



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

May 1, 2020

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

SUBJECT: REISSUE – EDWIN I. HATCH NUCLEAR PLANT – 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), REPORT 05000321/2019014 AND 05000366/2019014

Dear Ms. Gayheart

On December 17, 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 ML19351E202. 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 the Observation: Detection, Alarms, and General Criteria - TI 2515/194-03.01 – VII (Part 1,) and that statement 2 of the 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,

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

Docket Nos. 05000321 and 05000366

License Nos. DPR-57 and NPF-5

Enclosure:

1. Reissued Hatch Cover Letter
2. Reissued Inspection Report 05000321/2019014  
and 05000366/2019014

cc w/ encl: Distribution via LISTSERV



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

December 17, 2019

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

SUBJECT: EDWIN I. HATCH NUCLEAR PLANT – 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), REPORT 05000321/2019014 AND  
05000366/2019014

Dear Ms. Gayheart:

On November 22, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Edwin I. Hatch Nuclear Plant. On November 21, 2019, the NRC inspectors discussed the results of this inspection with Mr. Sonny Dean, 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*

Enclosure

*Regulations 2.390, "Public Inspections, Exemptions, Requests for Withholding."*

Sincerely,

*Bradley J. Davis*

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

Docket Nos. 05000321 and 05000366  
License Nos. DPR-57 and NPF-5

Enclosure:  
As stated

cc w/ encl: Distribution via LISTSERV

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

Docket Numbers: 05000321 and 05000366

License Numbers: DPR-57 and NPF-5

Report Numbers: 05000321/2019014 and 05000366/2019014

Enterprise Identifier: I-2019-014-0002

Licensee: Southern Nuclear Operating Co. Inc.

Facility: Edwin I. Hatch Nuclear Plant

Location: Baxley, GA

Inspection Dates: November 18, 2019 to November 22, 2019

Inspectors: J. Kent, Construction Inspector

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

## **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 Edwin I. Hatch Nuclear 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 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 voluntary industry initiative (VII) in compliance with Commission guidance. The inspectors discussed the licensee's open phase condition (OPC) system design and ongoing implementation plans with plant staff. The inspectors reviewed licensee documentation, vendor documentation, and performed system walkdowns to determine if the installed equipment was supported by the design documentation. These reviews were also made to determine if the licensee had completed the installation and testing of equipment, installed and tested alarming circuits both locally and in the control room, 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 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 was to verify that licensees had 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)

Hatch Nuclear 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 Start-up Auxiliary Transformers (SAT) 1C, 1D, 2C, 2D, and 2E. Hatch Nuclear Plant will install this equipment on SAT 1E after the installation of that transformer is completed in February 2020. Hatch Nuclear 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 Updated Final Safety Assessment Report (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>	

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. One additional transformer will be installed and connected to the electrical power distribution system and will also have detection and mitigating equipment for OPCs installed.</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 Start-up Auxiliary Transformers (SAT) 1C, 1D, 2C, 2D, and 2E. Hatch Nuclear Plant will install this equipment on SAT 1E after the installation of that transformer is completed in February 2020. 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>	



Observation: Detection, Alarms, and General Criteria Exceptions - TI 2515/194-03.01 – VII (Part 1)	2515/194
<p>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 SENH-17-005, “HNP Open Phase Detection System PSSTech Setpoints Calculation,” Version 1.</p>	

Observation: Protective Actions Criteria Exceptions - TI 2515/194-03.01 – VII (Part 1)	2515/194
<p>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 that is affected is tripped and isolated.</p> <p>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 field testing to demonstrate Main Control Room (MCR) annunciator panel illumination and the tripping function signal was present during simulated testing at the Open Phase Protection (OPP) cabinets. The licensee is currently tracking the tripping function initiation under Design Change/Modifications (DCPs) SNC836321, SNC873725, SNC881203, SNC881210. Once enabled, the OPP system will have the ability to isolate an affected SAT with an OPC detected on the high voltage side of the transformer at any operating condition when the transformers are energized.</p> <p>Due to the configuration of Hatch Nuclear Plant electrical distribution system a loss of phase on one transformer would not affect power availability to any Essential Bus because the backup SAT would pick-up the affected loads. This configuration would ensure that safety functions are preserved as required by the current licensing bases.</p> <p>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.</p>	

## **EXIT MEETINGS AND DEBRIEFS**

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

- On November 21, 2019, the inspectors presented 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 (NRC Bulletin 2012-01), results to Mr. Sonny Dean, Site Vice President and other members of the licensee staff.

## DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	SCNH-16-003,	"Open Phase Protection Cabinet Foundation and Anchorage Design For Sat 2C and CVR/Circuit Breaker Support"	2
		SENH-17-005	HNP Open Phase Detection System PSSTech Setpoints Calculation	1
	Drawings	H-13350,	EDWIN I. HATCH NUCLEAR PLANT UNIT No. 1 MASTER SINGLE LINE DIAGRAM	29
		H-23350	EDWIN I. HATCH NUCLEAR PLANT UNIT No. 2 MASTER SINGLE LINE DIAGRAM	15
		H-23614	EDWIN I. HATCH NUCLEAR PLANT UNIT No. 2 ELEMENTARY DIAGRAM START-UP TRANSFORMERS 2C & 2D FAULT PRESSURE PROT. SYS. 2R20K & OPP SYS. 2S11	19
		H-23667	EDWIN I. HATCH NUCLEAR PLANT UNIT No. 2 CONTROL AND ANNUNCIATOR FOR MAIN POWER TRANSF. & AUX. TRANSF. 2A, 2B, 2C & 2D SYSTEM 2S11 – SHEET 2	24
		S-76895	OPEN PHASE PROTECTION (OPP) SYSTEM, ELECTRICAL DRAWINGS, CHANNEL 1 & CHANNEL 2 – SAT 1C	2
	Engineering Changes	SNC654775	SAT 1C and SAT 1D Open Phase Protection	3
		SNC654779	SAT 2C Open Phase Protection	4
		SNC654780	SAT 2D Open Phase Protection	3
		SNC836321	SAT 2E Open Phase Protection	1
		SNC873725	SAT 1E Open Phase Protection	2
		SNC881203	SAT 1C and SAT 1D Open Phase Protection Trip Enable	3 and 4
	SNC881210	SAT 2C and SAT 2D Open Phase Protection Trip Enable	3 and 4	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Miscellaneous	SNC10133196	Certificate of Conformance - 1/C 4/0 AWG 19/STR XLPE/CSPE 2000V	07/21/2016
	Procedures	34AR-651-901-1	ARP'S FOR CONTROL PANEL 1H11-P651, ALARM PANEL 1	27.3
		34AR-651-901-2	ARP'S FOR CONTROL PANEL 2H11-P651, ALARM PANEL 1	20.2
		34AR-651-902-2	ARP'S FOR CONTROL PANEL 2H11-P651, ALARM PANEL 2	8
		34IT-H21-001-1	Low Voltage Switchyard Annunciator Functional Test and Transformer Fault Pressure Annunciator And Open Phase Protection Trip Functional Test	4.1
		34SO-S11-001-2	Unit 2 Transformers And Open Phase Protection System Operation	4.1
	Work Orders	SNC848540	F/T TEST FOR OPEN PHASE 1H21-P044 SAT 1C	
		SNC944287	F/T TEST FOR OPEN PHASE 2H21-P046 ON SAT 2E	
		SNC968068	U1 START-UP AUXILIARY TRANSFORMER 1C (1S11-S004) OPP SYSTEM TRIP FUNCTIONAL TEST	09/19/2019