



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

February 9, 2022

Mr. 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: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 –
INTEGRATED INSPECTION REPORT 05000277/2021004 AND
05000278/2021004

Dear Mr. Rhoades:

On December 31, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Peach Bottom Atomic Power Station, Units 2 and 3. On January 28, 2022, the NRC inspectors discussed the results of this inspection with Mr. David Henry, 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 Peach Bottom Atomic Power Station, Units 2 and 3.

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 Peach Bottom Atomic Power Station, Units 2 and 3.

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,

Jonathan E. Greives, Chief
Projects Branch 4
Division of Operating 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 –
 INTEGRATED INSPECTION REPORT 05000277/2021004 AND
 05000278/2021004 DATED FEBRUARY 9, 2022

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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: 05000277/2021004 and 05000278/2021004

Enterprise Identifier: I-2021-004-0140

Licensee: Constellation Energy Generation, LLC

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

Location: Delta, PA 17314

Inspection Dates: October 1, 2021 to December 31, 2021

Inspectors: S. Rutenkroger, Senior Resident Inspector
P. Boguszewski, Resident Inspector
E. Andrews, Technical Assistant
L. Casey, Senior Project Engineer
E. Dipaolo, Senior Reactor Inspector
B. Edwards, Health Physicist
J. Kulp, Senior Reactor Inspector
S. Veunephachan, Health Physicist

Approved By: Jonathan E. Greives, Chief
Projects Branch 4
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 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

Reactor Core Isolation Cooling Turbine Trip Latch			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000278/2021004-01 Open/Closed	[H.6] - Design Margins	71111.15
The inspectors identified a Green non-cited violation (NCV) of Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," when the procedures used to reset the reactor core isolation cooling (RCIC) turbine following surveillance testing did not include sufficient instructions to verify that the turbine reset had been satisfactorily accomplished. Specifically, after tripping and restoring the RCIC turbine from the main control room following routine surveillance testing, the procedure did not provide adequate instructions to ensure that the turbine trip mechanism had proper engagement, which is required to prevent tripping the system on a subsequent system startup.			

Additional Tracking Items

None.

PLANT STATUS

Unit 2 began the inspection period at rated thermal power (RTP). On November 14, 2021, the unit was manually tripped due to lowering condenser vacuum caused by isolation of the offgas system. Following repairs, the unit was restarted on November 15, 2021, and returned to RTP the following day. On November 19, 2021, the unit was down powered to 68 percent for a control rod pattern adjustment and returned to RTP the following day. The unit remained at or near RTP for the remainder of the inspection period.

Unit 3 began the inspection period in end-of-cycle coastdown. On October 24 and 25, 2021, the unit was down powered and then shutdown for a planned refueling outage (RFO). After completing the refueling, the unit was restarted on November 6, 2021, and returned to RTP the following day. On November 9, 2021, the unit was down powered to 66 percent for a control rod pattern adjustment and returned to RTP the following day. The unit remained at or near RTP 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," conducted routine reviews using IP 71152, "Problem Identification and Resolution," 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.

On February 1, 2022, the operating license for Peach Bottom Atomic Power Station, Units 2 and 3, held by Exelon Generation Company, LLC was transferred to Constellation Energy Generation, LLC (Constellation) as documented in the associated license amendments (ML22021B660). While some or all of the inspection documented in this report was performed while the license was held by Exelon Generation Company, LLC, this report will refer to the licensee as Constellation throughout.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

External Flooding Sample (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated that flood protection barriers, mitigation plans, procedures, and equipment are consistent with the licensee's design requirements and risk analysis assumptions for coping with external flooding on December 20, 2021

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (2 Samples)

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

- (1) Unit 3 high-pressure coolant injection (HPCI) during Unit 3 RCIC testing on November 30, 2021
- (2) Unit 2 HPCI during Unit 2 RCIC maintenance on December 28, 2021

Complete Walkdown Sample (IP Section 03.02) (1 Sample)

- (1) Unit common 'E-3' emergency diesel generator (EDG) with a focus on power and control cable routing on December 15, 2021

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (4 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 3 drywell area, PF-28 on October 26, 2021
- (2) Unit 3 torus room, PF-13C on October 30, 2021
- (3) Unit 2 165' general area, PF-5J on November 19, 2021
- (4) Unit 3 'B' residual heat removal (RHR) pump room, PF-10 on December 27, 2021

71111.08G - Inservice Inspection Activities (BWR)

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

- (1) 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 from October 26, 2021 to October 29, 2021:

03.01.a - Nondestructive Examination and Welding Activities

1. Ultrasonic examination of the Standby Liquid Control Nozzle to Shell Weld (N10) (3R23-ISI-UT-015)
2. Phased Array Ultrasonic Examination of the Standby Liquid Control Nozzle to Safe End Weld 4-N10-1 (3R23-ISI-VN-001)
3. Magnetic Particle Examination of Core Spray Welded Attachment 14GB-H58(IA) (3R23-ISI-MT-001)
4. Magnetic Particle Examination of Core Spray Valve MO-3-14-026B (3R23-BOP-MT-006)

5. Review of EC 629854 Torus Pitting Evaluation
6. Replace Core Spray Valve MO-3-14-026B (WO 4979440)

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

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

- (1) The inspectors observed and evaluated licensed operator performance in the control room during the planned Unit 3 shutdown for refueling on October 24 and 25, 2021, and the subsequent startup on November 5, 2021

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

- (1) The inspectors observed and evaluated licensed operator requalification training in the simulator on December 6, 2021

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

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

- (1) Unit 2 main steam system on December 2, 2021
- (2) Unit 2 HPCI on December 13, 2021

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (6 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 common 'E-3' 24-hour endurance run on October 20, 2021
- (2) Unit 3 reduced inventory during reactor disassembly on October 26, 2021
- (3) Unit 3 'B' RHR in alternate decay heat removal mode, '3C' station battery discharge testing, and 'E-33' bus and 'E-3' EDG testing on October 27, 2021
- (4) Unit 3 reactivity controls during control rod blade and drive mechanism replacements on October 29, 2021
- (5) Unit 3 'E-33' bus maintenance with a focus on Unit 2 action green risk on October 30, 2021
- (6) Unit 3 reduced inventory during reactor reassembly on November 4, 2021

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (7 Samples)

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

- (1) Unit common 'E-2' EDG governor control responding abnormally on October 11, 2021
- (2) Unit 3 emergency service water pipe hanger '3-33HB-S63' was found relaxed and not carrying load on October 18, 2021
- (3) Unit common 'E-3' EDG output breaker 'E-32' failed to trip on October 20, 2021
- (4) Unit 3 RCIC trip throttle valve latch was not fully engaged on October 20, 2021
- (5) Unit 3 multiple control rods did not initially display position indication following insertion on October 25, 2021
- (6) Unit 2 high-pressure service water system Unit 2 to Unit 3 crosstie valve 'HV-3-32-5186B' in intermediate position on November 2, 2021
- (7) Unit common 'E-1' EDG tripped on overspeed during shutdown on November 2, 2021

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (2 Samples)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Unit 3 RCIC trip throttle valve disc replacement on November 29, 2021
- (2) Unit 3 first load of 'GNF-3' nuclear fuel assemblies on November 30, 2021

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (7 Samples)

The inspectors evaluated the following post-maintenance test activities to verify system operability and functionality:

- (1) Unit common 'E-3' EDG following gear drive replacement on October 6, 2021
- (2) Unit common 'E-2' EDG following maintenance on October 12, 2021
- (3) Unit common 'E-3' EDG following high resistance conductor repair on October 21, 2021
- (4) Unit 3 RCIC turbine overspeed trip test following trip throttle valve maintenance on November 2, 2021
- (5) Unit 3 main steam isolation valves following RFO maintenance activities on November 2, 2021
- (6) Unit 3 RCIC turbine 175 psig test following system maintenance on November 3, 2021
- (7) Unit 3 RHR check valve leak test following repairs on November 5, 2021

71111.20 - Refueling and Other Outage Activities

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

- (1) The inspectors evaluated Unit 3 RFO P3R23 activities from October 25 to November 6, 2021

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (2 Samples)

- (1) Unit 3 high-pressure service water pump, valve, and flow surveillance on December 16, 2021
- (2) Unit common 'E-4' EDG simulated emergency core cooling system auto start test on December 29, 2021

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

- (1) Unit 3 'AO-3-07B-3502A' and 'VBV-3-07B-26A' torus vacuum breaker containment isolation valve leak rate testing on November 2, 2021

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 reviewed the following:

Radiation Work Permits

- PB-3-21-00510
- PB-3-21-00513
- PB-3-21-00543
- PB-3-21-00902
- PB-3-21-00906

Labeling of Containers

- Temporary lead shielding box in Unit 3 reactor building 135' elevation
- Temporary dry active waste storage in Unit 3 reactor building 135' elevation
- Temporary staging of portable local leak rate test cart outside Unit 3 drywell personnel hatch
- Temporary staging of torus led lights outside Unit 3 hot tool room

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 the Unit 3 RFO
- (2) Observed licensee 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) Observed Unit 3 reactor cavity draindown
- (2) Observed Unit 3 reactor cavity decontamination
- (3) Observed Unit 3 reactor reassembly
- (4) Observed worker briefings for entry into high radiation areas and contaminated areas

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 and Very High Radiation Areas:

- (1) Unit 3 drywell entrance
- (2) Unit 3 recombiner pipe tunnel room
- (3) Unit 2 steam jet air ejector 'A' and 'B' rooms

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

71124.02 - Occupational ALARA Planning and Controls

Radiological Work Planning (IP Section 03.01) (4 Samples)

The inspectors evaluated the licensee's radiological work planning for the following activities:

- (1) PB-0-21-00222, ISFSI - Cask Painting Project
- (2) PB-2-20-00543, DW: N16A - Nozzle Weld Repair and Associated Activities
- (3) PB-3-21-00513, P3R23 DW Control Rod Drive Exchange
- (4) PB-3-21-00906, P3R23 Refuel Floor Cavity Decon Activities

Verification of Dose Estimates and Exposure Tracking Systems (IP Section 03.02) (4 Samples)

The inspectors evaluated dose estimates and exposure tracking for the following activities:

- (1) ALARA Plan 20-543, U2 DW N16A Support Activities, Nozzle Weld Repair
- (2) ALARA Plan 21-023, 2021 ISFSI Cask Painting Project
- (3) ALARA Plan 21-513, U2 DW/U3 Reactor Building - CRD Exchange, Support Activities and Transport
- (4) ALARA Plan 21-521, U2 Drywell Power Entry

Implementation of ALARA and Radiological Work Controls (IP Section 03.03) (3 Samples)

The inspectors reviewed as low as reasonably achievable practices and radiological work controls for the following activities:

- (1) Unit 3 reactor cavity draindown
- (2) Unit 3 reactor cavity decontamination
- (3) Unit 3 reactor reassembly

Radiation Worker Performance (IP Section 03.04) (1 Sample)

- (1) The inspectors evaluated radiation worker and radiation protection technician performance during work activities

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified Constellation's performance indicator submittals listed below for the period October 1, 2020 through September 30, 2021:

MS05: Safety System Functional Failures (SSFFs) Sample (IP Section 02.04) (2 Samples)

- (1) Unit 2 SSFFs
- (2) Unit 3 SSFFs

MS06: Emergency AC Power Systems (IP Section 02.05) (2 Samples)

- (1) Unit 2 emergency AC power systems
- (2) Unit 3 emergency AC power systems

OR01: Occupational Exposure Control Effectiveness Sample (IP Section 02.15) (1 Sample)

- (1) Occupational Exposure Control Effectiveness

PR01: Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual
Radiological Effluent Occurrences (RETS/ODCM) Radiological Effluent Occurrences Sample
(IP Section 02.16) (1 Sample)

- (1) Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual
Radiological Effluent Occurrences

71152 - Problem Identification and Resolution (PI&R)

Semiannual Trend Review (IP Section 02.02) (1 Sample)

- (1) The inspectors reviewed the licensee's corrective action program (CAP) for potential adverse trends in the third and fourth quarters of 2021 that might be indicative of a more significant safety issue

Annual Follow-up of Selected Issues (IP Section 02.03) (2 Samples)

The inspectors reviewed the licensee's implementation of its CAP related to the following issues:

- (1) Unit 2 unplanned down power to 31 percent in single loop operation when the 'B' reactor recirculation pump reduced to zero speed due to an issue with the adjustable speed drive (ASD) power supply system on December 19, 2020 (Issue Report (IR) 4391299)
- (2) Replacement Drywell Chiller Unreliability due to Unexpected Trips (IR 4350131, IR 4362654, and IR 4392114)

71153 - Follow Up of Events and Notices of Enforcement Discretion

Personnel Performance (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated an unplanned manual scram of Unit 2 due to lowering condenser vacuum caused by isolation of the offgas system and Constellation's performance on November 14, 2021

INSPECTION RESULTS

Reactor Core Isolation Cooling Turbine Trip Latch			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000278/2021004-01 Open/Closed	[H.6] - Design Margins	71111.15
The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," when the procedures used to reset the RCIC turbine following surveillance testing did not include sufficient instructions to verify that the turbine reset had been satisfactorily accomplished. Specifically, after tripping and restoring the RCIC turbine from the main control room following routine surveillance testing, the procedure did not provide adequate instructions to ensure that the turbine trip mechanism had proper engagement, which is required to prevent tripping the system on a subsequent system startup.			
<u>Description:</u> The RCIC system consists of a turbine, pump, piping, valves, and instrumentation designed to assure that sufficient reactor water inventory is maintained in the reactor vessel to permit adequate core cooling to take place and prevent fuel overheating should the vessel be isolated and either maintained in hot standby, experience a loss of feedwater, or to complete a plant shutdown with a loss of normal feedwater. The RCIC turbine is equipped with a mechanical overspeed trip assembly. When activated, the			

overspeed trip system will shut off the flow of steam to the turbine, via the turbine's trip and throttle valve, and allow the turbine and its driven equipment to come to a stop. The overspeed trip device consists of a tappet, spring, and tappet nut, connected by a mechanical trip linkage to a trip hook and trip latch. When the turbine trip is reset, the trip hook and trip latch are engaged to allow the motor operator to move the valve stem of the turbine trip throttle valve, which allows steam to flow to the RCIC turbine. When the trip latch and trip hook are disengaged, the closing spring forces the stem of the trip and throttle valve to close, isolating steam to the RCIC turbine. The RCIC turbine can also be tripped remotely from the main control room. This remote trip utilizes a solenoid to move the trip hook, unseating it from the trip latch, while sending a close signal to the motor operated trip and throttle valve. This would also isolate steam to the RCIC turbine.

On October 19, 2021, the licensee was performing surveillance testing on the RCIC turbine. The testing directed operators to trip the RCIC turbine via the remote trip in the main control room. Once the test had been completed the operators used procedures to reset the trip from the main control room by cycling the trip and throttle valve, which reengages the trip latch and hook. The licensee's procedures did not require visual verification in the field of the trip hook and latch to verify proper engagement. On October 20, 2021, the inspectors identified that the RCIC trip latch and hook were not fully engaged. Based on industry operating experience in which inadequate engagement of the trip latch resulted in system trips, the inspectors questioned operators on the acceptability of the observed engagement. The station determined that there was between 40-45 percent engagement between the trip hook and trip latch. Constellation procedures and Electric Power Research Institute (EPRI) both specify the engagement between trip latch and trip hook should be complete, with EPRI guidance also stating that the contact of the trip hook and latch should be at least 75 percent of the surface area. This complete engagement is specified in order to prevent unwanted RCIC turbine trips upon system startup.

Corrective Actions: Immediate corrective actions included tripping and resetting the RCIC turbine with operators in the field to verify complete trip hook and latch engagement. Additionally, operations published a standing order requiring visual inspection of the RCIC trip hook and latch engagement after the turbine is tripped and reset, before the system can be declared operable. The issue was entered into the CAP so that more comprehensive corrective actions could be identified such as implementing permanent procedure changes.

Corrective Action References: IR 4454364

Performance Assessment:

Performance Deficiency: The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," when the procedures used to reset the RCIC turbine following surveillance testing did not include sufficient instructions to verify that the turbine reset had been satisfactorily accomplished. Specifically, after tripping and restoring the RCIC turbine from the main control room following routine surveillance testing, the procedure did not provide adequate instructions to ensure that the turbine trip mechanism had proper engagement, which is required to prevent tripping the system on a subsequent system startup.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Procedure Quality attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable

consequences. Specifically, the licensee's procedure for resetting a RCIC trip following testing did not contain sufficient guidance to ensure the RCIC trip hook and latch were fully engaged after remotely tripping the system from the main control room. Incomplete engagement of the trip hook and latch could result in the hook and latch becoming uncoupled upon a RCIC start, causing the RCIC system to trip and be unable to fulfill its safety function. Also, this is similar to example 3.g in IMC 0612, Appendix E, in which there was a reasonable doubt of availability, reliability or capability of RCIC when this condition was first identified by the NRC inspectors. Specifically, inadequate engagement of the trip latch could impact the potential for a spurious trip to occur, negatively impacting its reliability.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding did not represent an actual loss of function of RCIC for greater than its technical specification allowed outage time, so inspectors determined the finding was of very low safety significance (Green).

Cross-Cutting Aspect: H.6 - Design Margins: The organization operates and maintains equipment within design margins. Margins are carefully guarded and changed only through a systematic and rigorous process. Special attention is placed on maintaining fission product barriers, defense-in-depth, and safety related equipment. Specifically, the RCIC system testing procedures did not include instructions to verify that the trip mechanism latch and hook engagement was adequately restored before returning the system to service.

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that procedures shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. Contrary to the above, on October 11, 2021, procedures used to reset the RCIC turbine following surveillance testing did not include sufficient instructions to verify that the turbine reset had been satisfactorily accomplished. Specifically, after tripping and restoring the RCIC turbine from the main control room following routine surveillance testing, the procedure did not provide adequate instructions to ensure that the turbine trip mechanism had proper engagement, which is required to prevent tripping the system on a subsequent system startup.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Observation: Replacement Drywell Chiller Unreliability due to Unexpected Trips (IR 4350131, IR 4362654, and IR 4392114)	71152
The inspectors performed an in-depth review of Constellation's actions and extent-of-condition reviews when replacement drywell chillers experienced trips and other unexpected conditions that affected system reliability. Engineering Change (EC) 621002, Drywell Chiller Replacement, replaced the Units 2 and 3 drywell chillers in the drywell chilled water system with new units to address aging, low margin, and reliability with the original chillers. The new chillers experienced automatic trips due to failures of the associated chillers' service water control valve to fully open due to stem/disc separation and a trip of a drywell chiller supply circuit breaker during swapping of chillers. Other performance issues included reduced margin due to Unit 3's drywell bulk average temperature being artificially elevated due to failed temperature sensors, elevated drywell temperatures due to drywell cooler heat transfer issues, and elevated drywell heat input due to deficient or missing drywell insulation. Some of	

these issues resulted in Off Normal and Emergency Operating Procedure entries due to high drywell temperature.

The inspectors reviewed Constellation's actions to address chiller service water control valve failures documented in IRs 4350131 and 4362645. Stem/disc separation issues were caused by the valves' anti-rotation pin coming loose and dislodging. The licensee worked with the vendor, redesigned the valve, and replaced the affected service water control valves including those associated with the main control room chillers that were of the same design. The licensee addressed the drywell chiller supply circuit breaker trip experienced during swapping of chillers in IR 4392114. The supply breaker had little to no margin to the instantaneous trip setpoint during compressor startup sequence under certain conditions. The inspectors reviewed EC 621002, "Drywell Chiller Replacement-Unit 2 and Unit 3," Revision 7, that modified the drywell chiller supply breaker instantaneous trip settings to account for low margin and reviewed circuit coordination curves for adequate circuit protection and reliable equipment operation.

The licensee also established a multi-disciplined Drywell Chiller Focus Team in December 2020 to resolve open issues with the drywell chilled water system and to plan actions to improve material conditions of the system, improve system margins, and to improve reliability. Actions taken during the Fall 2021 Unit 3 RFO included: 1) inspected, replaced and/or repaired drywell insulation; 2) chemically cleaned drywell cooler heat exchangers; 3) implemented repairs to improve drywell cooler air flow; and 4) repaired failed drywell bulk temperature detectors. These actions resulted in improved operating margin. For example, historically, 14 drywell unit coolers were required to be in operation to maintain acceptable drywell bulk average temperature. Following the implementation of the improvements, 7 drywell unit coolers were required to be in operation. Similar actions were planned for Unit 2 during the Fall 2022 RFO. At the time of the inspection, Constellation also planned future additional actions to improve margin including upgrading the drywell chilled water pumps to increase drywell chilled water system flow and to selectively replace degraded drywell unit coolers.

The NRC inspectors did not identify any findings or violations of more than minor significance.

Observation: Unit 2 Adjustable Speed Drive Power Supply System Issue	71152
<p>The inspectors performed an in-depth review of Constellation's actions and extent-of-condition reviews when the Unit 2 'B' recirculation pump speed reduced to zero caused by a malfunction in the ASD power supply system. On December 19, 2020, the Unit 2 'B' ASD unexpectedly shutdown causing a loss of recirculation flow from the 'B' recirculation pump. This caused the unit to be in single loop recirculation flow and reduced power to 30 percent. The ASD alarms indicated a controller swap from NGX-A to NGX-B in response to an instantaneous overcurrent. The ASD did not trip, but shutdown due to a malfunction.</p>	
<p>The licensee implemented repairs and performed a corrective action program evaluation. Technicians replaced NGX-A and verified wiring connections on the NGX-B signal conditioning board, fiber converter, and communication modules. Following testing, the 'B' ASD was restarted, and the unit was restored to RTP on December 21, 2020. The licensee sent NGX-A to the vendor for failure testing. The vendor determined the hardware was functioning properly and passed all bench testing. The vendor performed a cause evaluation which determined the malfunction was caused by digital corruption. The software relies upon a motor speed feedback loop involving the repetitive writing and reading of data. A review of the data log showed a large instantaneous step change increase in the recirculation pump</p>	

motor speed which indicated a loss of phase lock to the motor and not an actual speed change. This resulted in a large current detected by the software initiating the swap to NGX-B. However, since the fault was in the feedback data provided to both controllers, NGX-B also responded by driving speed demand to zero. The vendor determined that a firmware timing conflict and/or a data bus contention between address and data lines introduced the invalid data, and the software did not include a data validation routine for motor speed feedback.

Constellation reviewed industry operating experience and identified 30 NGX malfunctions which represented deficiencies impacting ASD system reliability. Constellation determined that an adverse trend existed with ASD NGX that had not been appropriately recognized and addressed. As a result, the licensee engaged the vendor in workshops and collaborative failure analyses to obtain a more thorough understanding of the NGX hardware and software design to identify measures to improve reliability. The vendor expedited the incorporation of a data validation routine for motor speed feedback in the most recent periodic update. The licensee installed the ASD software update in Unit 3 during the Fall RFO in November 2021. Constellation plans to install the update in Unit 2 in the Fall 2022 RFO.

The inspectors reviewed the ASD performance history, Constellation's related evaluations, and the vendor failure analyses and interviewed responsible personnel. The inspectors also reviewed the engineering change packages, software updates, and associated work orders. The inspectors determined that Constellation's corrective actions were commensurate with the safety significance and appropriately addressed the identified software vulnerabilities. The inspectors also determined that Constellation's actions to improve ASD system reliability were appropriately scoped and prioritized.

The NRC inspectors did not identify any findings or violations of more than minor significance.

Observation: Semi-Annual Trend

71152

The inspectors conducted a semi-annual trend review by evaluating sample issues that occurred in the third and fourth quarters of 2021. During the evaluation, the inspectors verified the issues identified were addressed within the scope of the CAP. The inspectors reviewed health reports and related databases for trends and considered prior issues while performing routine walkdowns and attending the plan of the day meetings. No substantive adverse performance trends or repetitive equipment failures were identified during this time.

However, the inspectors' trend review noted an increased number of EDG adverse conditions during the period. The issues included excessive lube oil consumption, abnormal lube oil leaks, abnormal jacket water leakage, a high resistance in a low voltage control circuit conductor causing loss of function, an unexpected overspeed trip during shut down, governor drive gears with unacceptable backlash, erratic governor operation, and battery system ground issues. Many of the issues required correction promptly or otherwise within the priority work list process and involved significant maintenance and station follow-up.

The inspectors reviewed the deficiencies to identify common causes, extent-of-condition concerns, and aging management considerations. During this inspection, the inspectors did not identify a performance deficiency for the selected issues. However, from this review the inspectors determined further assessment for commonality was warranted and noted that Constellation is performing a holistic review of system performance.

Based on the overall results of the semi-annual trend review, the inspectors determined that Constellation had identified adverse trends at Peach Bottom Atomic Power Station before

they could become more significant safety problems. The inspectors continue to monitor the CAP and maintenance effectiveness during routine inspection activities.

EXIT MEETINGS AND DEBRIEFS

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

- On January 28, 2022, the inspectors presented the integrated inspection results to Mr. David Henry, Plant Manager, and other members of the licensee staff.
- On December 10, 2021, the inspectors presented the Occupational ALARA Planning and Controls inspection results to Mr. Matthew Herr, Site Vice President, and other members of the licensee staff.
- On November 5, 2021, the inspectors presented the Radiological Hazard Assessment and Exposure Controls 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
71111.11Q	Procedures	GP-2-3	Normal Plant Start-up	Revision 29
		GP-3-3	Normal Plant Shutdown	Revision 23
71111.13	Corrective Action Documents Resulting from Inspection	AR 4458471		
	Miscellaneous	Technical Specification 3.10.5	Single Control Rod Drive Removal - Refueling	Amendment No. 214
		Technical Specification 3.10.6	Multiple Control Rod Withdrawal - Refueling	Amendment No. 214
		Technical Specification 3.3.1.1	Reactor Protection System Instrumentation	Amendment No. 281
		Technical Specification 3.3.1.2	Wide Range Neutron Monitoring Instrumentation	Amendment No. 224
	Procedures	ER-AA-600-1043	Shutdown Risk Management	Revision 7
		GP-26	Coordination of HCU, CRB, CRD, DBG, and PIP Work During a Refuel Outage	Revision 24
		ST-O-098-02D-3	Daily Surveillance Log Mode 4 or 5	Revision 25
		Technical Specification 3.9.5	Control Rod Operability - Refueling	Amendment No. 281
	71111.15	Corrective Action Documents	AR 4453683	
AR 4457427				
IR 4452313				
IR 4454290				
IR 4454298				
IR 4455401				
		IR 4457854		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Miscellaneous	EC 634790	Pre-Evaluate Unit 3 ESW Piping Supports Ref WO 04328547	Revision 0
	Work Orders	04328547		
71111.18	Corrective Action Documents	537538, 4457158		
	Corrective Action Documents Resulting from Inspection	4462143		
	Miscellaneous	EC 629260		
		EC 629261		
		Engineering Change Request 06-00415		
Work Orders	0965425, 04251660			
71111.19	Procedures	ST-M-01A-471-3	MSIV Timing Springs Only Closure and Position Switch Adjustment	Revision 16
		ST-O-07G-470-3	MSIV Closure Timing	Revision 18
		ST-O-07G-475-3	MSIV Closure Timing at Shutdown	Revision 4
71111.22	Procedures	ST/LLRT 30.07B.03	Torus Vacuum Breaker (AO-3-07B-3502A, VBV-3-07B-26A)	Revision 7
	Work Orders	04988989		
71124.01	Corrective Action Documents	04457862		
71124.02	Miscellaneous		P3R22 Radiation Protection Outage Report	
			P2R23 Radiation Protection Outage Report	
	Procedures	RP-AA-401	Operational ALARA Planning and Controls	28
71152	Corrective Action Documents	4350131		
		4353129		
		4353129		
		4362654		
		IR 4430942 IR 4431014		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		IR 4431752 IR 4449153 IR 4454298 IR 4452019 IR 4452313 IR 4454194 IR 4454290 IR 4454795 IR 4454832 IR 4457854		
	Engineering Changes	EC 621002	Drywell Chiller Replacement-Unit 2 and Unit 3	7
	Miscellaneous		Drywell Chilled Water System Health Group Issues/Action Plan	
		EC 634626		
	Work Orders	5170935		