



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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October 22, 2019

Mr. Don Moul
Vice President, Nuclear Division and Chief
Nuclear Officer
Florida Power & Light Company
Mail Stop: NT3/JW
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Jupiter, FL 33478

SUBJECT: TURKEY POINT NUCLEAR GENERATING STATION, UNITS 3 AND 4 – NRC
TEMPORARY INSTRUCTION 2515/194 INSPECTION REPORT
05000250/2019013 AND 05000251/2019013

Dear Mr. Moul:

On September 26, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Turkey Point Nuclear Generating Station, Units 3 and 4 and discussed the results of this inspection with Mr. B. Stamp, Site Director, 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/

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

Docket No.: 50-250 and 50-251
License No.: DPR-31, DPR-41

Enclosure:
Inspection Report 05000250/2019013 and 05000251/2019013

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SUBJECT: TURKEY POINT NUCLEAR GENERATING STATION, UNIT 3 AND UNIT 4 –
NRC TEMPORARY INSTRUCTION 2515/194 INSPECTION (REPORT
05000250/2019013 AND 05000251/2019013)

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number: 50-250 and 50-251

License Number: DPR-31 and DPR-41

Report Number: 05000250/2019013 and 05000251/2019013

Enterprise Identifier: I-2019-013-0009

Licensee: Florida Power & Light Company (FPL)

Facility: Turkey Point Nuclear Generating Station, Units 3 and 4

Location: 9760 SW 344th Street
Homestead, FL 33035

Inspection Dates: September 23, 2019 to September 26, 2019

Inspectors: G. Crespo, Sr. Construction Inspector

Approved By: Steven D. 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 Turkey Point Nuclear Generating Station, Units 3 and 4, 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 inspectors reviewed the licensee's implementation of Nuclear Energy Institute (NEI) voluntary industry initiative (VII) in compliance with Commission guidance. The inspector discussed the licensee's open phase condition 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. These reviews were also made to determine if the licensee had completed the installation and testing of equipment, installed and tested alarming circuits both local and in the control room, and analyzed potential impacts associated with the design implementation on the current licensing basis. The inspectors reviewed the status of indication lamps in the front of the individual system cabinets to verify the status of the system tripping functions. These tripping functions of the system had not been activated or wired to date pending resolution of decision if to activate the function.

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.

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

Turkey Point Nuclear Generating Station, Units 3 and 4 selected General Electric Energy Connections – ALSTOM, as the open phase detection system. At the end of this inspection, the system remained in the monitoring mode of operation to facilitate continued data gathering of grid perturbations for evaluation of alarm and trip setpoints. The equipment was installed on the start-up transformers SUT-3X03 and SUT-4X03. The licensee is scheduled to transition the open phase detection system to full implementation including trip functions, if so decided, by December 2020.

INSPECTION RESULTS

Based on discussions with the licensee staff, review of available design, testing, grid data monitoring results documentation, and walkdowns of installed equipment, the inspectors had reasonable assurance the licensee appropriately implemented the VII.

The inspectors determined:

Assessment	2515/194
<u>Detection, Alarms, and General Criteria; TI 2515/194-03.01 – VII (Part 1)</u>	
(1) Open phase conditions will be detected and alarmed in the control room on the "X" common annunciator panel.	

- (2) Detection circuits will be sensitive enough to identify an open phase condition for all credited loading conditions for installed equipment.
- (3) No Class-1E circuits were being replaced with non-Class 1E circuits in the design.
- (4) The updated final safety analysis report (UFSAR) has been prepared to discuss the design features and analyses related to the effects of, and protection for, and open phase condition (OPC) design vulnerability.

Assessment	2515/194
<u>Protective Actions Criteria; TI 2515/194-03.01 – VII (Part 1)</u>	
<p>(1) Two transformers were susceptible to an open phase condition and the licensee had installed detection and mitigating equipment for both.</p> <p>(2) With an open phase condition 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 open phase condition design solution added two General Electric-ALSTOM systems on the start-up transformers 3X03 and 4X03. The trip function, if and when enabled, will provide an additional input to the associated transformer output breakers. The credited plant response is unaffected and will be the same regardless of the conditions that generated the trip of the transformer output breakers.</p>	

The inspectors identified the following exceptions to the Temporary Instruction criteria resulting from the operating status of the design modifications:

Assessment	2515/194
<u>Detection, Alarms, and General Criteria Exceptions; TI 2515/194-03.01 – VII (Part 1)</u>	
<p>(1) The licensee's design was operating in the monitoring mode with already established setpoints and gathering data to ensure the open phase condition design and protective schemes would minimize mis-operation, or spurious actions in the range of voltage unbalance normally expected in the transmission system. The licensee developed engineering calculations applied to the open phase detection and protection (OPDP) system to protect important-to-safety equipment during an open phase condition. These calculations are included in MPR calculations 1110-0042-CALC-001, Rev. 0, "Turkey Point Setpoint #8 Calculation," and 1110-0044-RPT-001, Rev. 0, "Basis of Alarm Only Setpoints and Time Delays at Turkey Point 3 & 4," that provide ranges of setpoints to ensure both security against false trips and detection of open phase conditions.</p> <p>(2) A draft of the proposed changes to the Unit 3 and Unit 4 UFSARs were available for the inspector's review and included information related to open phase conditions that describe the functions of the OPDP system. These changes included for Units 3 and 4, to trip the 4.16 kV breakers upon detecting an OPC on the high side of the SUTs 3X03 and 4X03 respectively if the SUT is loaded and to provide an OPC alarm in the control room upon detecting the OPC on the high side of the SUT for loaded and unloaded SUT.</p>	

Assessment	2515/194
<u>Protective Actions Criteria Exceptions; TI 2515/194-03.01 – VII (Part 1)</u>	
<p>(1) The licensee's open phase condition design solution uses General Electric-ALSTOM systems to detect, alarm, and provide a trip signal input to the associated SUT transformer load side main breakers. Upon open phase trip signal, the existing undervoltage relays would operate as designed to initiate starting of the emergency diesel generator to restore power to the bus.</p> <p>The trip function input to the transformer load side breakers remained deactivated and disconnected during the onsite system implementation inspection and that design function was not able to be demonstrated. The implementation of the trip function was being tracked in the design change package EC 287154 for Unit 3 and EC 287155 for Unit 4, future revision for both that provides for the final electrical terminations required to enable the open phase protection (OPP) system SUT load breaker trip function. Once enabled, the OPP system will have the ability to isolate an affected SUT with a OPC detected on the high side of the SUTs.</p> <p>Due to the configuration of the Turkey Point Nuclear Generating Station's electrical distribution system, a loss of phase on one transformer would affect one of two utility feeds to the emergency busses in the affected unit and a back-up feed to the emergency buss on the other unit. The normal feed and diesel generator feed would still be available on all emergency buses required to mitigate postulated accidents, ensuring that safety functions are preserved as required by the current licensing bases.</p> <p>(2) Periodic tests, calibrations, setpoint verifications or inspections (as applicable) have been established for system operations at present. The surveillance requirements have been maintained for the plant Technical Specifications (TSs) in compliance with the provisions of 10 CFR 50.36.</p> <p>The licensee has included an action request AR 2259267 that covered both Unit 3 and 4 to develop a preventive maintenance program for the installed OPDP equipment. Existing plant equipment will continue to be maintained according to the licensee's current preventative maintenance program.</p>	

The inspectors identified the following observation:

Observations	2515/194
<ol style="list-style-type: none"> 1. The trip function capabilities for both OPDP systems on Units 3 & 4 have not been enabled by the positioning of the OPDP cabinet trip output knife switches (FT1-1 and FT1-2) and by missing final connections to the SUT output breaker trip signal wiring not run into the 3A, 3B, 4A and 4B 4.16kV switchgear specific breaker compartments. The associated conduits and wires were roughed in suspended directly above the switchgear compartments. 2. Preventive Maintenance Program for the OPDP systems have not been implemented but it has been recorded to be developed under an Action Request AR 02259267 program with an assigned due date of 12/12/2019. 	

EXIT MEETINGS AND DEBRIEFS

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

- On September 26, 2019, the inspector presented the NRC inspection results to Mr. B. Stamp, Site Director, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	1110-0043-Summary-001	Turkey Point Units 3 & 4 Startup Transformer Open Phase Setpoint Summary	0
		5614-E-315-SH124A-EC287154	Open Phase Cabinet 3C400 Start-up Transformer Unit 3	1
		5614-E-315-SH124A-EC287155	Open Phase Cabinet 4C400 Start-up Transformer Unit 4	1
		1110-0027-CALC-002	PTN Units 3 & 4 Main Transformer Mode 1 Open Phase Vulnerability Study. (Developed by MPR)	0
		1110-0026-CALC-002	Turkey Point Main Transformer Open Phase Scoping Study (Developed by MPR)	0
		1110-0026-RPT-001	PTN Main Transformer Open Phase Vulnerability Evaluation (Developed by MPR)	0
		1110-0044-RPT-001	Basis of Alarm-Only Setpoints and Time Delays at Turkey Point Units 3 and 4 (Developed by MPR)	0
		1110-0041-RPT-001	Methodology for Trip Enabled Setpoints	3
		1110-0044-RPT-001	Basis of Alarm Only Setpoints and Time Delays at Turkey Point Units 3 & 4.	0
		1110-0043-SUMMARY-001	Turkey Point Units 3 & 4 Startup Transformer Open Phase Setpoint Summary	0
	Action Request Documents	A/R 02283385	U3 Open Phase Cabinet Indicated OPD when FLAGAME Line Remove	10/03/2018
		A/R 02295123	Unit 3 Open Phase System Trouble While Enabling Alarm	12/18/2018
		A/R 02310755	Unit 4 Class B Alarm Locked In On 4C400 (Open Phase Detection)	04/16/2019
		A/R 02315855	Unit 4 Class C Alarm ON Open Phase Detection Cabinet.	05/28/2019
	Drawings	5610-E-1	Main Single Line – Unit 3 sheet 1	47
		5610-E-1	Main Single Line – Unit 4 sheet 2	19
		5610-T-E-1591	Operating Diagram Electrical Distribution	82
		5613-E-25	(Unit 3) Reactor Auxiliaries Spent Fuel Pit Pump 3P212A Breaker 30309	5

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		5613-M-3033	(Unit 3) Spent Fuel Pool Cooling System	26
		5614-E-25	(Unit 4) Reactor Auxiliaries Spent Fuel Pit Pump 4P212A Breaker 40309	3
		5614-M-3033	(Unit 4) Spent Fuel Pool Cooling System	31
	Design Change Packages	FCR #016 ECR 287154	Unit 3 OPDP Cabinet 3C400 Final Relay Design Setting to be installed in Micom Relays 1, 2, & 3.	3
		EC287154	U3 Switchyard Open Phase Protection – Phase III	4
		EC287155	U4 Switchyard Open Phase Protection – Phase III	4
	Miscellaneous	5613-E-315-SH124B-EC287154	Open Phase Cabinet 3C400 Start-Up Transformer Unit 3	1
		5614-E-315-SH124B-EC287155	Open Phase Cabinet 4C400 Start-Up Transformer Unit 4	1
		EC287154 Attachment H.2	NRC Functional Requirements Relative to Open Phase Detection and Protection	--
		EC287154 Attachment H.5	UFSAR Change Request Turkey Point Unit 3, UFSAR Chapter 8.2-3	16
		EC287155 Attachment H.5	UFSAR Change Request Turkey Point Unit 4, UFSAR Chapter 8.2-3	16
		EC287154	10 CFR 50.59 Screening Form	4
	Procedures	3-NOP-092.02	Open Phase Detection and Protection	0
		4-NOP-092.02	Open Phase Detection and Protection	0
		EN-AA-100-10001	Open Phase Detection and Protection (OPDP) Data Extraction and Analysis	1
	Work Orders	40491799 50	EC287154 U3 – FCR-016- Install New Design Settings at 3C400	11/12/2018
		40491799 51	EC287154 U3 – Install New COSI Firmware & Parameters at 3C400	12/10/2018
		40491800 52	EC287155 U4 – FCR-013- Install New Design Settings at 4C400	11/20/2018
		40491800 53	EC287155 U4 – Install New COSI Firmware & Parameters at 4C400	12/21/2018