UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE RD, STE 102
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

April 29, 2025

David P. Rhoades
Senior Vice President
Constellation Energy Generation, LLC
President and Chief Nuclear Officer (CNO)
Constellation Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2 – INTEGRATED INSPECTION REPORT 05000317/2025001 AND 05000318/2025001

Dear David Rhoades:

On March 31, 2025, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Calvert Cliffs Nuclear Power Plant, Units 1 and 2. On April 15, 2025, the NRC inspectors discussed the results of this inspection with Christopher Smith, Plant Manager, and other members of your staff. The results of this inspection are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance or severity of the violation documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Calvert Cliffs Nuclear Power Plant, Units 1 and 2.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; and the NRC Resident Inspector at Calvert Cliffs Nuclear Power Plant, Units 1 and 2.

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* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

NICOLE WARNEK

Digitally signed by NICOLE WARNEK
Date: 2025.04.29 13:57:29 -04'00'

Nicole S. Warnek, Chief
Projects Branch 3
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 – INTEGRATED INSPECTION REPORT 05000317/2025001 AND 05000318/2025001 DATED APRIL 29, 2025

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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:	05000317/2025001 and 05000318/2025001
Enterprise Identifier:	I-2025-001-0043
Licensee:	Constellation Energy Generation, LLC
Facility:	Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Location:	Lusby, MD
Inspection Dates:	January 01, 2025 to March 31, 2025
Inspectors:	G. Dipaolo, Senior Resident Inspector A. Tran, Senior Resident Inspector C. Borman, Health Physicist P. Cataldo, Senior Reactor Inspector E. Chen, Reactor Inspector R. Clagg, Senior Project Engineer
Approved By:	Nicole S. Warnek, Chief Projects Branch 3 Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated 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

Failure to Implement Operating Instruction Results in Loss of Shutdown Cooling			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000318/2025001-01 Open/Closed	[H.4] - Teamwork	71111.20
A self-revealed Green finding and associated non-cited violation (NCV) of Unit 2 Technical Specification (TS) 5.4.1, "Administrative Controls – Procedures," was identified when Constellation failed to implement the operating instruction for de-energizing a 4 kilovolt (kV) bus on March 1, 2025. This resulted in a loss of the operating low pressure safety injection (LPSI) pump and a loss of shutdown cooling event.			

Additional Tracking Items

None.

PLANT STATUS

Unit 1 began the inspection period at rated thermal power and operated at or near full power for the remainder of the inspection period.

Unit 2 began the inspection period at rated thermal power and operated at or near full power until February 17, 2025, when the unit entered an end-of-cycle power coast down. On February 24, 2025, operators shut down the unit, from 97 percent power, for a planned refueling outage. Operators commenced a unit startup on March 26, 2025, and returned the unit to 100 percent power on March 30, 2025. The unit remained at or near rated thermal power for the remainder of the inspection period.

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 performed activities described in IMC 2515, Appendix D, "Plant Status," observed risk- significant activities, and completed on-site portions of IPs. 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.

REACTOR SAFETY

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

(1) Units 1 and 2, 11 and 12 spent fuel pool cooling trains prior to fuel moves, February 20, 2025
(2) Unit 2, 21 and 22 LPSI trains during reduced inventory, March 14, 2025
(3) Unit 1, 'B' emergency diesel generator (EDG) following return to service post-surveillance testing, March 28, 2025

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

(1) Unit 1, 1A EDG building, fire area DGB1, January 17, 2025

(2) Unit 2, 21 and 22 emergency core cooling system pump rooms, fire areas 1 and 2, January 24, 2025
(3) Unit 2, service water pump room, fire area 15, February 5, 2025
(4) Unit 2, turbine building, fire area TB, February 24, 2025
(5) Unit 2, containment, fire area, 2CNMT, March 10, 2025

Fire Brigade Drill Performance Sample (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated and observed the onsite fire brigade training and performance during an unannounced fire drill on the 12' contractor plant area on February 7, 2025.

71111.08P - Inservice Inspection Activities (PWR)

The inspectors verified that the reactor coolant system boundary, reactor vessel internals, risk-significant piping system boundaries, and containment boundary are appropriately monitored for degradation and that repairs and replacements were appropriately fabricated, examined and accepted by reviewing the following activities in Unit 2 during refueling outage CC2R26 from February 24, 2025 through March 6, 2025.

PWR Inservice Inspection Activities Sample - Nondestructive Examination and Welding Activities (IP Section 03.01) (1 Sample)

The inspectors verified that the following nondestructive examination (NDE) and welding activities were performed appropriately:

(1)
- American Society of Mechanical Engineers, Section XI, Repair and Replacement activity, including welding and liquid penetrant examinations (PT) of reactor vessel head vent flange replacements, conducted under Repair and Replacement Plan 2022-2-067, Revision 3, Work Order (WO) C93890353, and NDE Reports CC-2-PT-037, CC-2-PT-056, and CC-2-PT-058
- Augmented (American Society of Mechanical Engineers Code, Case N-722-1) VT-2 examination of the Class 1 pressurizer heater sleeves (NDE Report 2R26-ISI-VT-046)
- Visual examination of the containment liner (NDE Report 2R26-CISI-VT-007)
- Visual examination of nine (of ten) containment pedestal moisture barriers (NDE Report 2R26-CISI-VT-004), containment pedestal No. 5 (NDE Report 2R26-CISI-VT-009), and containment pedestal No.5 post-repair examination (NDE Report 2R26-CISI-VT-024)
- Augmented visual examination of containment leak chase channels (NDE Report 2R26-CISI-VT-005,) and Leak Chase No.33 boric acid as-found and post-clean examinations (NDE Reports 2R26-CISI-VT-008 and 2R26-CISI-VT-020)
- Visual examinations of containment perimeter moisture barrier and post-clean examinations (NDE Reports 2R26-CISI-VT-006 and 2R26-CISI-VT-021)
- Relevant indications from the previous outage (CC2R25) that were evaluated and accepted for continued use, listed in Owners Activity Report for the reactor vessel head during augmented examination, as 20230227_04557632_CAL_A2_RVH Indications, and documented in Report

"CC2R25 RVH Boric Acid Evaluation Report, action request (AR) 4557143; AR 4557659; AR 4557632"
- Remote visual (VT-3) examination of eight reactor vessel core shroud tie-rods (NDE Report 2R26-ISI-VT-066)
- Visual examination (VT-2) at normal operating pressure/temperature, during outage recovery, of Class 1 steam generator (SG) manway bolting (NDE Report C93915171)

PWR Inservice Inspection Activities Sample - Vessel Upper Head Penetration Inspection Activities (IP Section 03.02) (1 Sample)

The inspectors verified that the licensee conducted the following vessel upper head penetration inspections and addressed any identified defects appropriately:

(1) Visual examination based on American Society of Mechanical Engineers Code, Case N-729-6, of penetrations 22 and 70 (NDE Report 2R26-ISI-VT-24-067)

PWR Inservice Inspection Activities Sample - Boric Acid Corrosion Control Inspection Activities (IP Section 03.03) (1 Sample)

The inspectors verified the licensee is managing the boric acid corrosion control program through a review of the following evaluations:

(1)
- Boric acid evaluation and corrective actions for 2HVRC-1096 (AR 4840076)
- Boric acid evaluation and corrective actions for 2CV-517 (AR 4840067)
- Boric acid evaluation for 2RC-228 (AR 4840416)
- Boric acid evaluation for 2RC-141 (AR 4840408)
- Boric acid evaluation for 2PDT-111A (AR 4840862)

PWR Inservice Inspection Activities Sample - Steam Generator Tube Inspection Activities (Section 03.04) (1 Sample)

The inspectors verified that the licensee is monitoring the SG tube integrity appropriately through a review of the following examinations:

(1)
- Several eddy current testing results of inservice tubes in both the 21 and 22 SGs, including remote evaluations with a senior, independent qualified data analyst for the following tubes: 21 SG Tube R72C146 (loose part wear); 21 SG Tube R44C6 (fan bar wear); 21 SG Tube R131C65 (lattice grid wear); 21 SG Tube R108C76 (fan bar wear); 22 SG Tube R102C30 (lattice grid wear); 22 SG Tube R3C127 (potential loose part); 22 SG Tube R2C126 (potential loose part)
- Secondary side visual examinations of SG components, tube sheet and tubes, including evaluation of foreign object search and retrieval activities, and sludge lance activities
- Tube plug and stabilizer installation activities following eddy current testing results indicating foreign object wear on 22 SG Tubes R2C126 and R3C127, and adjacent Tube R1C127; as-found and as-left tube plug inspections on hot leg and cold leg locations

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (2 Samples)

(1) The inspectors observed and evaluated licensed operator performance in the main control room during the Unit 2 shutdown for the refueling outage on February 24, 2025.
(2) The inspectors observed and evaluated licensed operator performance in the main control room during the Unit 2 transition from Mode 3 to Mode 5 due to emergent replacement of pressurizer relief valve, 2RV-201, due to main valve seat leakage on March 23, 2025.

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

(1) The inspectors observed licensed operator classroom training related to plant modifications being implemented during the upcoming Unit 2 refueling outage, CC2R26, on January 28, 2025.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (1 Sample)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

(1) Unit 1, AR 4818265, 1A EDG lubricating oil cooler inlet temperature switch thermowell coolant leak, March 18, 2025

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

(1) Unit 2, elevated risk condition due to 2A EDG out of service due to a lubricating tube oil leak, January 30, 2025
(2) Unit 1, risk-informed completion time implementation due to reactor protection system channel 'A' inoperability, February 6, 2025
(3) Unit 2, elevated risk condition due to reactor vessel level reduced inventory condition, February 27, 2025
(4) Unit 2, high risk plant operating state and associated contingency plan during refueling outage reactor vessel level reduced inventory condition, March 12, 2025
(5) Unit 1, risk-informed completion time implementation due to planned 21 13kV service bus outage, March 16, 2025

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (6 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

(1) Unit 1, AR 4826957, SG level indicator 1-LI-1124D trending low, January 8, 2025
(2) Units 1 and 2, AR 4828807, NRC-identified trailers inside the swale area near Unit 1 'A' EDG building, January 15, 2025
(3) Units 1 and 2, AR 4829473, load cell used for SG snubber testing out-of-tolerance review of operability, January 17, 2025
(4) Unit 2, AR 4832682, Operability Evaluation 24-003, Revision 5, associated with 21 saltwater pump past operability on as-found degraded support brackets due to corrosion, February 10, 2025
(5) Unit 2, AR 4839630, leak found during personnel access airlock drop test, March 17, 2025
(6) Unit 2, AR 4847922, pressurizer relief valve, 2RV-201, exhibited main seat leakage during startup requiring reinstallation of valve installed during prior operating cycle, March 24, 2025

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (4 Samples)

The inspectors evaluated the following temporary or permanent modifications:

(1) Unit 2, Engineering Change Package (ECP)-24-000291, "13kV Service Bus 21 Protection Digital Upgrade," Revision 0, March 13, 2025
(2) Unit 2, ECP-14-000209, "Replace Unit 2 Containment Area Radiation Monitoring System," Revision 2, March 14, 2025
(3) Unit 2, ECP-24-000294, "Unit 2 4kV Supervised Fast Bus Transfer Modification," Revision 0, March 17, 2025
(4) Unit 2, ECP-000541, "Replace Unit 2 Control Rod Drive Logic and Display System," Revision 2, March 19, 2025

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage Sample (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated Unit 2 refueling outage activities from February 24, 2025 to March 28, 2025.

71111.24 - Testing and Maintenance of Equipment Important to Risk

The inspectors evaluated the following testing and maintenance activities to verify system operability and/or functionality:

Post-Maintenance Testing (PMT) (IP Section 03.01) (4 Samples)

(1) Unit 2, WO C93792530, 23 auxiliary feedwater pump post-maintenance testing following motor replacement, March 19, 2025
(2) Unit 2, WO C93915065, auxiliary feedwater actuation system SG level transmitter calibration, March 19, 2025
(3) Unit 2, WO C93915068, control element drive mechanism testing following control rod logic and display system upgrade, March 24, 2025
(4) Unit 2, WO C93937188, 21 auxiliary feedwater pump post-maintenance testing following turbine overhaul, March 27, 2025

Surveillance Testing (IP Section 03.01) (5 Samples)

(1) Unit 2, STP I-525B-2, “AFAS Pipe Rupture Loop Calibration SG 21 Channel ZD 21 S/G Steam Train,” Revision 9, January 7, 2025
(2) Unit 2, STP-O-8B-2, "Test of 2B DG and 4kV Bus 24 UV," Revision 38, January 17, 2025
(3) Unit 1, STP-O-8A-1, "Test of 1A DG and 11 4kV Bus UV," Revision 39, January 30, 2025
(4) Unit 2, M-003A-0, "On-Line Main and Offsite Steam Safety Valve Testing," Revision 01100, February 20, 2025
(5) Unit 2, STP-O-4A-2, "'A' Train Integrated Engineered Safety Features Test," Revision 36, March 26, 2025

Inservice Testing (IST) (IP Section 03.01) (1 Sample)

(1) Unit 2, STP-O-73KA-2, "'A' Train Containment Spray Pump and Check Valve Quarterly Operability Test," Revision 2, February 13, 2025

Containment Isolation Valve (CIV) Testing (IP Section 03.01) (1 Sample)

(1) Unit 2, STP-O-108D46-2, "Containment Penetration 47 Local Leak Rate Tests," Revision 00001, March 11, 2025

RADIATION SAFETY

71124.01 - Radiological Hazard Assessment and Exposure Controls

Radiological Hazard Assessment (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated how the licensee identifies the magnitude and extent of radiation levels and the concentrations and quantities of radioactive materials and how the licensee assesses radiological hazards.

Instructions to Workers (IP Section 03.02) (1 Sample)

(1) The inspectors evaluated how the licensee instructs workers on plant-related radiological hazards and the radiation protection requirements intended to protect workers from those hazards.

Contamination and Radioactive Material Control (IP Section 03.03) (2 Samples)

The inspectors observed/evaluated the following licensee processes for monitoring and controlling contamination and radioactive material:

(1) Observed workers exiting the radiologically controlled area during a refueling outage
(2) Observed the licensee perform surveys of potentially contaminated material leaving the radiologically controlled area

Radiological Hazards Control and Work Coverage (IP Section 03.04) (4 Samples)

The inspectors evaluated the licensee's control of radiological hazards for the following radiological work:

(1) Removal of containment air chiller motor from auxiliary building radiologically controlled area to the Unit 2 containment (Radiation Work Permit (RWP) CC-2-25-00617)
(2) Removal of Unit 2 reactor vessel head O-rings (RWP CC-2-25-00613)
(3) Maintenance work performed on Unit 2 recirculation containment sump valve, 2-MOV-4044 (RWP CC-2-25-00512)
(4) Work on the upper guide structure lift in reactor cavity (RWP CC-2-25-00614)

High Radiation Area and Very High Radiation Area Controls (IP Section 03.05) (3 Samples)

The inspectors evaluated licensee controls of the following high radiation areas (HRAs) and very high radiation areas (VHRAs):

(1) Locked HRA, Unit 2 reactor coolant waste room
(2) Locked HRA, Unit 2 let down heat exchanger room
(3) Locked HRA, Unit 2 degasifier filter room

Radiation Worker Performance and Radiation Protection Technician Proficiency (IP Section 03.06) (1 Sample)

(1) The inspectors evaluated radiation worker and radiation protection technician performance as it pertains to radiation protection requirements.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

BI01: Reactor Coolant System Specific Activity Sample (IP Section 02.10) (2 Samples)

(1) Unit 1, January 1, 2024 through December 31, 2024
(2) Unit 2, January 1, 2024 through December 31, 2024

BI02: Reactor Coolant System Leak Rate Sample (IP Section 02.11) (2 Samples)

(1) Unit 1, January 1, 2024 through December 31, 2024

(2) Unit 2, January 1, 2024 through December 31, 2024

INSPECTION RESULTS

<table>
<tr><td colspan="4">Failure to Implement Operating Instruction Results in Loss of Shutdown Cooling</td></tr>
<tr><td>Cornerstone</td><td>Significance</td><td>Cross-Cutting Aspect</td><td>Report Section</td></tr>
<tr><td>Initiating Events</td><td>Green
NCV 05000318/2025001-01
Open/Closed</td><td>[H.4] - Teamwork</td><td>71111.20</td></tr>
<tr><td colspan="4">A self-revealed Green finding and associated non-cited violation (NCV) of Unit 2 Technical Specification (TS) 5.4.1, “Administrative Controls – Procedures,” was identified when Constellation failed to implement the operating instruction for de-energizing a 4 kilovolt (kV) bus on March 1, 2025. This resulted in a loss of the operating low pressure safety injection (LPSI) pump and a loss of shutdown cooling event.</td></tr>
<tr><td colspan="4">Description: On February 28, 2025, Constellation was preparing to de-energize the safety-related 21 4kV bus during the Unit 2 refueling outage, CC2R26, for a planned bus maintenance outage in accordance with Operating Instruction (OI)-27C, “4.16kV System,” Revision 40. At the time, Unit 2 was in Mode 6, “Refueling,” with the refueling cavity flooded and the 21 LPSI pump, powered from 21 4kV bus, providing shutdown cooling.

On March 1, 2025, at 1:17 a.m., Constellation de-energized the 21 4kV bus, resulting in a loss of shutdown cooling. Constellation entered Abnormal Operating Procedure (AOP) 03B, “Abnormal Shutdown Cooling Conditions” and restored shutdown cooling by starting the 22 LPSI pump.

Constellation conducted a human performance review board and fact-finding review on the operating crew. Constellation concluded that the senior reactor operator leading the electric bus de-energization evolution assumed no loads were present on the 21 4kV bus due to successfully de-energizing other 21 4kV bus electrical load centers throughout the shift. The inspectors reviewed OI-27C and noted that Section 6.8, “De-energizing a 4kV Bus,” Initial Condition A.1, required “All loads on 4kV bus to be de-energized have been evaluated for a loss of power.” The evolution to de-energize the 21 4kV bus was conducted in the main control room. The senior reactor operator leading the evolution did not communicate with all main control room personnel, and no announcement was made prior to de-energizing the bus. Additionally, Constellation concluded that the protected equipment controls used for the plant conditions were not appropriate. Communications with all main control room personnel could have resulted in a challenge to the evolution and appropriate protected equipment controls could have provided an additional barrier to the loss of shutdown cooling.

Corrective Actions: Operators entered AOP-03B and started the 22 LPSI pump to restore shutdown cooling.

Corrective Action References: AR 4841661</td></tr>
<tr><td colspan="4">Performance Assessment:

Performance Deficiency: The inspectors determined that the failure of station operators to evaluate all loads for a loss of power to the 21 4kV bus on March 1, 2025, as required by OI-27C, was a performance deficiency.</td></tr>
</table>

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Human Performance attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, de-energizing the 21 4kV bus resulted in a loss of shutdown cooling. Additionally, this issue is similar to IMC 0612, App E, Example 4.B, in that the procedure error resulted in reactor scram or other transient.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix G, "Shutdown Operations Significance Determination Process." In accordance with Attachment 1, Exhibit 2, the finding resulted in a shutdown initiating event (loss of shutdown cooling) and, therefore, required a Phase 2 evaluation. A Region 1 Senior Reactor Analyst (SRA) performed a risk evaluation for the finding using IMC 0609, Appendix G, Attachment 2, "Phase 2 Significance Determination Process Template for PWR During Shutdown."

The loss of the safety-related 21 4kV bus resulted in the loss of the 21 LPSI pump which was providing shutdown cooling and, therefore, the initiating event likelihood was set to 1.0 in accordance with Table 4. Unit 2 was in Mode 6, "Refueling," with the refueling cavity flooded and in Plant Operating State 3. Therefore, the unit was in a late time window with decay heat relatively low as defined by IMC 0609, Appendix G, "Shutdown Operations Significance Determination Process." The time to boil was estimated to be a nominal eight hours. Although there is no worksheet for Plant Operating State 3 for loss of residual heat removal (RHR), the SRA conservatively used Worksheet 9 for Plant Operating State 2 as a surrogate to be a bounding condition. A dominant core damage sequence was the initiating event likelihood for the loss of RHR with failure to recover RHR before boiling, and failure of reactor coolant system injection. Both loss of RHR sequences resulted in conditional core damage probabilities below E-6. The SRA noted additional considerations that minimized the risk in the existing unit configuration:

- If required, the control room operators could have attempted to re-power the 21 bus and restore the availability of the 21 LPSI, 21 high pressure safety injection and 21 containment spray pumps.
- The high pressure safety injection and containment spray pumps powered by the remaining safety-related bus were both available.
- Time to boil was a nominal eight hours and the unit was in Mode 6 with the cavity flooded, which would provide the operators extra time to recover from the loss of the operating shutdown cooling train using various methods prior to core damage.

The SRA used Table 9, "Counting Rule Worksheet," to determine the risk significance of the finding to be of very low safety significance, Green.

Cross-Cutting Aspect: H.4 - Teamwork: Individuals and work groups communicate and coordinate their activities within and across organizational boundaries to ensure nuclear safety is maintained. Specifically, the senior reactor operator leading the evolution did not communicate nor coordinate with control room personnel prior to de-energizing the 21 4kV bus.

Enforcement:

Violation: Calvert Cliffs TS 5.4.1, "Administrative Controls – Procedures," requires, in part, that written procedures shall be established, implemented, and maintained covering the

applicable procedures recommended in NRC Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Appendix A, Section 3, Step S, requires Procedures for Startup, Operation, and Shutdown of Electrical Systems. OI-27C, “4.16 kV System,” Revision 040, Initial Condition 6.8.A.1, required all loads on the 4kV bus to be de-energized to be evaluated for loss of power.

Contrary to the above, on March 1, 2025, Constellation failed to evaluate all loads for loss of power prior to de-energizing the 21 4kV bus. As a result, the 21 LPSI pump, operating in shutdown cooling mode, was de-energized resulting in a loss of shutdown cooling event.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

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

- On April 15, 2025, the inspectors presented the integrated inspection results to Christopher Smith, Plant Manager, and other members of the licensee staff.
- On March 6, 2025, the inspectors presented the inservice inspection results to Peter Moodie, Site Vice President, and other members of the licensee staff.
- On March 7, 2025, the inspectors presented the 71124.01 radiological hazard assessment and exposure control inspection results to Peter Moodie, Site Vice President, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.04	Calculations		RICT Calculation for 21 13kV Bus OOS	03/10/2025
	Corrective Action Documents	AR 4845726	Emergency License Amendment Request	03/09/2025
	Corrective Action Documents Resulting from Inspection	AR 4839036	NRC ID: BACC Inactive Boric Acid leak from 0-SFP-1030	2/20/2025
	Procedures	OI-21B	1B Diesel Generator	032
71111.05	Corrective Action Documents	AR 4835853	4.0 Critique Section 1 1st Quarter Fire Drill	02/08/2025
	Miscellaneous	Fire Drill Scenario No. 18-05	12' Contractor Plant Area	05/09/2018
71111.08P	Corrective Action Documents Resulting from Inspection	4842602 4841482 4843256 4843374 4840849	Issue Reports	
	Engineering Evaluations	ECP-25-000084	Technical Evaluation for Containment Pedestal No. 5 Moisture Barrier Gaps (IR 04840805)	0
		Framatome Engineering Information Record: 51-9387643	Framatome Safety Evaluation (50.59) Input for SG Tube Flexible Stabilizers Installed at Calvert Cliffs 1 & 2	2
		Framatome Engineering Information Record: 51-9388254	Calvert Cliffs Unit 2 - 2R26 ECT Inspection Plan - 02/25	0
71111.12	Corrective Action Documents	AR 4801524	AOP-09A Actions May Require Periodic Testing	09/13/2024
	Procedures	AOP-9A-1/2	Control Room Evacuation and Safe Shutdown Due to a	02000/021000

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Severe Control Room Fire	
		AOP-9B-1/2	Safe Shutdown Due to a Severe Cable Spreading Room Fire	24/22
		AOP-9X-2	Safe Shutdown Due to a Severe Fire	00100
71111.13	Calculations		RICT Calculation for RPS CH A	02/03/2025
	Procedures	OU-CA-104	Calvert Cliffs Shutdown Safety Management Program	5
71111.15	Calculations	Fukushima NTTF 50.54 (f), Enclosure 2 - 2.1 Flooding 010	LIP Drainage Study Bechtel Calc	10/23/2012
	Corrective Action Documents Resulting from Inspection	AR 4828807	NRC-Identified, Trailers Inside the Swale Area	01/10/2025
	Miscellaneous	ASME OM-2012, Division 1, Mandatory Appendix I	Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants	2012
71111.18	Engineering Changes	ECP-19-000541	Replace Unit 2 Control Rod Drive Logic and Display System	2
		ECP-24-000291	13 kV Service Bus 21 Protection Digital Upgrade	0
		ECP-24-000294	Unit 2 4kV Supervised Fast Bus Transfer Modification	0
	Engineering Evaluations	SE00578	U2 Control Element Drive Logic and Display System Replacement	0
		SE00592	CCNPP Unit 2 Supervised 4kV BOP Fast Bus Transfer	0
71111.20	Miscellaneous		Fact Findings for SDC Personnel	03/01/2025
		CC2R26	Calvert Cliffs Shutdown Safety Plant	001
		Contingency Plan 25-01	2025 Reactor Coolant System Lowered and Reduced Inventory or <30 Minutes Time to Boil Conditions	001
	Procedures	OI-27C	4.16 KV System	40
		OP-4-2	Plant Shutdown from Power Operation to Hot Standby	02700
		OP-5-2	Plant Shutdown from Hot Standby to Cold Shutdown	03200
		OP-7-2	Shutdown Operation	057
		OP-CA-0201	Calvert Cliffs Operating Manual	5
71111.24	Corrective Action	AR 4834411	NRC-Identified: Inadequate SQR Used During STP O8A-1	02/03/2025

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Documents Resulting from Inspection			
	Procedures	STP M-525-AT-2	AFAS Steam Generator Level Transmitter Calibration Check/Calibration	009
71151	Corrective Action Documents Resulting from Inspection	AR 4845833	NRC ID: IRIS Data Form Lacking SFAM Approval Signature	03/16/2025
	Miscellaneous	NRC PI BI01 1Q24-4Q24	NRC PI BI01 1Q24-4Q24	03/31/2025
		NRC PI BI021Q24-4Q24	NRC PI BI02 1Q24-4Q24	03/31/2024