulated accidents would be available on the non-affected train. At normal power, a loss of phase on one transformer would not affect the associated train of equipment as the emergency diesel generators would pick up all loads. This configuration would ensure that safety functions are preserved as required by the current licensing bases.

Periodic tests, calibrations, setpoint verifications or inspections (as applicable) have been established for any new protective features. The surveillance requirements have been maintained for the plant Technical Specifications (TSs) in compliance with the provisions of 10 CFR 50.36. Existing plant equipment will continue to be maintained according to the licensee's current preventative maintenance program.

## **EXIT MEETINGS AND DEBRIEFS**

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

- On August 15, 2019, the inspectors presented the NRC TEMPORARY INSTRUCTION 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) results to Mr. Jesse Thomas and other members of the licensee staff.

## DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	X3CA53	Vogtle Nuclear Power Plant Open Phase Detection System Setpoint Calculation	3.0
	Drawings	02-1560	1/C 350KCM XLPE/XLPO 2000V Cable Cut Sheet	
		AXJD-AA-AOJA	VOGTLE - WILSON MASTER ONE LINE DIAGRAM	20
		SNC676475E001	THREE-LINE DIAGRAM STANDBY AUXILIARY TRANSFORMER ANXRA	1
		SNC680113E111	OPEN PHASE PROTECTION (OPP) SYSTEM, ELECTRICAL DRAWINGS, CHANNEL 1 & CHANNEL 2	1
		SNC680114E003	THREE LINE DIAGRAM UNIT 2 RESERVE AUX. TRANSFORMERS 2NXRA & 2NXRB	1
		SNC847051E016	CONNECTION DIAGRAM OPEN PHASE PROTECTION (OPP) PANEL 1NCPORA	1
		SNC872975E007	WIRING DIAGRAM OPEN PHASE PROTECTOIN (OPP) PANEL ANCPORA	1
	Engineering Changes	SNC676474	Unit 2 RAT A Open Phase Detection Design	3.0
		SNC676475	Common SAT Open Phase Detection	2.0
		SNC676476	Unit 1 RAT A Open Phase Protection	3.0
	Engineering Evaluations	TE 1049641		
	Miscellaneous	SNC872971	RAT/SAT Open Phase Protection Trip Implementation	1.0
	Procedures	13415-1	Reserve Auxiliary Transformers	20
		13418A-1	Standby Auxiliary Transformer Unit One Train A Operations	5.2
		17032-1	ANNUNCIATOR RESPONSE PROCEDURES FOR ALB 32 ON EAB PANEL	29
		25912-C	Open Phase Protection Maintenance	1.01.0
	Work Orders	SNC833646	OPP-OUTAGE-ONLINE COMMISSIONING TEST FOR OPP (2NCPORB)	11/8/2018
		SNC797503	NON-OUTAGE SAT Testing for 1NCPORB Open Phase Protection	9/28/2017
		SNC804598	OUTAGE- Online Commissioning Test for 1NCPORA	10/9/2018
		SNC832552	PERFORM FUNCTIONAL-COMMISSIONING TEST FOR ANCPORA	11/7/2018
		SNC833626	OPP-NON- OUTAGE- SAT TESTING FOR 2NCPORA OPEN PHASE PROTECTION	9/28/2017