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

November 20, 2019

Mr. John A. Krakuszeski
Site Vice President
Brunswick Steam Electric Plant
Duke Energy Progress, LLC
8470 River Road, SE (M/C BNP001)
Southport, NC 28461

SUBJECT: Brunswick Steam Electric Plant – 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) Inspection Reports 05000325/2019012 & 05000324/2019012

Dear Mr. Krakuszeski:

On October 10, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Brunswick Steam Electric Plant and discussed the results of this inspection with Jay Ratliff and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspector did not identify any findings or violations 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, and Requests for Withholding.”

Sincerely,

/RA Guillermo Crespo for/

Steven D. Rose, Chief
Construction Inspection Branch 2
Division of Construction Oversight

Docket No.: 05000325/05000324
License No.: DPR-71/62

Enclosure:
Inspection Reports 05000325/2019012 &
05000324/2019012
w/ Attachment: TI 2515/194 Inspection
Documentation Request

cc w/ encl: Distribution via Listserv

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT – NRC TEMPORARY INSTRUCTION 2515/194 INSPECTION REPORTS 05000325/2019012 & 05000324/2019012

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000325 / 05000324
License Numbers:	DPR-71 and DRP-62
Report Numbers:	c and 05000324/2019012
Enterprise Identifier:	I-2019-012-0017
Licensee:	Duke Energy Progress, LLC
Facility:	Brunswick Steam Electric Plant, Units 1 & 2
Location:	Southport, NC
Inspection Dates:	October 7 to October 10, 2019
Inspector:	C. Stancil, Sr. Fuel Facility Inspector
Approved By:	Steve Rose, Chief Construction Inspection Branch 2 Division of Construction Oversight

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring licensee's performance by conducting 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 Brunswick Steam Electric Plant, 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), dated October 31, 2017. The inspector reviewed the licensee's implementation of Nuclear Energy Institute (NEI) voluntary industry initiative (VII) in compliance with regulatory requirements and current licensing bases. The inspector discussed the licensee's open phase protection (OPP) system design and ongoing implementation plans with plant staff. The inspector reviewed licensee documentation, vendor documentation, and performed system walkdowns to verify that the installed equipment was supported by the design documentation. The inspector verified that the licensee had completed the installation and testing of equipment, installed and tested alarm circuits both local and in the control rooms, and analyzed potential impacts associated with the design implementation on the current licensing basis.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

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) (1 Sample)

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 open phase conditions (OPC).

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

Brunswick Steam Electric Plant selected the OPP system designed and manufactured by PCS2000 Solutions. Each OPP system for Brunswick included two Schweitzer microprocessor transformer protection relays installed on the high-voltage sides of the 230/4.16 KV start-up auxiliary transformers (SAT) and the 230/24 KV main power transformers (MPT) for both units to detect and initiate an alarm locally and in the main control room for OPCs. The SAT was the immediately available (preferred) offsite power source and the unit auxiliary transformer back-feed (through the MPT) was the delayed alternate offsite power source. The capability to separate emergency busses from the offsite sources (trip of associated high side switchyard breakers) was installed and tested on all transformers. At the end of the inspection, the system was in the passive monitoring mode for all SATs and MPTs with the intent to remove trip functions based on risk analysis.

INSPECTION RESULTS

Based on discussions with the licensee staff, review of available documentation, and walkdowns of installed equipment, the inspector had reasonable assurance the licensee is appropriately implementing the voluntary industry initiative.

The inspectors identified:

Assessment	2515/194
Detection, Alarms, and General Criteria; TI 2515/194-03.01 – VII (Part 1) (1) OPCs could be detected and alarmed in the main control room with minimal nuisance alarms experienced to date, and therefore, no reduction in overall plant operation reliability. The detection circuits were sensitive enough to identify an OPC for all credited loading conditions. (2) No Class-1E circuits were replaced with non-Class 1E circuits in the design. (3) The updated final safety analysis report (UFSAR) was updated to discuss the design features and analyses related to the effects of, and protection for, any OPC design vulnerability, reflecting the fact that the trip function was not currently enabled.	

Assessment	2515/194
Protective Actions Criteria; TI 2515/194-03.01 – VII (Part 1) (1) Both units' 230 kV SATs and MPTs (back-feed), and associated circuitry were susceptible to an OPC. The licensee's OPC design solution added the OPP system manufactured by PCS2000 Solutions to include non-safety related detection and alarm of OPCs and separation (trip) of the SATs and MPTs from offsite source OPCs. (2) With an OPC present and with or without an accident condition signal, the OPP design would not adversely affect the function of important-to-safety systems, structures, or components. With automatic actuation enabled, loads required to mitigate postulated accidents would transfer to an alternate source to ensure that safety functions were preserved. The credited plant response was unaffected. (3) Periodic tests, calibrations, and setpoint verifications have not been established for the new protective features. However, Preventive Maintenance Add Request (PMAD) 2137356 was previously initiated to transition switchyard preventive maintenance to the site and includes an assignment to evaluate and determine appropriate periodic testing of OPD systems.	

No findings or exceptions were identified.

Observations	2515/194
The OPP trip circuit, although installed, remained disabled during the onsite system implementation inspection. The OPP system was in the passive monitoring mode for all SATs and MPTs with the intent to remove trip functions based on risk analysis. The trip circuit will be permanently removed under engineering changes (EC) 415902 and 415916.	

EXIT MEETINGS AND DEBRIEFS

On October 10, 2019, the inspector presented the NRC inspection results to Mr. Jay Ratliff and other members of the licensee staff. The inspector verified no proprietary information was retained or documented in this report.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	BNP-E-4.008	Open Phase Condition Response Time	0
	Drawings	F-03001	230KV & 24KV Systems Main One Line Diagram	37
		F-03000	230KV & 24KV Systems Main One Line Diagram	40
		F-03043	230KV, 24KV, & 4160V Systems Key One Line Diagram	41
	Design Change Packages	EC 298348	Unit 1 Open Phase Detection System	3 & 4
		EC 300946	U1 MPT Installation	3
		EC 299563	U2 MPT Installation	3
		EC 415902	U1 MPT Trip Defeat	0
		EC 415916	U2 SAT Trip Defeat	0
		EC 413372	U1 Cyber Security Changes	0
		AR 2206699	Open Phase Detection System 10CFR50.59 Screen	0
	Miscellaneous	LOT-AOP-140	Licensed Operator Continuing Training Simulator Exercise Guide “Sat Phase A Failure…”	9
		LOI-CLS-LP-050	230 KV Electrical Distribution	17A
		AOI-CLS-LP-050	230 KV Electrical Distribution	6
		SD-50	230 KV Electrical Distribution System	24
		1OI-03.4.3	Unit 1 Turbine Building Auxiliary Operator Daily Check Sheets	Deleted
		PMR-747065	PM Request for SEL Protective Relay and Clock Batteries	
		PMR-755683	Preventive Maintenance Request for U1 MPT	
		PMR-755687	Preventive Maintenance Request for U1 SAT	
		PMAD-2137356	PM Add Request with Assignment for OPDS Evaluation	
		PCHG-DESG	PCS Open Phase Detection System User Manual	06/30/2014
		UFSAR	Brunswick Nuclear Plant Units 1 and 2, Section 8	25

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Procedures	1OP-50	Plant Electric System Operating Procedure	136
		2OP-50	Plant Electric System Operating Procedure	167
		1APP-UA-13	Annunciator Procedure for Panel UA-13	57
		0AOP-36.1	Loss of Any 4160 Buses or 480V E-Buses	79
	Work Orders	WO 13413042	Implement Open Phase Relay Protection EC on U2 SAT	
		WO 13413044	Implement Open Phase Relay Protection EC on U2 MPT	