



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION I  
2100 RENAISSANCE BOULEVARD, SUITE 100  
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

April 1, 2021

Mr. David P. Rhoades  
Senior Vice President  
Exelon Generation Company, LLC  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Rd  
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 – TEMPORARY  
INSTRUCTION 2515/194 INSPECTION REPORT 05000277/2021011 AND  
05000278/2021011

Dear Mr. Rhoades:

On March 25, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Peach Bottom Atomic Power Station, Units 2 and 3, and discussed the results of this inspection with Mr. Matthew Herr, 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 Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

X /RA/

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Signed by: Glenn T. Dentel  
Glenn T. Dentel, Chief  
Engineering Branch 2  
Division of Reactor Safety

Docket Nos. 05000277 and 05000278  
License Nos. DPR-44 and DPR-56

Enclosure:  
As stated

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SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 – TEMPORARY INSTRUCTION 2515/194 INSPECTION REPORT 05000277/2021011 AND 05000278/2021011 DATED APRIL 1, 2021

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

Docket Numbers: 05000277 and 05000278

License Numbers: DPR-44 and DPR-56

Report Numbers: 05000277/2021011 and 05000278/2021011

Enterprise Identifier: I-2021-011-0014

Licensee: Exelon Generation Company, LLC

Facility: Peach Bottom Atomic Power Station, Units 2 and 3

Location: Delta, PA

Inspection Dates: March 23, 2021 to March 25, 2021

Inspectors: F. Arner, Senior Reactor Analyst  
B. Pinson, Reactor Inspector

Approved By: Glenn T. Dentel, 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 at Peach Bottom Atomic Power Station, Units 2 and 3, 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. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), inspectors were directed to begin telework. In addition, regional baseline inspections were evaluated to determine if all or portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

## 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)

The inspectors reviewed the licensee's implementation of the "Nuclear Energy Institute Voluntary Industry Initiative," (ADAMS Accession No. ML15075A454) dated March 16, 2015. This included reviewing how the licensee updated their licensing basis to reflect the need to protect against open phase conditions.

### 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) Exelon selected the open phase detection system designed and manufactured by Schweitzer Engineering Laboratories (SEL), as the design vendor for the open phase condition system at Peach Bottom Atomic Power Station, Units 2 and 3.

Peach Bottom Atomic Power Station has two independent offsite sources (500kV and 230kV) which provide power via the station auxiliary buses to the appropriate 4 kV safeguard buses. The open phase detection system is designed to protect the offsite power sources from a loss of phase scenario. Six SEL relays were installed to provide detection and alarm capability for open phase conditions associated with the 2 Startup Transformer, the 343 Startup Transformer, the 3 Startup Transformer, the 2 Emergency Auxiliary Transformer, and the 3 Emergency Auxiliary Transformer. The relays are wired to provide main control room annunciation if a loss of one or two phase conditions is detected or if the associated relays are non-functional. The associated 500kV and 230kV substation control houses also contain annunciation window panels that provide trouble alarms for the relays.

In lieu of automatic open phase protective actions, Exelon implemented an alarm only strategy which relies on proper operator actions to diagnose and respond to an open

phase condition. At the end of this inspection the SEL relays were monitoring the associated power sources and would provide main control room annunciation if a loss of one or two phase conditions was detected or if a relay was non-functional.

## INSPECTION RESULTS

Observation: Temporary Instruction 2515/194 - Section 03.01(a) and (c) Results	2515/194
<p>Based on discussions with Exelon staff, review of design and testing documentation, and walkdowns of installed equipment, the inspectors had reasonable assurance that Exelon is appropriately implementing, with a noted exception discussed below, the voluntary industry initiative at Peach Bottom Atomic Power Station, Units 2 and 3. The inspectors verified the following criteria:</p>	
<p><u>Detection, Alarms and General Criteria</u></p>	
<ol style="list-style-type: none"> <li>1. [03.01(a)(1)] Open phase conditions are detected and alarmed in the control room.</li> <li>2. [03.01(a)(2)] In scenarios where automatic detection may not be possible due to very low or no load conditions, or when transformers are in a standby mode, automatic detection will occur as soon as loads are transferred to the standby source. Additionally, where automatic detection is not reliable, Exelon has established monitoring requirements on a per shift basis, to look for evidence of an open phase condition.</li> <li>3. [03.01(a)(3)] The open phase condition design and protective schemes minimize misoperation or spurious action in the range of voltage unbalance normally expected in the transmission system that could cause separation from an operable off-site power source. Additionally, Exelon has demonstrated that the actuation circuit design does not result in lower overall plant operation reliability.</li> <li>4. [03.01(a)(4)] No Class-1E circuits were replaced with non-Class-1E circuits in this design.</li> <li>5. [03.01(a)(6)] The open phase condition detection and alarm components are maintained in accordance with Exelon's procedures or maintenance program, and periodic tests, calibrations setpoint verifications or inspections (as applicable) have been established.</li> </ol>	
<p><u>Use of Risk-Informed Evaluation Method</u></p>	
<ol style="list-style-type: none"> <li>1. [03.01(c)(1)] The plant configuration matched the changes made to the probabilistic risk assessment model to address an open phase condition, and the logic of the probabilistic risk assessment model changes is sound.</li> <li>2. [03.01(c)(2)] The procedures which validate that the open phase condition alarm would identify the proper indication to validate the open phase conditions at all possible locations</li> <li>3. [03.01(c)(3)] Observations associated with procedure(s) and operator actions required to respond to an open phase condition alarm and potential equipment trip match the Human Reliability Analysis.</li> <li>4. [03.01(c)(4)] Assumptions listed in the NEI 19-02 Appendix A evaluation and the sensitivity analyses listed in Section 5 of the evaluation.</li> <li>5. [03.01(c)(5)] Assumptions, procedures, operator actions and Exelon's analyses specified above are consistent with the plant-specific design and licensing basis, including:</li> </ol>	

- a. Initiating events considered in the analysis
- b. Boundary conditions specified in Attachment 1 of the NEI Voluntary Industry Initiative, Revision 3
- c. Operating procedures for steps taken to recover equipment assumed tripped/locked out or damaged due to the open phase conditions (or use of alternate equipment)
- d. Where recovery was assumed in the probabilistic risk assessment analysis for tripped electric equipment, restoration of the equipment was based on analyses that demonstrate that automatic isolation trips did not result in equipment damage

Observation: Temporary Instruction 2515/194 - Section 03.01(a)(5) Exception	2515/194
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UFSAR not Updated to Reflect Current Open Phase Condition Detection and Protection Design

Criteria - [03.01(a)(5)] The Updated Final Safety Analysis Report was updated to discuss the design features and analyses related to the effects of any open phase condition design vulnerability.

Exception - The Peach Bottom Atomic Power Station's Updated Final Safety Analysis Report was updated to discuss the configuration of the open phase detection system during the monitoring period beginning in 2017 (alarm function only with automatic isolation function disabled). The Updated Final Safety Analysis Report did not discuss the open phase detection and protection system configuration that was in place at the time of the inspection. A discussion of the analyses and design of the risk-based approach with manual operator actions was not included.

This deviation was identified in a pre-inspection self-assessment performed by Exelon and captured in the corrective action program as Issue Report 04330015.

## EXIT MEETINGS AND DEBRIEFS

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

- On March 25, 2021, the inspectors presented the Temporary Instruction 2515/194 Inspection results to Mr. Matthew Herr, Site Vice President and other members of the licensee staff.

**DOCUMENTS REVIEWED**

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Engineering Changes	EC 556071	Loss of Phase (2SU and 2EA)	2
		EC 556072	Loss of Phase (3SU)	4
		EC 556073	Loss of Phase (343SU and 3EA)	5
	Engineering Evaluations	PB-MISC-041	Peach Bottom Atomic Power Station Open Phase Condition Evaluation	0