



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

July 29, 2021

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

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2 –
TEMPORARY INSTRUCTION 2515/194 INSPECTION REPORT
05000317/2021011 AND 05000318/2021011

Dear Mr. Rhoades:

On July 14, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Calvert Cliffs Nuclear Power Plant, Units 1 and 2 and discussed the results of this inspection with Mr. Thomas Haaf, 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,

Glenn T. Dentel, Chief
Engineering Branch 2
Division of Operating Reactor Safety

Docket Nos. 05000317 and 05000318
License Nos. DPR-53 and DPR-69

Enclosure:
As stated

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SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2 –
 TEMPORARY INSTRUCTION 2515/194 INSPECTION REPORT
 05000317/2021011 AND 05000318/2021011 DATED JULY 29, 2021

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ADAMS ACCESSION NUMBER: ML21210A124

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

Docket Numbers: 05000317 and 05000318

License Numbers: DPR-53 and DPR-69

Report Numbers: 05000317/2021011 and 05000318/2021011

Enterprise Identifier: I-2021-011-0016

Licensee: Exelon Generation Company, LLC

Facility: Calvert Cliffs Nuclear Power Plant, Units 1 and 2

Location: Lusby, MD

Inspection Dates: July 12, 2021 to July 14, 2021

Inspectors: A. Patel, Senior Reactor Inspector
F. Arner, Senior Reactor Analyst

Approved By: Glenn T. Dentel, Chief
Engineering Branch 2
Division of Operating 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 Calvert Cliffs Nuclear Power Plant, Units 1 and 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. 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 a 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. However, all the inspection activities were performed onsite. 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 Calvert Cliffs Nuclear Power Plant, Units 1 and 2.

Calvert Cliffs Nuclear Power Plant has three independent offsite sources (500kV) which provide power via the 13kV station service 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. Eleven SEL relays were installed to provide detection and alarm capability for open phase conditions associated with the three 500kV-13kV service transformers, four voltage regulators, and four 13kV-4kV service transformers. 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.

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 the voluntary industry initiative at Calvert Cliffs Nuclear Power Plant, Units 1 and 2. The inspectors verified the following criteria:</p> <p><u>Detection, Alarms and General Criteria</u></p> <ol style="list-style-type: none"> 1. [03.01(a)(1)] Open phase conditions are detected and alarmed in the control room. 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. 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. 4. [03.01(a)(4)] No Class-1E circuits were replaced with non-Class-1E circuits in this design. 5. [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. 6. [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. <p><u>Use of Risk-Informed Evaluation Method</u></p> <ol style="list-style-type: none"> 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. 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. 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. 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. 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: <ol style="list-style-type: none"> (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

EXIT MEETINGS AND DEBRIEFS

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

- On July 14, 2021, the inspectors presented the Temporary Instruction 2515/194 Inspection results to Mr. Thomas Haaf, Site Vice President and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Corrective Action Documents Resulting from Inspection	4434683		
		4434789		
		4434994		
		4435033		
		4435115		
	Drawings	1E-001SH0001	Electrical Main Single Line Diagram	Revision 54
	Engineering Changes	ECP-14-000629	Open Phase Detection for P-13000-1	Revision 0
		ECP-15-000572	Open Phase Detection for P-13000-2	Revision 0
		ECP-17-000022	Open Phase Detection Project Support for Revised Algorithm	Revision 0
		ECP-17-000029	Calvert Cliffs Electrical Distribution Reliability Improvement Project (EDRIP) 500kV/13.8kV	Revision 0
	Miscellaneous	CA-MISC-028	Calvert Cliffs Nuclear Power Plant Open Phase Condition Evaluation	Revision 0
	Procedures	0C003-ALM	Electrical Distribution Control System Panel 0C003 Alarm Manual	Revision 0
		1C18-ALM	13kV & 4kV Essential Feeder Bkrs Control Board Alarm Manual	Revision 38
		1C19-ALM	13kV & 4kV Essential Feeder Bkrs Control Board Alarm Manual	Revision 43
		1C20-ALM	13kV & 4kV Essential Feeder Bkrs Control Board Alarm Manual	Revision 37