



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

September 4, 2024

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 – REISSUED  
INTEGRATED INSPECTION REPORT 05000277/2024002 AND  
05000278/2024002

Dear David Rhoades:

The U.S. Nuclear Regulatory Commission (NRC) identified an administrative error in NRC Integrated Inspection Report 05000277/2024002 and 05000278/2024002, dated August 14, 2024 (ADAMS Accession No. ML24227A549). In the inspection results section, Non-Cited Violation (NCV) 05000278/2024002-03 did not properly annotate the significance screening process. The paragraph in the NCV has been edited for accuracy. As a result, the NRC has reissued the report in its entirety to correct the error.

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

cc w/ encl: Distribution via LISTSERV

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 – REISSUED  
 INTEGRATED INSPECTION REPORT 05000277/2024002 AND  
 05000278/2024002 DATED SEPTEMBER 4, 2024

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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: 05000277/2024002 and 05000278/2024002

Enterprise Identifier: I-2024-002-0042

Licensee: Constellation Energy Generation, LLC

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

Location: Delta, PA 17314

Inspection Dates: April 1, 2024 to June 30, 2024

Inspectors: S. Rutenkroger, Senior Resident Inspector  
C. Dukehart, Resident Inspector  
B. Edwards, Health Physicist  
J. Schoppy, Senior Reactor Inspector  
A. Taverna, 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. A licensee-identified non-cited violation is documented in report section: 71153.

### List of Findings and Violations

Failure to Remove Refueling Outage Scaffolding			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000278/2024002-01 Open/Closed	[H.5] - Work Management	71111.15
<p>The inspectors identified a Green finding and associated non-cited violation (NCV) of 10 <i>Code of Federal Regulations</i> (CFR) Part 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings,” because Constellation personnel did not accomplish scaffold removal in the Unit 3 sump room of the reactor building. Specifically, the inspectors identified a three-tier scaffold that was required to be removed during the previous refueling outage (RFO), which did not meet clearance requirements from high-pressure coolant injection (HPCI) instrument tubing, was not adequately restrained for online operation, and was not evaluated and approved by engineering for long-term placement.</p>			
B.5(b) Pump Credited for Extensive Damage Mitigation Not Stored According to Procedure			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277,05000278/2024002-02 Open/Closed	[H.9] - Training	71111.15
<p>The inspectors identified a Green finding and associated NCV of 10 CFR 50.155, “Mitigation of Beyond-Design-Basis Events,” when Constellation personnel moved the B.5(b) pump, credited for extensive damage mitigation, to a location not allowed by procedure which was within an area assumed to be affected by the event, did not ensure the pump’s location was tracked, and did not establish a compensatory measure using an alternate pump.</p>			
Untimely Corrective Actions Contributes to Main Steam Isolation Valve (MSIV) Technical Specification (TS) Violation			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000278/2024002-03 Open/Closed	[H.6] - Design Margins	71152A
<p>A self-revealing Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” and associated violation of Unit 3 Technical Specification (TS) 3.6.1.3 was identified. The inspectors determined that, despite several reasonable opportunities, Constellation personnel did not take timely and appropriate corrective actions leading up to the TS violation to preclude its occurrence.</p>			

Unit Scram Due to Degraded Audio Tone Transfer Trip System Communication Cables Caused by Long-Term Cable Tray Degradation			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000277/2024002-04 Open/Closed	[H.1] - Resources	71153
The inspectors identified a self-revealing Green finding because Constellation did not properly accomplish corrective actions to address and disposition undesirable conditions identified in their corrective action program (CAP). Specifically, Constellation did not mitigate or repair damaged cable trays with loose and missing covers which exposed cables to adverse environmental conditions that caused degradation that resulted in a unit scram.			

Loss of Condenser Vacuum Following a Scram Due to an Incorrect Sealing Steam Header Control Valve Setpoint			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277/2024002-05 Open/Closed	None (NPP)	71153
The inspectors identified a self-revealing Green NCV of TS 5.4.1 (a), "Procedures," because Constellation failed to adequately maintain the operating procedure for sealing steam and the off-normal event response procedure for a loss of condenser vacuum. Specifically, the operating procedure did not specify a lower limit for the control pressure setting for the supply of main steam to the sealing steam header which resulted in a loss of sealing steam and main condenser vacuum following a turbine trip. In addition, the response procedure for the loss of condenser vacuum did not provide adequate information for the operators to recover sealing steam header pressure prior to vacuum degradation resulting in a loss of mitigating equipment.			

### Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000278/2023-002-00	Licensee Event Report (LER) 2023-002-00 for Peach Bottom Atomic Power Station (PBAPS), Unit 3, MSIVs Stroke Times Exceed TS Limit	71153	Closed
LER	05000277/2024-001-00	LER 2024-001-00 for PBAPS, Unit 2, Automatic Reactor Scram due to an Invalid Generator Lockout	71153	Closed
LER	05000278/2023-001-00	LER 2023-001-00 for PBAPS, Unit 3, Standby	71153	Closed

		Liquid Control Pump Inoperable for Greater than Limiting Condition for Operation (LCO) Window due to Gas Intrusion		
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## PLANT STATUS

Unit 2 began the inspection period at rated thermal power (RTP). On May 3, 2024, the unit was down powered to 52 percent for a control rod pattern adjustment, waterbox cleaning, and main turbine valve testing, and returned to RTP the following day. On May 5, 2024, the unit was down powered to 74 percent for a control rod pattern adjustment and returned to RTP the following day. On June 7, 2024, the unit was down powered to 65 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 at RTP. On May 15, 2024, the '3A' condensate pump tripped which initiated a recirculation pump runback, and the unit was down powered to 55 percent. The condensate pump was restored, and the unit was returned to RTP the following day. On May 29, 2024, the unit was down powered to 57 percent for a control rod pattern adjustment, waterbox cleaning, and main turbine valve testing 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," 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

### 71111.01 - Adverse Weather Protection

#### Impending Severe Weather Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant plant systems cooled by the Units 2 and 3 reactor building closed cooling water systems, and the Unit common turbine building closed cooling water system from impending severe hot weather on June 20, 2024

### 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 common, 'E-1' and 'E-2' emergency diesel generators (EDGs) during 'E-4' EDG planned maintenance on May 23, 2024

- (2) Unit common, 'E-3' and 'E-4' EDGs during 'E-1' EDG planned maintenance on June 13, 2024

#### 71111.05 - Fire Protection

##### Fire Area Walkdown and Inspection Sample (IP Section 03.01) (3 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 2, fire area PF-57, reactor building refuel floor on April 23, 2024
- (2) Unit 3, fire area PF-55, reactor building refuel floor on April 24, 2024
- (3) Unit 2, fire area PF-59, HPCI room on June 13, 2024

#### 71111.11A - Licensed Operator Requalification Program and Licensed Operator Performance

##### Requalification Examination Results (IP Section 03.03) (1 Sample)

- (1) The inspectors reviewed and evaluated the licensed operator examination results on April 4, 2024, for the requalification annual operating exam completed on March 28, 2024

#### 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 response to an unplanned trip of the '3A' condensate pump and subsequent recirculation pump runback on May 15, 2024

##### 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 May 13, 2024

#### 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 2, reactor core isolation cooling (RCIC) through April 10, 2024

##### Quality Control (IP Section 03.02) (1 Sample)

The inspectors evaluated the effectiveness of maintenance and quality control activities to ensure the following SSC remains capable of performing its intended function:



- (1) Unit common, quality control of parts during the 'E-1' EDG 4-year preventative maintenance activity on June 12, 2024

#### 71111.13 - Maintenance Risk Assessments and Emergent Work Control

##### Risk Assessment and Management Sample (IP Section 03.01) (4 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-2' EDG supplemental fan planned maintenance on May 2, 2024
- (2) Unit common, station black out bus planned outage on May 14, 2024
- (3) Unit common, 'E-4' EDG air cooler heat exchanger tube bundle replacement on May 22, 2024
- (4) Unit common, 'E-1' EDG planned maintenance on June 11, 2024

#### 71111.15 - Operability Determinations and Functionality Assessments

##### Operability Determination or Functionality Assessment (IP Section 03.01) (10 Samples)

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

- (1) Unit 2, reactor building door 197 breached open on April 9, 2024
- (2) Unit 3, three-tier scaffold in the reactor building sump room was not laterally braced in all directions on April 18, 2024
- (3) Unit common, the B.5.b. pump '00P432' was moved to a location that was not approved by procedure on April 24, 2024
- (4) Unit 2, combined intercept valves #2 and #6 did not show fast closure via position indication trends on May 3 and 4, 2024
- (5) Unit common, the B.5.b pump '00P432' battery charger was unplugged on May 22, 2024
- (6) Unit 3, HPCI steam drain valves failed stroke time requirements on May 28, 2024
- (7) Unit 3, HPCI high thrust bearing temperature on June 1, 2024
- (8) Unit common, 'E-1' EDG total indication runout measurements found out of tolerance for the vertical drive spring pack on June 10, 2024
- (9) Unit common, 'E-4' EDG governor oil leak on June 19, 2024
- (10) Unit 2, the '2C' number 2 battery charger did not come up to scale on June 24, 2024

#### 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 common, water treatment plant modifications and temporary relocation of plant equipment on April 24, 2024

- (2) Unit 3, reviewed and evaluated a permanent modification to the classification of the 'E-4' EDG lube oil waterbox sealing o-ring on May 29, 2024

#### 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) (8 Samples)

- (1) Unit common, 2 start up emergency cable repair and remote breaker trip function testing on April 4, 2024
- (2) Unit common, 'E-2' EDG supplemental fan preventative maintenance on May 2, 2024
- (3) Unit common, technical support center emergency ventilation preventative maintenance on May 6, 2024
- (4) Unit common, station black out cable repair on May 16, 2024
- (5) Unit common, 'E-4' EDG air cooler heat exchanger tube bundle replacement on May 23, 2024
- (6) Unit 3, RCIC steam trap internals replacement on May 30, 2024
- (7) Unit common, 'E-1' EDG 4-year preventative maintenance on June 16, 2024
- (8) Unit 2, '2C' number 2 battery charger maintenance on June 27, 2024

#### Surveillance Testing (IP Section 03.01) (1 Sample)

- (1) Unit common, 'E-1' diesel generator slow start full load test on April 3, 2024

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

- (1) Unit 2, '2B' loop residual heat removal (RHR) pump, valve and flow and in-service test on April 9, 2024

#### Reactor Coolant System Leakage Detection Testing (IP Section 03.01) (1 Sample)

- (1) Unit 2, monitored for increased drywell unidentified leakage as of June 27, 2024

#### Diverse and Flexible Coping Strategies (FLEX) Testing (IP Section 03.02) (1 Sample)

- (1) Unit common, flex tow vehicle functional test on May 1, 2024

### **RADIATION SAFETY**

#### 71124.03 - In-Plant Airborne Radioactivity Control and Mitigation

#### Permanent Ventilation Systems (IP Section 03.01) (1 Sample)

The inspectors evaluated the configuration of the following permanently installed ventilation systems:

- (1) Unit 3, refuel floor ventilation system

Temporary Ventilation Systems (IP Section 03.02) (1 Sample)

The inspectors evaluated the configuration of the following temporary ventilation systems:

- (1) Various high-efficiency particulate air units assigned to the Hot Shop area

Use of Respiratory Protection Devices (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated the licensee's use of respiratory protection devices

Self-Contained Breathing Apparatus for Emergency Use (IP Section 03.04) (1 Sample)

- (1) The inspectors evaluated the licensee's use and maintenance of self-contained breathing apparatuses

71124.04 - Occupational Dose Assessment

Source Term Characterization (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated licensee performance as it pertains to radioactive source term characterization

External Dosimetry (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated how the licensee processes, stores, and uses external dosimetry

Internal Dosimetry (IP Section 03.03) (2 Samples)

The inspectors evaluated the following internal dose assessments:

- (1) Radioactive material intakes from sandblasting tent activities
- (2) Radioactive material intake from assisting the doffing of person protective equipment at step off pad

Special Dosimetric Situations (IP Section 03.04) (2 Samples)

The inspectors evaluated the following special dosimetric situations:

- (1) Review packet for declared pregnant worker from December 2023
- (2) Reviewed packet for declared pregnant worker from March 2024

## **OTHER ACTIVITIES – BASELINE**

### 71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

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

- (1) Unit 2, April 1, 2023 to March 31, 2024
- (2) Unit 3, April 1, 2023 to March 31, 2024

#### BI02: RCS Leak Rate Sample (IP Section 02.11) (2 Samples)

- (1) Unit 2, April 1, 2023 to March 31, 2024
- (2) Unit 3, April 1, 2023 to March 31, 2024

### 71152A - Annual Follow-up Problem Identification and Resolution

#### Annual Follow-up of Selected Issues (Section 03.03) (1 Sample)

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

- (1) MSIVs Slow Stroke Times

### 71152S - Semiannual Trend Problem Identification and Resolution

#### Semiannual Trend Review (Section 03.02) (1 Sample)

- (1) The inspectors conducted a semiannual trend review by evaluating sample issues that occurred in the first and second quarters of 2024

### 71153 - Follow Up of Events and Notices of Enforcement Discretion

#### Event Report (IP Section 03.02) (3 Samples)

The inspectors evaluated the following licensee's event reporting determinations to ensure it complied with reporting requirements.

- (1) LER 05000278/2023-001-00, "Standby Liquid Control Pump Inoperable for Greater than LCO Window due to Gas Intrusion," (ADAMS Accession No. ML23311A061). The inspectors determined that the cause of the condition described in the LER was not reasonably within the licensee's ability to be foreseen and corrected and therefore was not reasonably preventable. Therefore, no performance deficiency (PD) was identified by the inspectors. Constellation identified a violation which is dispositioned in this report under the Inspection Results section as a licensee-identified NCV. This LER is closed.

- (2) LER 05000278/2023-002-00, "MSIVs Stroke Times Exceed TS Limit," (ADAMS Accession No. ML23348A260). A Green self-revealing finding was identified during the review of an associated annual sample and is documented under the Inspection Results section of this report as an NCV and associated TS 3.6.1.3 violation. This LER is closed.
- (3) LER 05000277/2024-001-00, "Automatic Reactor Scram Due to an Invalid Generator Lockout," (ADAMS Accession No. ML24081A121). The inspection conclusions associated with this LER are documented in this report under Inspection Results section as a self-revealing Green finding and NCV. This LER is closed.

Personnel Performance (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated the Unit 3 recirculation pump runback to 45 percent caused by the trip of the '3A' condensate pump trip and Constellation's performance on May 15, 2024

**INSPECTION RESULTS**

Failure to Remove RFO Scaffolding			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000278/2024002-01 Open/Closed	[H.5] - Work Management	71111.15
<p>The inspectors identified a Green finding and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," because Constellation personnel did not accomplish scaffold removal in the Unit 3 sump room of the reactor building. Specifically, the inspectors identified a three-tier scaffold that was required to be removed during the previous RFO, which did not meet clearance requirements from HPCI instrument tubing, was not adequately restrained for online operation, and was not evaluated and approved by engineering for long-term placement.</p> <p><u>Description:</u> On April 18, 2024, the inspectors identified a scaffold in the Unit 3 sump room that was not constructed in accordance with procedures. The scaffold was a three-tier scaffold with a minimum required clearance of six inches in any unrestrained direction and one inch in any restrained direction. The inspectors identified multiple locations that did not meet the required clearances at the height of the third tier. Specifically, the scaffold was not restrained in the north-south (N-S) direction and multiple spans of unprotected safety-related HPCI instrument tubing were within one to four inches of the top deck plating on the west side of the structure in the N-S direction. In addition, two tubing runs contained within a Unistrut channel were about 9/16 inches away from deck plating on the east side of the structure in the N-S direction. A lack of adequate clearance between scaffolding/decking and instrumentation tubing can affect the safety function of HPCI given a seismic event if scaffold movement impacted or ruptured tubing that provided pressure or flow rate feedback for control and/or actuated a system isolation.</p> <p>As a result of the inspectors' identified issues and questions, Constellation removed the scaffold impacting HPCI. Constellation later determined that operability of the equipment was maintained. Constellation concluded that scaffold movement would be inhibited by the smallest clearance area with the Unistrut channel, and the channel would remain intact since the scaffold did not include or support any high mass equipment such that the tubing would</p>			

not be damaged. Constellation also performed a work group evaluation (WGE) and an extent of condition review. Constellation determined that the scaffold had been documented as being removed at the end of the prior Unit 3 RFO in October 2023. Constellation performed additional walkdowns and identified eight additional scaffolds that were not identified or tracked in any documentation or system that were required to be removed.

Constellation procedure MA-MA-796-024-1001, states that, scaffolds shall not be in contact with nuclear safety-related pipes, valves, equipment, pipe hangers, snubbers, conduit, cable trays, instrumentation, tubing, or duct work, and further requires a minimum of one inch of clearance to always be maintained for all scaffolds, whether free-standing or braced, and requires varying minimum clearances for unrestrained directions based on building and elevation. Any case in which these criteria are not maintained requires engineering review and approval which was neither requested nor performed. Finally, MA-AA-716-025, "Scaffold Installation, Modification, and Removal Request Process," requires that, scaffolds be removed before exceeding 90 days or be reviewed and approved as a permanent scaffold. However, none of the scaffolds had been reviewed and approved for permanent or longer-term installation when installed for more than 90 days.

Corrective Actions: Constellation removed the scaffold which corrected the installation beyond 90 days without proper review and approval and resolved the inadequate clearance issues.

Corrective Action References: Issue Report (IR) 4767567

Performance Assessment:

Performance Deficiency: The inspectors determined that Constellation's failure to maintain scaffolding in accordance with procedures by not maintaining required restraint and clearance combinations and not tracking and removing the scaffold when required was reasonably within Constellation's ability to foresee and correct and should have been prevented and therefore was a PD.

Screening: The inspectors determined the PD was more than minor because it was associated with the Design Control 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. The inspectors also noted that the PD was similar to Example 4.a of IMC 0612, Appendix E. Specifically, the issues did not have a pre-approved engineering evaluation to assess seismic impact of the scaffold onto safety-related equipment. Instrument tubing contained within Unistrut had potential to be subject to seismic induced loads that had not been considered in the original analysis because the status and usage of the scaffold was not being tracked or controlled. In addition, the scaffold had potential to contact unprotected instrument tubing on its opposite side which was also not considered in the original analysis. Constellation resolved the concerns by removing the scaffold, similar to IMC 0612, Appendix E, Example 3.a.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The inspectors determined this finding to be of very low safety significance (Green) in accordance with Exhibit 2, because the finding is a deficiency affecting the design or qualification of a mitigating SSC, and the SSC maintained its operability or probabilistic risk analysis (PRA) functionality.

**Cross-Cutting Aspect: H.5 - Work Management:** The organization implements a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. The work process includes the identification and management of risk commensurate to the work and the need for coordination with different groups or job activities. The work management process used for the scheduling, constructing, approving, and removing scaffolds did not establish sufficient control to ensure personnel were aware of the status of scaffolds and properly accomplish the associated activities commensurate with safety significance.

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” states that, “Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.”

Procedure MA-MA-796-024-1001 requires that, all scaffolds maintain a minimum of 1 inch clearance when restrained, that scaffolds are not in contact with nuclear safety-related equipment, and that scaffolds maintain greater clearances in directions of motion when not restrained. MA-AA-716-025 requires that, scaffold installed beyond 90 days be reviewed and approved as permanent scaffolds. Contrary to this, following Unit 3 startup from refueling on October 28, 2023, through April 18, 2024, Constellation personnel did not adequately accomplish scaffold construction, inspection, approval, and removal in the safety-related Unit 3 reactor building sump room. Specifically, the scaffold did not meet minimum required clearances, and the scaffold was installed for greater than 90 days and was not reviewed and approved as permanent scaffolding.

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

**B.5(b) Pump Credited for Extensive Damage Mitigation Not Stored According to Procedure**

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277,05000278/2024002-02 Open/Closed	[H.9] - Training	71111.15

The inspectors identified a Green finding and associated NCV of 10 CFR 50.155, “Mitigation of Beyond-Design-Basis Events,” when Constellation personnel moved the B.5(b) pump, credited for extensive damage mitigation, to a location not allowed by procedure which was within an area assumed to be affected by the event, did not ensure the pump’s location was tracked, and did not establish a compensatory measure using an alternate pump.

Description: 10 CFR 50.155(b)(2) requires extensive damage mitigation guidelines be developed, implemented, and maintained. These strategies and guidelines exist in order to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant impacted by explosions or fire. The strategies and guidelines are required in firefighting, operations to mitigate fuel damage, and actions to minimize radiological release. To meet this requirement, PBAPS credits a B.5(b) pump which is an on-site, self-powered, portable pumping capability

assuming the explosions or fire occurs. Among the requirements for this pump are restrictions on storage and location as described in procedure OP-AA-201-010-1001, “EDMG (B.5.b) Mitigating Strategies Equipment Expectations.”

The pump’s normal storage location was unavailable due to modifications being performed. Since an alternate storage location was not identified, personnel relocated the pump as necessary. On April 24, 2024, the inspectors identified that the pump was placed in a plant area assumed to be impacted by the explosions or fire, contrary to OP-AA-201-010-1001. After the inspectors questioned the storage location, Constellation personnel moved the pump to an alternate location that met the requirements. Constellation determined that the location and storage of the pump during this modification time was not being controlled, tracked, or communicated. In addition, the personnel moving the pump were unaware of the limitations on location, and no signage or other measures were in place to ensure the pump location was correctly maintained and known by Operations shift personnel, in order to be accessible and undamaged during the assumed event.

The inspectors noted that the Diverse and Flexible Coping Strategies (FLEX) pumps were available, capable, and retrievable during this time. However, PBAPS procedures did not explicitly direct retrieval of a FLEX pump as an alternate or provide a timing required to decide to use a FLEX pump. In addition, the uncontrolled relocating of the B.5(b) pump introduced uncertainty with respect to its location which would reasonably impact implementation of the required strategies as personnel searched for and attempted to obtain the potentially blocked and/or damaged B.5(b) pump prior to switching to a decision to retrieve a FLEX pump. Although the inspectors determined the required strategies were adversely affected, the inspectors determined that the strategies were recoverable by being reasonably compensated. Specifically, the additional time required to obtain a FLEX pump is 10 minutes which is less than the available margin of 30 minutes in the most limiting scenario, which remains within the overall 2 hour required implementation time.

Corrective Actions: Constellation moved the B.5(b) pump to a location allowed by procedure.

Corrective Action References: IR 04769128

Performance Assessment:

Performance Deficiency: The inspectors identified a Green finding and associated NCV because Constellation personnel moved the B.5(b) pump, credited for extensive damage mitigation, to a location not allowed by procedure which was within an area assumed to be affected by the event, did not ensure the location of the pump was tracked, and did not establish a compensatory measure using an alternate pump.

Screening: The inspectors determined the PD was more than minor because it was associated with the Protection Against External Factors 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 B.5(b) pump being located in an area assumed to be affected by the event, the pump was credited to mitigate without tracking and without an identified compensatory measure adversely affected the extensive damage mitigation strategies.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix L, “SDP for B.5.b.” The finding screened as of very low safety significance (Green) because the finding was most consistent with the Green example listed in “TABLE 2 –



Significance Characterization.” Specifically, on-site, self-powered, portable pumping capability was recoverable due to the existence of the FLEX pumps which were available, functionally capable, and retrievable within the available margin of the required implementation times.

Cross-Cutting Aspect: H.9 - Training: The organization provides training and ensures knowledge transfer to maintain a knowledgeable, technically competent workforce and instill nuclear safety values. Specifically, Constellation did not ensure personnel were sufficiently knowledgeable of the events the B.5(b) pump mitigates to understand its intended purpose and question proposed relocation areas.

Enforcement:

Violation: Title 10 CFR Part 50.155(b)(2) requires, in part, that strategies and guidelines be implemented and maintained to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant impacted by the event, due to explosions or fire, to include strategies and guidelines in the following areas: (i) Firefighting; (ii) Operations to mitigate fuel damage; and (iii) Actions to minimize radiological release.

Contrary to this, Constellation did not implement and maintain the strategies and guidelines to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant impacted by the event, due to explosions or fire. Specifically, from a date prior to April 24, 2024, the B.5(b) pump was the credited on-site, self-powered, portable pumping capability for performing these strategies and guidelines and was in a location assumed to be affected by the explosions or fire and an alternate means to perform the pumping required of these strategies and guidelines was not developed, implemented, and maintained.

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

Untimely Corrective Actions Contributes to MSIV TS Violation

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000278/2024002-03 Open/Closed	H.6 - Design Margins	71152A

A self-revealing Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” and associated violation of Unit 3 TS 3.6.1.3 was identified. The inspectors determined that, despite several reasonable opportunities, Constellation personnel did not take timely and appropriate corrective actions leading up to the TS violation to preclude its occurrence.

Description: The MSIVs have an active safety function to close automatically to (1) prevent damage to the fuel barrier by limiting the loss of reactor coolant in case of a major leak from the steam piping outside the primary containment, (2) limit release of radioactive materials by closing the nuclear system process barrier in case of gross release of radioactive materials from the reactor fuel to the reactor cooling water and steam, and (3) limit release of radioactive materials by closing the primary containment barrier in case of a major leak from the nuclear system inside the primary containment. Each unit has eight MSIVs, two in each of the four main steam lines, with one valve as close as possible to the primary containment

barrier inside, and the other just outside the barrier. AO-2(3)-02-080A(B)(C)(D) are the inboard MSIVs and AO-2(3)-02-086A(B)(C)(D) are the outboard MSIVs for each of the four main steam lines for Unit 2(3).

During the Unit 3 P3R24 RFO in October 2023, engineering staff determined that two MSIVs (AO-3-01A-086A and AO-3-01A-080B) exceeded their allowable closure time specified in TS Surveillance Requirement (SR) 3.6.1.3.9 (stroking slower than five seconds) and were likely inoperable during some portion of the previous operating cycle. Constellation personnel initiated corrective action IRs 4709935 and 4709937 for these deficiencies. On December 14, 2023, Constellation personnel submitted LER 2023-002-00 for these two inoperable MSIVs. Engineering's associated WGE (4709935-07) determined that the direct cause for the 86A MSIV was dashpot drift over the operating cycle combined with the prior outage speed adjustments (adjustments left the as-left stroke time right at the upper procedure limit of 4.9 seconds). For the 80B MSIV, engineering determined that the direct cause was suspected debris/contamination in the solenoid valve delaying actuation of the valve with normal equipment drift over the operating cycle cited as a contributing cause.

Constellation's short-term corrective actions included: (1) restoring compliance by performing follow-up stroke timing for each MSIV and making adjustments such as dashpot and exhaust restrictor tuning as required; (2) revising the maintenance procedure used to perform MSIV stroke time adjustments to modify the as-left acceptance band to accommodate dashpot drift over the run cycle (4709935-15); and (3) obtaining Plant Health Committee (PHC) approval to proceed forward with a License Amendment Request (LAR) to expand the MSIV stroke time acceptance band from five seconds to seven seconds to provide more testing margin (4709935-16). Constellation's planned long-term corrective actions included: (1) scheduling replacement of the 80B MSIV solenoid valve during P3R25 and sending the removed solenoid valve to their testing facility (Powerlabs) for analysis to verify the suspected cause (4709937-12); (2) performing additional evaluations of the test performance and stroke timing methodology (4709935-23); and (3) submitting the LAR for TS SR 3.6.1.3.9.

TS SR 3.6.1.3.9 requires the MSIVs to close within three to five seconds. Engineering's evaluation confirmed that the Updated Final Safety Analysis Report conservatively utilizes a maximum valve closure time of ten seconds for analyses where the loss of reactor coolant inventory is the controlling variable, which provides conservatism between the TS SR and the analyzed performance. Engineering staff noted that the observed stroke times for the two degraded MSIVs (86A & 80B) were 6.2 seconds or less and therefore within the bounds of their analyses and that the safety function was maintained.

The inspectors concluded that it was reasonable for Constellation personnel to take corrective actions prior to the TS violation to preclude its occurrence in October 2023. This determination was based on inspector review of the CAP history for MSIV stroke time testing, MSIV stroke time test results over the past four PBAPS RFOs (P2R23 – P3R24), and Life Cycle Management (LCM) issue LCM-17-0053, "MSIV Stroke Time Change." Specifically, the inspectors noted that Constellation personnel initiated numerous IRs during the past four RFOs for fast and slow MSIV stroke times found during testing (six IRs in October 2020 in P2R23, four IRs in October 2021 in P3R23, eight IRs in October 2022 in P2R24, and eight IRs in October 2023 in P3R24). The inspectors noted that the recorded MSIV stroke times repeatedly and more frequently exceeded the established administrative limits in the TS surveillance procedure necessitating additional engineering review to ensure TS compliance. Finally, the inspectors noted that LCM-17-0053 was initiated on July 12, 2017, and its problem statement stated, "There is a long standing issue with MSIV stroke times being

outside of the allowable TS limit of 3 – 5 seconds due to the tight acceptance criteria." This results in challenges to Maintenance Rule condition monitoring criteria, and also puts the station at risk of a LER if both MSIVs (inboard and outboard) in the same line fail to meet these requirements." Constellation personnel targeted this LCM project to start in 2025. The inspectors noted the PBAPS TS Bases for TS 3.6.1.3, "PCIVs," states that, the closure time of the MSIVs is the most significant variable from a radiological standpoint.

Corrective Actions: Constellation personnel entered the issue into their CAP. Constellation's short-term corrective actions included adjusting the MSIV stroke times, changing the MSIV maintenance procedure to provide more margin relative to the as-left stroke times, and obtaining PHC approval for an associated TS 3.6.1.1.9 LAR.

Corrective Action References: IRs 4709935 and 4709937

Performance Assessment:

Performance Deficiency: Constellation personnel did not take corrective action so that the Unit 3 MSIVs continued to meet their containment isolation times specified in TSs. It was reasonable to take actions based on MSIV stroke trends prior to a condition where a steam line inboard and outboard MSIV were tested to be out of the TS-required range in the slow direction.

Screening: The inspectors determined the PD was more than minor because it was associated with the SSC and Barrier Performance attribute of the Barrier Integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, Constellation personnel did not take timely action to ensure that the Unit 3 MSIVs continued to meet their containment isolation times specified in TSs.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Because the finding impacted the Barrier Integrity cornerstone, the inspectors screened the finding using Exhibit 3, "Barrier Integrity Screening Questions." The finding screened as a finding of very low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of reactor containment, failure of containment isolation system, failure of containment pressure control equipment, or failure of containment heat removal components.

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. In this case, Constellation personnel did not take timely action to carefully guard the design margin to the TS limits for MSIV fast closure times.

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected.

Contrary to the above, from July 12, 2017, until October 16, 2023, Constellation did not promptly correct a deficiency associated with Unit 3 MSIV containment isolation times.

PBAPS Unit 3 TS LCO for Operation 3.6.1.3, Condition A, requires a main steam line flow path to be isolated within eight hours when one MSIV is inoperable in Modes 1, 2, and 3. TS 3.6.1.3, Condition F, requires the unit to be in Mode 3 within 12 hours, and Mode 4 within 36 hours, if Condition A cannot be met.

Contrary to the above, on October 17, 2023, an engineering evaluation determined that two MSIVs (AO-3-01A-086A & AO-3-01A-080B) did not meet the required TS maximum closure time of greater or equal to five seconds. This determination was based on MSIV stroke time testing performed on October 16, 2023, during the P3R24 RFO. This issue was considered as a condition prohibited by TSs since there was evidence that the condition had existed during plant operations.

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

Observation: Semiannual Trend Review

71152S

The inspectors conducted a semiannual trend review by evaluating sample issues that occurred in the first and second quarters of 2024. 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. The inspectors did not identify any repetitive equipment issues, but did identify one substantive adverse performance trend during this time that was not already identified by Constellation in the area of scaffold construction, tracking, and removal.

- On February 8, 2024, the inspectors identified a two-tier scaffold in contact with Unistrut containing a safety-related instrument line supporting the '3A' core spray pump discharge auto blowdown instrumentation. Constellation modified the scaffold impacting core spray to maintain required clearance.
- On February 15, 2024, the inspectors identified an unrestrained teletower (a portable scaffold) in the Unit 3 sump room adjacent to a HPCI instrument sensing line rack. The teletower had the upper guards installed such that it was susceptible to falling and impacting the instrument rack during a seismic event and was therefore required to be either restrained or located at least its height plus two feet away from safety-related equipment. Constellation moved and restrained the teletower.
- On April 18, 2024, the inspectors identified a three-tier scaffold in the Unit 3 sump room that was not constructed in accordance with procedures, was not being tracked in the scaffold log, and was installed for more than 90 days without review and approval. Constellation removed the scaffold.
- On April 25, 2024, the inspectors identified an A-frame gantry lifting device staged in the Unit 3 reactor building closed loop cooling room which was not restrained and in contact with safety-related electrical conduit. Constellation initially restrained the A-frame and then reviewed and approved its staging in the specific location without restraint.
- On May 24, 2024, Constellation identified eight additional scaffolds that were not being tracked in the scaffold log and could not be determined when they were constructed and whether or not they had been installed for more than 90 days. Constellation removed the scaffolds.

- On June 20, 2024, the inspectors identified an unrestrained teletower in the Unit 3 sump room adjacent to a HPCI instrument sensing line rack for the second time. Constellation removed the teletower from the area.

Constellation procedure MA-MA-796-024-1001, states that, scaffolds shall not be in contact with nuclear safety-related pipes, valves, equipment, pipe hangers, snubbers, conduit, cable trays, instrumentation, tubing, or duct work, and further requires a minimum of one inch of clearance to always be maintained for all scaffolds, whether free-standing or braced, and requires varying minimum clearances for unrestrained directions based on building and elevation. MA-AA-716-026, "Station Housekeeping / Material Condition Program," requires unsecured equipment that is taller than it is wide to be located at least two feet greater than its height away from safety-related equipment. Any case in which these criteria are not maintained requires engineering review and approval. MA-AA-716-025, "Scaffold Installation,

Modification, and Removal Request Process," requires that scaffolds be removed before exceeding 90 days or be reviewed and approved as a permanent scaffold.

Although Constellation determined that operability of the equipment was maintained in each case, the inspectors reviewed the issues and determined that an adverse trend was present. Constellation initiated further actions in the CAP in response to the trend, including obtaining physical tags to identify long-term scaffolds, implementing work process improvements for tracking installed scaffolds, and distributing learnings from crew clock resets to station personnel. The issue regarding the three-tier scaffold in the Unit 3 sump room identified on April 18, 2024, is documented in this report in the Inspection Results section as a Green finding and NCV.

The inspectors evaluated other deficiencies noted above for significance in accordance with the guidance in IMC 0612, Appendix B, "Issue Screening," and Appendix E, "Examples of Minor Issues." In particular, the inspectors determined that during a postulated seismic event any contact with safety-related equipment would have been incidental and not challenge any seismic margins due to small mass, no vulnerable components, no adverse interactions, and/or the inherent limitations to movement that existed. The inspectors concluded the other issues, separate from the Green NCV, were deficiencies not greater than minor in significance and, therefore, are not subject to enforcement action in accordance with the NRC's Enforcement Policy.

Based on the overall results of the semiannual trend review, the inspectors determined that Constellation had entered adverse trends into the CAP at PBAPS in order to address them before they could become more significant safety problems. The inspectors continue to monitor the CAP and maintenance effectiveness during routine inspection activities.

Unit Scram Due to Degraded Audio Tone Transfer Trip System Communication Cables Caused by Long-Term Cable Tray Degradation			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000277/2024002-04 Open/Closed	[H.1] - Resources	71153
The inspectors identified a self-revealing Green finding because Constellation did not properly accomplish corrective actions to address and disposition undesirable conditions			

identified in their CAP. Specifically, Constellation did not mitigate or repair damaged cable trays with loose and missing covers which exposed cables to adverse environmental conditions that caused degradation that resulted in a unit scram.

Description: The main generator audio tone transfer trip (ATTT) system communicates trip information between the PBAPS plant and the switchyard and consists of two redundant drawers, 1 and 2. The ATTT system was installed at both PBAPS units due to the physical distance between each unit and its respective switchyard, which prevented linking the direct current systems of these locations via a direct relay logic linkage. A selection of switchyard and plant lockout relays, pertinent to main generator protection and grid reliability, are connected at the switchyard and the plant. Under normal conditions (no lockout relays tripped at the switchyard or the plant), the ATTT system transmits a constant, audio frequency sinusoidal signal across the cables between the switchyard and plant and plant and switchyard (i.e., a signal in both directions). This transmission is at a specific frequency called a “guard” frequency. If a lockout relay actuates in either the plant or switchyard location, the resultant contact closure prompts the ATTT system to shift its transmitted guard frequency to a different specific audio frequency which is interpreted as a trip signal which actuates the lockout relays in the other location (i.e., switchyard or plant). Therefore, main generator lockout actuations at the plant produce immediate 500 kilovolt (kV) output breaker lockout actuations at the switchyard, and switchyard 500kV output breaker lockout actuations produce immediate main generator lockout actuations at the plant. The need for a specific frequency to be present for a trip condition makes this system more resistant to spurious actuation.

On January 29, 2024, PBAPS Unit 2 experienced a main turbine trip and automatic reactor scram from 100 percent power. This trip was due to an actuation of the main generator ATTT system (drawer 1) which actuated a main generator lockout relay. Constellation conducted a root cause evaluation and determined the most likely cause to be a spurious false ATTT system trip signal resulting from degradation of communication cables between the PBAPS cable spreading room and the south substation. Although the ATTT system filters noise, specific combinations of shorts can be recognized by the system as a valid trip signal. Constellation determined that the subject cables had a combination of intermittent low resistance, hot shorts, and grounds which were the most likely cause of the event. Constellation identified a similar issue that occurred at PBAPS in 2001 in which a frequency shift occurred in the ATTT system. The troubleshooting of the 2001 event identified that a phone pair used by the ATTT system relay was impacted in such a way that the relay received the two shifted tones, one up and the other down, necessary to initiate the breaker trips.

Constellation concluded that staff incorrectly considered the ATTT system to be fail-safe, and therefore, did not appropriately prioritize cable monitoring, response to ATTT system alarms, and corrective actions. Constellation identified three IRs that had been written in the past few years regarding the condition of the ATTT system cable support structures (i.e., outdoor cable trays) that were closed to no actions and a work order that had been open since 2018. The lack of fixing the enclosure issues allowed foreign material and small animals to easily enter the junction box and exposed the cables to the environment (sun and rain), which contributed to the ATTT system spurious trip signal being sent. Loose or missing cable tray covers were identified on January 7, 2014; March 2, 2018; March 3, 2018; and May 23, 2023; with raccoons observed exiting the cable tray through a missing cover. Constellation also identified IRs for ATTT system alarms that lacked adequate investigation on March 21, 2016; April 8, 2018; November 28, 2019; February 18, 2020; and March 28, 2022. Procedure PI-AA-125, “CAP Procedure,” provides personnel direction for using the CAP to take appropriate

corrective actions to address undesirable conditions. PI-AA-125 requires that identified issues to be addressed and dispositioned. Constellation did not take appropriate corrective actions to address and disposition the identified issues.

Corrective Actions: Constellation removed the affected ATTT system (drawer 1) from service with the redundant ATTT system (drawer 2) providing required generator/grid protection. Constellation also inspected and repaired the affected cable tray, completed on June 3, 2024, and initiated actions to identify and correct similar degradation in similar outdoor cable trays. A complete replacement of the Unit 2 ATTT system is scheduled in the P2R25 RFO in the Fall of 2024.

Corrective Action References: IR 4738575

Performance Assessment:

Performance Deficiency: The inspectors determined that Constellation's failure to mitigate or repair damaged cable trays with loose and missing covers prior to the cables degrading to the point that it resulted in a unit scram was reasonably within Constellation's ability to foresee and correct and should have been prevented. Specifically, timely resolution of cable tray issues identified from 2014 through 2023 would have eliminated environmental/wildlife exposure that contributed to degradation of the audio tone system cables that caused the scram.

Screening: The inspectors determined the PD was more than minor because it was associated with the Equipment 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, the failure to address cable tray degradation resulted in degraded cables associated with the ATTT system causing a Unit 2 generator lockout and subsequent reactor scram.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, "The SDP for Findings At-Power." The inspectors determined that the finding screened as very low safety significance (Green) because the finding did not cause both a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition (e.g., loss of condenser, loss of feedwater). Specifically, the cable tray and ATTT system degradation caused the reactor trip, but the finding did not cause a loss of condenser or feedwater.

Cross-Cutting Aspect: H.1 - Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Constellation did not allocate resources to address cable tray degradation and did not conduct cable testing of these cables exposed to the degraded environmental conditions, including the ATTT system cables.

Enforcement: Inspectors did not identify a violation of regulatory requirements associated with this finding.

Loss of Condenser Vacuum Following a Scram Due to an Incorrect Sealing Steam Header Control Valve Setpoint			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277/2024002-05 Open/Closed	None (NPP)	71153
<p>The inspectors identified a self-revealing Green NCV of TS 5.4.1 (a), "Procedures," because Constellation failed to adequately maintain the operating procedure for sealing steam and the off-normal event response procedure for a loss of condenser vacuum. Specifically, the operating procedure did not specify a lower limit for the control pressure setting for the supply of main steam to the sealing steam header which resulted in a loss of sealing steam and main condenser vacuum following a turbine trip. In addition, the response procedure for the loss of condenser vacuum did not provide adequate information for the operators to recover sealing steam header pressure prior to vacuum degradation resulting in a loss of mitigating equipment.</p>			
<p><u>Description:</u> Sealing steam is provided to seal the main turbine shaft, reactor feedwater pump turbine (RFPT) shafts, turbine stop valves, turbine control valves, combined intermediate/intercept valves, and main turbine bypass valve stems. Steam seals prevent air in-leakage to the main condenser as well as prevent radioactive steam from leaking into the atmosphere. For startup conditions (less than 100 psig reactor pressure), sealing steam is provided by the auxiliary steam system (oil-fired boilers). For low load conditions (greater than 100 psig reactor pressure, and including hot shutdown conditions), main steam provides sealing steam to the header. At high load conditions (~700 MWe and greater), the sealing steam header is supplied from the leak off of the high-pressure turbine seals. Control of the sealing steam header pressure varies based on each operating condition. Steam seal header pressure control valve CV-2551 is utilized to maintain steam seal header pressure in a normal band depending on operating mode. CV-2551 is relied upon when sealing steam is being provided by auxiliary steam (startup conditions) or main steam (low load).</p> <p>On January 29, 2024, Unit 2 experienced a main generator lockout, a main turbine trip, and an automatic reactor scram. After approximately four minutes following the scram, condenser vacuum began to degrade. The lowering of condenser vacuum coincided with high off gas flow and loss of turbine steam seal pressure. The operators were initially not aware of the issue until vacuum reached approximately 26" Hgv. The operators then entered OT-106-2, "Condenser Low Vacuum," to address the degrading vacuum trend. At that time, steam seal pressure was not identified as being abnormal. Due to the lowering condenser vacuum, the RFPTs were required to be secured at 20" Hgv about twenty minutes post-scram. In response to lowering condenser vacuum and high off gas flow, the operators first verified loop seals were filled and started the mechanical vacuum pump which slowed the rate of, but did not stop, the lowering of vacuum. As condenser vacuum continued to degrade (approximately 30 minutes after OT-106-2 entry and 40 minutes post-scram), the operators identified that steam seal header pressure was downscale. However, OT-106-2 had no procedural direction for correcting low steam seal header pressure. As vacuum degraded further, the turbine bypass valves locked out at 7" Hgv about 55 minutes post-scram. This required the crew to transition reactor level control to RCIC and reactor pressure control to HPCI in condensate storage tank to condensate storage tank mode of operation. Operators used the sealing steam operating procedure for guidance and performed actions to recover steam seal pressure which restored condenser vacuum. Condenser vacuum reached 5.4" Hgv about one</p>			



hour and fifteen minutes after the scram before slowly recovering. Condenser vacuum remained below 20" Hgv for approximately two hours and twenty minutes in total.

Operations was able to recover sealing steam header pressure upon making an adjustment of PC-2551 pressure setpoint, which controls the position of CV-2551, from the as-found value of below 0 psig to 15 psig. The as-found value of below 0 psig is not the expected pressure setpoint. Per IISCP data sheet for PC-2551, Note #2 states, "Adjust controller to control pressure @ 4 psig setpoint." A 4 psig setpoint would ensure the controller would respond with an open demand signal to the valve upon a lowering header pressure transient and control header pressure within the normal band of 2.5 to 4.5 psig. Per the PC-2551 vendor manual, the pressure setting dial accurately reflects the desired setpoint if the controller is accurately calibrated. Regardless, operations lowered the pressure setting to below 0 psig following startup on October 29, 2022, from the last RFO, when adjusting sealing steam header pressure using existing procedural guidance contained in SO 1H.1.A-2, "Seal Steam Startup and Normal Operation."

Constellation performed a cause evaluation and determined that the cause of the loss of sealing steam was due to PC-2551 setting being set below 0 psig (~7 O'clock position) at the time of the Unit 2 scram. At this pressure setting, CV-2551 did not open to admit main steam to the sealing steam header following trip of the main turbine. Therefore, steam seals were lost, allowing significant air in-leakage and causing condenser vacuum to degrade.

Constellation concluded that the procedural guidance for placing sealing steam in service using main steam was inadequate because it did not limit how low pressure can be set using PC-2551. This created a latent vulnerability for CV-2551 to not open when main steam was relied upon for supplying the sealing steam header. This issue was not apparent under normal operating conditions when the sealing steam header was maintained by leak off from the high-pressure turbine seals (> 700 Mwe). Constellation also determined that OT-106-2 did not provide sufficient information and needed to be revised to include specific direction for correcting steam seal header pressure.

Corrective Actions: Constellation revised operating procedure SO 1H.1.A-2 for sealing steam to include a lower limit of 2.5 psig when adjusting PC-2251 to ensure CV-2551 supplies main steam following a turbine trip and off-normal procedure OT-106-2 to include specific direction for correcting steam seal header pressure.

Corrective Action References: IR 04738912

Performance Assessment:

Performance Deficiency: The inspectors determined that Constellation failed to adequately maintain the operating and off-normal procedures for sealing steam and loss of condenser vacuum, which was reasonably within Constellation's ability to foresee and correct and should have been prevented. Specifically, the operating procedure did not specify a lower limit for the control pressure setting for the supply of main steam to the sealing steam header which resulted in a loss of sealing steam and main condenser vacuum following a turbine trip and the off-normal procedure did not provide adequate direction to resolve degrading condenser vacuum pertaining to sealing steam.

Screening: The inspectors determined the PD 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 inadequate sealing steam operating and response procedures impacted the ability to use main feedwater and bypass valves following a scram.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, "The SDP for Findings At-Power." The inspectors determined this finding required a detailed risk evaluation (DRE) because the amount of time that the finding existed exceeded 24 hours and involved a loss of the normal heat sink, the main condenser.

A Region I senior reactor analyst (SRA) performed the DRE and estimated the increase in core damage frequency (CDF) associated with this PD to be  $6.4E-7/yr$ , or of very low safety significance (Green). This included both internal and external risk considerations.

Background:

The DRE evaluated the impact of the inadequate operating procedure for the sealing steam system. The inadequate procedure resulted in the loss of sealing steam pressure and subsequent degradation of main condenser vacuum following the Unit 2 turbine trip on January 29, 2024. The main RFPTs were required to be secured at 20" Hgv about 20 minutes post-scram and the main turbine bypass valves locked out and closed at 7" Hgv in accordance with the electro-hydraulic control logic approximately 55 minutes post-scram. During a standard turbine trip event and automatic reactor scram, a significant reduction in condenser vacuum is not an expected event. This challenged the normal power conversion system (PCS) mitigating system's ability to respond to the event. Specifically, the RFPTs were initially available, but then were secured due to the vacuum degrading, while the turbine bypass valves became unavailable around 55 minutes into the event. The SRA noted the MSIVs did remain open and available. However, once the turbine bypass valves closed, the torus became the heat sink for the bulk of the reactor decay heat. This DRE models the probabilistic impact of various core damage sequences given the normal heat sink was impacted for a short period of time, degrading the ability of the PCS to perform its function. The SRA noted that operators responded to the lowering condenser vacuum. The operators recognized the loss of sealing steam header pressure and performed actions for vacuum recovery and therefore recovery credit is warranted.

The key risk insight is that after the inappropriate setting adjustment to the sealing steam header pressure setpoint, any subsequent turbine trip or normal transient would degrade into a loss of the PCS function. Thus, the high-pressure reactor feedwater system would be lost as well as the main turbine bypass valves during any transient over the exposure time of this degraded condition. The increase in risk associated with this PD consisted of the elevated probability of a normal turbine trip transient degrading into a failure to recover the condenser heat sink. The risk of this PD was minimized by the actions of the operators to recognize the cause of the degradation of condenser vacuum and subsequently recover the PCS function. The main turbine bypass valves' low vacuum interlock appeared to have cleared relatively quickly as vacuum began increasing after the operators adjusted the sealing steam header pressure setpoint. Subsequently, vacuum slowly increased to the point where RFPT recovery and operation would be supported as well.

Standardized Plant Analysis Risk (SPAR) Model Information and Modifications

The SRA developed the internal and external events risk estimate for the failure to maintain the sealing steam system using System Analysis Program for Hands-On Integrated Reliability Evaluations (SAPHIRE) version 8.2.10, SPAR Model, version 8.82 for PBAPS Unit 2. SPAR model changes and insights to reflect the current nominal as-built, as-operated unit, as well as, this specific condition included the following:

The SRAs applied credit for post-Fukushima FLEX and updated FLEX unreliability parameters to those documented in PWROG-18042-NP, "FLEX Equipment Data Collection and Analysis," Revision 1. The SRA determined this data represents the best estimate for FLEX reliability.

The increase in risk included evaluating all postulated events where the PCS is normally expected to be available (Base case model). This base case would then have to reflect and evaluate a probabilistic failure of plant operators to accurately diagnose and perform actions to recover the PCS (the conditional case). The delta between the two is the increase in risk for the PD.

The SRA noted that operational staff lowered the pressure setting to below 0 psig at some point during the operating cycle, during or following startup on October 29, 2022. A bounding assumption of the maximum exposure time of one year was used for this condition. It is noted once at normal operating conditions the sealing steam header pressure was maintained by leak-off from the high-pressure turbine seals, resulting in a latent vulnerability upon a normal turbine trip condition.

There would be no increase in risk involved for any postulated events over the exposure period which normally involve an expected loss of the PCS. Therefore, many events would not be impacted by this condition.

Internal flooding events which would result in a turbine trip or transient were evaluated for the increased probability of the failure to recover from the loss of the PCS.

All postulated fire external events which would result in turbine trip or transients were evaluated for the increased probability of the failure to recover from the loss of the PCS.

For the internal event risk evaluation, for a transient event (base and conditional case), the SRA adjusted the high-pressure injection (HPI) basic failure-to-run event probabilities, to account for the ability to maximize the control rod drive system flow for makeup requirements. A surrogate failure probability adjustment to the HPI failure-to-run events was made (6E-2) to account for the probability of early success. This early HPI success (6 hours) allows for control rod drive capability as referenced in PB-PRA-004, "Peach Bottom PRA Human Reliability Analysis Notebook," Volume I, human error probability event A22.

For the Stuck Open Relief Valve postulated events (base and conditional case), HPI basic failure-to-run event probabilities were revised to reflect the appropriate lower mission time due to the reactor vessel pressure depressurization and loss of function within an assumed 6 hour mission time period. HPI failure-to-run event probabilities were set to 4.35E-2.

SPAR-H was used to analyze the human error probability representing the failure to recover the sealing steam system and condenser vacuum (PCS). A value of 0.11 failure probability was calculated and was used as the conditional (degraded) value for MFW-SYS-FC-TRIP (feedwater fails to remain available after reactor trip). This was a surrogate used for the failure to recover probability of the sealing steam system and condenser vacuum. This represented the conditional failure to recover the PCS function given the PD.

PCS-SYS-FC-SLOCA, (PCS is unavailable during an inadvertent opening of a safety relief valve or small-break loss-of-coolant-accident) was adjusted from its base case value of 0.167 to a conditional case value of failure of 1.0 to recover the PCS due to this condition. This was calculated using the SPAR-H tool.

Contributions from Internal Events

The increase in CDF from internal events was 3.6E-7/yr. Dominant core damage sequences included transient events with loss of the PCS, loss of HPI and failure to depressurize the reactor, as well as small break loss-of-coolant events with loss of the PCS and failure to establish and control late injection.

Contributions from External Events

The increase in CDF from external events was 2.8E-7/yr. The SRA noted there was no dominant fire area but the risk was spread out among many fire areas that result in transient type events. Therefore, these events would have a probability to lose the PCS given the PD. The top events consisted of postulated fire events among various fire areas with the failure to recover PCS, the failure of HPI systems to run and the failure to depressurize the reactor.

The SRA reviewed portions of the Peach Bottom PRA summary notebook, PB-PRA-013, relative to the analysis of large early release frequency (LERF). The evaluation incorporates a Level 2 methodology analyzing issues such as magnitude and timing of releases through level 2 containment trees. The SRA determined that the increase in LERF due to the condition was bounded by the increase in CDF.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance. Specifically, the procedure inadequacies were not associated with a change in the previous three years and did not involve a recent reasonable opportunity to identify and correct.

Enforcement:

Violation: TS 5.4.1(a), "Procedures," requires, in part, that written procedures shall be established, implemented, and maintained covering the activities referenced in Regulatory Guide (RG) 1.33, Appendix A, November 1972. RG 1.33, Appendix A, Section G.4 requires packing steam exhauster operating procedures and Section F.5 requires event procedures for responding to a loss of condenser vacuum.

Contrary to the above, prior to February 4, 2024, Constellation did not establish and maintain the sealing steam (i.e., packing steam exhauster) operating procedure SO 1H.1.A-2 and the loss of condenser vacuum event response procedure OT-106-2. Specifically, the operating procedure allowed the pressure control for the main steam supply to the sealing steam header to be set lower than required which resulted in a loss of sealing steam and main condenser vacuum, and the event response procedure did not provide adequate specific direction to address the sealing steam header pressure causing the loss of condenser vacuum.

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

Licensee-Identified NCV

71153

This violation of very low safety significance was identified by the licensee and has been entered into the licensee's CAP and is being treated as a NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Violation: PBAPS TS LCO 3.1.7, Required Action B.1, requires that, a standby liquid control subsystem be restored to operable status within 7 days or in accordance with the Risk

Informed Completion Time Program. If this action is not met, the plant is required to be in MODE 3 within 12 hours and MODE 4 within 36 hours. Contrary to this, from a date after May 29, 2023, until September 12, 2023, Constellation determined that the Unit 3 '3B' standby liquid control subsystem was inoperable for more than 7 days, and not in accordance with the Risk Informed Completion Time Program, and the plant was not in Mode 3 within 12 hours and Mode 4 within 36 hours.

Significance/Severity: Severity Level IV. The NRC Enforcement Policy, Section 2.2.1, states, in part, that, whenever possible, the NRC uses risk information in assessing the safety significance of violations. In accordance with IMC 0609, Appendix A, a DRE was required to assess the violation because the condition represented a loss of function for a single train TS system for greater than its TS allowed outage time. A Region I SRA performed the DRE and estimated the increase in CDF associated with this condition to be on the order of 5E-9/yr, or of very low safety significance. Accordingly, after considering that the condition represented very low safety significance, the inspectors concluded that the violation would be best characterized as Severity Level IV under the traditional enforcement process.

Corrective Action References: IR 04701411

## EXIT MEETINGS AND DEBRIEFS

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

- On August 1, 2024, the inspectors presented the integrated inspection results to Adam Frain, Director of Operations and Acting Plant Manager, and other members of the licensee staff.
- On April 11, 2024, the inspectors presented the Exit Debrief for IP 71124.03 and IP 71124.04 inspection results to Ryan Stiltner, Plant Manager, and other members of the licensee staff.
- On May 9, 2024, the inspectors presented the Problem Identification and Resolution sample inspection results inspection results to Jeremy Searer, Maintenance Director and Acting Plant Manager, and other members of the licensee staff.

**DOCUMENTS REVIEWED**

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.05	Procedures	PF-55	Unit 3 Reactor Building; Refuel Floor – Elevation 234'-0"	Revision 7
		PF-57	Unit 3 Reactor Building; Refuel Floor – Elevation 234'-0"	Revision 7
71111.11Q	Corrective Action Documents	Condition Reports IR 04774301		
71111.15	Corrective Action Documents	04771883		
		04771933		
		04771934		
		04776205		
		04782564		
	Corrective Action Documents Resulting from Inspection	AR 04779932 04781835		
		*IR 04767567		
		Condition Reports *IR 04764768		
	Procedures	Condition Reports *IR 04767567		
		MA-MA-796-024-1001, Scaffolding Criteria for the Mid Atlantic Stations, Revision 10	Scaffolding Criteria for the Mid Atlantic Stations	Revision 10
71111.18	Corrective Action Documents Resulting from Inspection	*IR 04769128		
	Procedures	OP-AA-201-010-1001	EDMG (B.5.b) Mitigating Strategies Equipment Expectations	Revision 8
71111.24	Procedures	ST-O-010-306-2	'B' RHR Loop Pump, Valve, Flow and Unit Cooler Functional and Inservice Test	Revision 57

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71152A	Corrective Action Documents	4377623		
		4377629		
		4377630		
		4377631		
		4377637		
		4377639		
		4455468		
		4455470		
		4455473		
		4455475		
		4500437		
		4529892		
		4529896		
		4529897		
		4529898		
		4529908		
		4529911		
		4529913		
		4529914		
		4709933		
		4709935		
4709937				
4709939				
4709942				
4709943				
4709944				
4709946				
	Corrective Action Documents Resulting from Inspection	4773080		
	Engineering Evaluations	1171049-08	MSIV Stroke Testing Methodology	dated 3/24/11
		4529892-04	P3R24 MSIV Slow Stroke Times WGE	dated

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
				11/17/22
		4709935-07	Multiple MSIV Stroke Times Exceeded Maximum Allowable Time WGE	dated 2/17/24
		EC 637774	P2R24 MSIV As-Found Stroke Times Unsatisfactory	Revision 0
		EC 640016	P3R24 MSIV As-Found Stroke Times Unsatisfactory	Revision 0
	Miscellaneous	6280-M-1-JJ-80	Instruction Manual for 26" MSIVs	Revision 3
		ST-O-07G-475-2	MSIV Closure Timing at Shutdown	performed 10/19/20 & 10/17/22
		ST-O-07G-475-3	MSIV Closure Timing at Shutdown	performed 10/25/21 & 10/16/23
	Procedures	PI-AA-120	Issue Identification and Screening Process	Revision 13
		PI-AA-125	CAP Procedure	Revision 9
		ST-M-01A-471-3	MSIV Timing, Springs Only Closure and Position Switch Adjustment	Revision 19