



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
475 ALLENDALE RD, STE 102
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

May 8, 2023

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 05000277/2023001 AND
05000278/2023001**

Dear David Rhoades:

On March 31, 2023, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Peach Bottom Atomic Power Station, Units 2 and 3. On May 4, 2023, the NRC inspectors discussed the results of this inspection with Ryan Stiltner, Director Site Operations, and other members of your staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. The findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations 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, D.C. 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* (CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Sarah H. Elkhiamy, 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 05000277/2023001 AND
05000278/2023001 DATED MAY 8, 2023

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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: 05000277/2023001 and 05000278/2023001

Enterprise Identifier: I-2023-001-0046

Licensee: Constellation Energy Generation, LLC

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

Location: Delta, PA

Inspection Dates: January 1, 2023 to March 31, 2023

Inspectors: S. Rutenkroger, Senior Resident Inspector
C. Dukehart, Resident Inspector
J. Ambrosini, Senior Emergency Preparedness Inspector
S. Elkhiamy, Branch Chief
T. Fish, Senior Operations Engineer
M. Hardgrove, Senior Project Engineer
J. Kepley, Operations Engineer
K. Murphy, Operations Engineer

Approved By: Sarah H. Elkhiamy, 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

Failure to Assess Internal Cell Resistance Test Results and Conduct Performance Testing of the Hardened Containment Vent System Battery			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277,05000278/2023001-01 Open/Closed	[H.6] - Design Margins	71111.24
<p>The inspectors identified a Green finding and associated non-cited violation (NCV) of NRC Order EA-13-109 because Constellation did not perform a battery performance test (or cell replacement or other corrective action) when the hardened containment vent system (HCVS) battery cell internal ohmic resistance measurements significantly changed by greater than 50 percent above baseline. Specifically, the battery annual surveillance procedure lacked acceptance criteria for cell resistance, and no trending of cell resistances was performed. Therefore, when the measurements increased by a significant amount above baseline no actions were taken in response.</p>			

Inadequate Corrective Actions for Safety/Relief Valve-71B Following Filter Plug Leakage			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277/2023001-02 Open/Closed	[P.2] - Evaluation	71153
<p>A Green self-revealing finding and associated NCV of 10 <i>Code of Federal Regulations</i> (CFR) Part 50, Appendix B, Criterion XVI, “Corrective Actions,” was identified when Constellation did not ensure a condition adverse to quality (CAQ) associated with the degraded filter plug for the 71B safety/relief valve (SRV) was promptly identified and corrected. Specifically, Constellation documented a small leak identified on SRV-71B in an incident report but did not correct the condition. Consequently, SRV-71B was discovered to be inoperable during the P2R24 refueling outage (RFO) due to a water leak on October 17, 2022.</p>			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000277/2022-002-00	LER 2022-002-00 for Peach Bottom Atomic Power Station (PBAPS) Unit 2 Automatic Depressurization System (ADS) SRV Actuator Diaphragm Degraded	71153	Closed

PLANT STATUS

Unit 2 began the inspection period at rated thermal power (RTP). On March 3, 2023, the unit was down powered to 64 percent for a control rod sequence exchange and main turbine valve exercising and testing. The unit was returned to RTP the following day and remained at or near RTP for the remainder of the inspection period.

Unit 3 began the inspection period at RTP. On January 10, 2023, the unit experienced a recirculation pump runback with a corresponding power reduction to 60 percent due to an unplanned trip of a reactor feedwater pump caused by a cable fault. The unit was then down powered to 40 percent. Following maintenance and restoration of the pump, the unit was returned to RTP the following day. On February 10, the unit was down powered to 58 percent for planned reactor feedwater pump circuit modifications and cable replacements, main turbine valve exercising and testing, and a control rod pattern adjustment. The unit was returned to RTP the same day and 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

Seasonal Extreme Weather (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated readiness for seasonal extreme weather conditions in the Unit 2 and Unit 3 reactor building and control building general areas with a focus on standby liquid control systems, the cable spreading room, 4 kV switchgear rooms, and the station batteries on January 3, 2023

71111.04 - Equipment Alignment

Partial Walkdown (IP Section 03.01) (4 Samples)

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

- (1) Unit 3, reactor core isolation cooling (RCIC) on February 16, 2023
- (2) Unit 2, station battery '2BD001' during cell replacements and use of temporary cells on February 28, 2023

- (3) Unit common, 4kV electrical switchgear during '3EA' transformer outage on March 21, 2023
- (4) Unit common, 'E-4' emergency diesel generator (EDG) during '34SU' transformer maintenance on March 28, 2023

71111.05 - Fire Protection

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

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

- (1) Unit 3, high-pressure coolant injection (HPCI) room, PF-62, on February 7, 2023
- (2) Unit 2, emergency battery and switchgear rooms, PF-127, on March 14, 2023
- (3) Unit common, cable spreading and computer rooms, PF-78H, on March 15, 2023
- (4) Unit common, diesel generator building general area, PF-132, on March 28, 2023
- (5) Unit 3, emergency battery and switchgear rooms, PF-117, on March 29, 2023

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

- (1) The inspectors evaluated the onsite fire brigade training and performance during an unannounced fire drill on March 7, 2023

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 Unit 2 and Unit 3 licensed operator examination failure rates for the requalification annual operating exams administered February through March 2023

71111.11B - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Requalification Program (IP Section 03.04) (1 Sample)

- (1) Biennial Requalification Written Examinations

The inspectors evaluated the quality of the Unit 2 and Unit 3 licensed operator biennial requalification written examinations previously administered March through April 2022

Annual Requalification Operating Tests

The inspectors evaluated the adequacy of the facility licensee's 2023 annual requalification operating tests

Administration of an Annual Requalification Operating Test

The inspectors evaluated the effectiveness of the facility licensee in administering the 2023 requalification operating tests required by 10 CFR 55.59(a)(2) and that the

facility licensee is effectively evaluating their licensed operators for mastery of training objectives

Requalification Examination Security

The inspectors evaluated the ability of the facility licensee to safeguard examination material, such that the examination is not compromised

Remedial Training and Re-examinations

The inspectors evaluated the effectiveness of remedial training conducted by the licensee, and reviewed the adequacy of re-examinations for licensed operators who did not pass a required requalification examination

Operator License Conditions

The inspectors evaluated the licensee's program for ensuring that licensed operators meet the conditions of their licenses

Control Room Simulator

The inspectors evaluated the adequacy of the facility licensee's control room simulator in modeling the actual plant, and for meeting the requirements contained in 10 CFR 55.46

Problem Identification and Resolution

The inspectors evaluated the licensee's ability to identify and resolve problems associated with licensed operator performance

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 Unit 3 power ascension and restoration of the '3A' reactor feedwater pump on January 11, 2023

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 January 9, 2023

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, main steam safety relief valve 'RV-71B' through March 7, 2023

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management (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 2, HPCI planned maintenance on January 10, 2023
- (2) Unit 2, '2B' high-pressure service water (HPSW) ventilation out of service for maintenance on March 7, 2023
- (3) Unit 2, HPCI power supply replacement on March 13, 2023
- (4) Unit common, '3EA' transformer planned maintenance on March 20, 2023

71111.15 - Operability Determinations and Functionality Assessments

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

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

- (1) Unit 2, 'D' air compressor time delay relay '2-36-6TR' did not perform as required during testing on January 5, 2023
- (2) Unit 2, relay '2-10A-K016B' was found deenergized on February 7, 2023
- (3) Unit common, 'E-4' EDG trip on high crankcase pressure during a slow start on January 16, 2023, and subsequent replacement of the crankcase vacuum orifice on February 21, 2023
- (4) Unit 2, 'A' residual heat removal (RHR) system with the heat exchanger outlet block valve 'HV-2-10-28A' unlocked on February 17, 2023
- (5) Unit 2, 'B' station battery temporary cells not positively restrained on February 28, 2023
- (6) Unit common, 'E-3' EDG with low lube oil level in the makeup tank on March 21, 2023

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) Units 2 and 3, permanent modification to containment atmospheric control systems to include backup nitrogen supply cylinders on February 13, 2023
- (2) Unit 3, reactor feedwater pump turbine (RFPT) trip vulnerability mitigation temporary modification on February 14, 2023

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 (IP Section 03.01) (5 Samples)

- (1) Unit 2, 'C' HPSW pump check valve testing following packing modification and replacement on January 3, 2023
- (2) Unit 2, HPCI lube oil system testing following maintenance on January 10, 2023
- (3) Unit common, 'E-2' EDG testing following a system outage window on January 27, 2023
- (4) Unit 2, 'B' RHR relay '2-10A-K0168' testing following replacement on March 1, 2023
- (5) Unit common, 'A' standby gas treatment (SBGT) testing following maintenance on instrument air solenoids associated with the fan inlet and outlet dampers on March 22, 2023

Surveillance Testing (IP Section 03.01) (6 Samples)

- (1) Unit 2, 'C' RHR room cooler heat transfer test on February 17, 2023
- (2) Unit 3, 'E43' 4 kV undervoltage relays functional testing on March 7, 2023
- (3) Unit common, 'E-2' EDG alternative shutdown control functional test and loaded run on March 8, 2023
- (4) Unit 2, 'A' channel of automatic depressurization system logic system functional test, on March 15, 2023
- (5) Unit 2, 'A' RHR loop logic system functional test on January 5, 2023
- (6) Units 2 and 3, hardened containment vent emergency battery annual inspection on February 17, 2023

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

- (1) Unit 3, reactor building torus vacuum breakers functional testing and breakaway force testing on March 13, 2023

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

- (1) Unit common, diesel driven flex pump '00P441' dry run test on January 17, 2023

71114.02 - Alert and Notification System Testing

Inspection Review (IP Section 02.01-02.04) (1 Sample)

- (1) The inspectors evaluated Constellation's maintenance and testing of the Alert and Notification System on February 27 through March 2, 2023, for the period of February 2021 through January 2023

71114.03 - Emergency Response Organization Staffing and Augmentation System

Inspection Review (IP Section 02.01-02.02) (1 Sample)

- (1) The inspectors evaluated the readiness of the Constellation's Emergency Preparedness Organization on February 27 through March 2, 2023

71114.04 - Emergency Action Level and Emergency Plan Changes

Inspection Review (IP Section 02.01-02.03) (1 Sample)

- (1) The inspectors evaluated the following submitted Emergency Action Level and Emergency Plan changes:
 - 22-23, EP-AA-120-1006, "EP Reportability - Loss of Emergency Preparedness Capabilities," Revision 007

This evaluation does not constitute NRC approval.

71114.05 - Maintenance of Emergency Preparedness

Inspection Review (IP Section 02.01 - 02.11) (1 Sample)

- (1) The inspectors evaluated Constellation's maintenance and testing of the emergency preparedness program on February 27 through March 2, 2023, for the period of February 2021 through January 2023

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 02.01) (2 Samples)

- (1) Unit 2 for the period January 1, 2022 through December 31, 2022
- (2) Unit 3 for the period January 1, 2022 through December 31, 2022

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02) (2 Samples)

- (1) Unit 2 for the period January 1, 2022 through December 31, 2022
- (2) Unit 3 for the period January 1, 2022 through December 31, 2022

IE04: Unplanned Scrams with Complications Sample (IP Section 02.03) (1 Sample)

- (1) Unit 3 for the period January 1, 2022 through December 31, 2022

EP01: Drill/Exercise Performance Sample (IP Section 02.12) (1 Sample)

- (1) January 1, 2022 through December 31, 2022

EP02: Emergency Response Organization Drill Participation (IP Section 02.13) (1 Sample)

- (1) January 1, 2022 through December 31, 2022

EP03: Alert and Notification System Reliability (IP Section 02.14) (1 Sample)

- (1) January 1, 2022 through December 31, 2022

71152A - Annual Follow-up Problem Identification and Resolution

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

- (1) Units 2 and Unit 3 review of corrective actions and extent of condition as a result of non-conservative off rated power dependent thermal limits associated with issue report (IR) 04524984

71153 - Follow-up of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (1 Sample)

The inspectors evaluated the following licensee event report (LER):

- (1) LER 05000277/2022-002-00 for PBAPS, Unit 2, "ADS SRV Actuator Diaphragm Degraded," on March 6, 2023, (ADAMS Accession No. ML22349A084)

The inspectors conclusions associated with this LER are documented in this report under Inspection Results Section, NCV 05000277/2023001-01. This LER is Closed.

INSPECTION RESULTS

Failure to Assess Internal Cell Resistance Test Results and Conduct Performance Testing of the Hardened Containment Vent System Battery			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277,05000278/2023001-01 Open/Closed	[H.6] - Design Margins	71111.24
The inspectors identified a Green finding and associated NCV of NRC Order EA-13-109 because Constellation did not perform a battery performance test (or cell replacement or other corrective action) when the HCVS battery cell internal ohmic resistance measurements significantly changed by greater than 50 percent above baseline. Specifically, the battery annual surveillance procedure lacked acceptance criteria for cell resistance, and no trending of cell resistances was performed. Therefore, when the measurements increased by a significant amount above baseline no actions were taken in response.			
<u>Description:</u> PBAPS was required by NRC Order EA-13-109 to have a reliable, severe accident capable HCVS. Phase 1 of the order required upgraded the venting capabilities from the containment wetwell to provide a reliable, severe accident capable hardened vent to assist in preventing core damage and, if necessary, to provide venting capability during severe accident conditions. PBAPS achieved Phase 1 compliance in November 2016 for Unit 2 and in November 2017 for Unit 3. Constellation submitted a Final Integrated Plan (ML18271A008) to the NRC to address all the elements of NRC Order EA-13-109 utilizing the endorsed (with some clarifications and exceptions) guidance in Nuclear Energy Institute (NEI)			

13-02, Revision 1, and the related endorsed HCVS-Frequently Asked Questions and HCVS-White Papers documents. In addition, Constellation's PBAPS response to NRC Order EA-12-049 addressed an extended loss of AC power with injection. In such an event, the HCVS wetwell vent will be opened to protect the containment from overpressure. The required operator actions and timing of those actions to perform this function under extended loss of alternating current power conditions were evaluated as part of the response to NRC Order EA-12-049.

PBAPS modified the existing hardened wetwell vent path that was installed in response to NRC Generic Letter 89-16 to comply with NRC Order EA-13-109. The EA-13-109 compliant HCVS system added a dedicated 125 Vdc battery, nitrogen motive gas source, and argon purge system to the existing GL-89-16 wetwell hardened vent system. In addition, new HCVS radiation monitoring and temperature sensors and new control switches were added. The dedicated HCVS 125 Vdc battery supplies power to the actuating solenoid for inner primary containment isolation valves (PCIV) AO-2(3)511 (Unit 2 and Unit 3, respectively) and primary containment outboard barrier valves AO-8(9)0290 (Unit 2 and Unit 3, respectively). This battery also powers the new HCVS instrumentation. During an extended loss of AC power, electric power to operate the vent valves will be provided by the battery with a capacity to supply required loads for at least the first 24 hours. Before the battery is depleted, the FLEX generator will repower the battery charger to supplement the required power and recharge the 125 Vdc battery to support operation of the vent valves and instrumentation. Calculation PE-0308 demonstrated that the 125 Vdc battery capacity is sufficient to supply HCVS wetwell venting components for the 24 hours.

NEI 13-02 states that FLEX equipment that directly performs a FLEX mitigation strategy for the core, containment, or spent fuel pool should be subject to maintenance and testing guidance provided in Institute of Nuclear Power Operations AP 913, "Equipment Reliability Process," to verify proper function. NEI 13-02 also states that site-specific bases will be developed to define specific testing, including that periodic testing and frequency should be done to verify design requirements, and the basis for the testing should be documented and deviations from vendor recommendations and applicable standards should be justified.

On February 17, 2023, the inspectors observed Constellation personnel performing the annual inspection of the containment emergency battery. The inspectors noted that the inspection measured and recorded the internal resistance of the battery cells. However, the procedure did not provide acceptance criteria for internal resistance and cell voltage, nor did it describe providing the data to engineering personnel for evaluation. The inspectors requested further information from engineering personnel and questioned the lack of acceptance criteria. Engineering determined that the cell resistance check is performed for trending as described in associated vendor guidance and Institute of Electrical and Electronics Engineers (IEEE) 1188-2005, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications."

Engineering checked with the battery vendor and determined that an increase of 50 percent from the initial baseline internal cell resistance when new should prompt further scrutiny of battery function, typically provided via performance testing (i.e., a battery discharge test). The HCVS battery average cell resistance first exceeded 50 percent of baseline when the measurements were taken on January 21, 2020. The average cell internal ohmic resistances were determined to be 86 percent above baseline in the most recent test performed on February 17, 2023.

The inspectors noted that CC-AA-118, "Diverse and Flexible Coping Strategies (FLEX), Spent Fuel Pool Instrumentation (SFPI), and HCVS Program Document," Attachment 3, "FLEX / SFPI / HCVS Equipment Preventative Maintenance (PM) Requirements," lists required PMs tasks for FLEX, SFPI, and HCVS equipment. The listed PMs for VRLA batteries include a three-month cell inspection and one-year detailed cell inspection, with bases listed as "PCM templates, Vendor Recommendations and Battery SME." The PCM template lists both a quarterly cell inspection and annual detailed cell inspection that include measuring cell internal ohmic values. The annual detailed cell inspection also states to compare to previous values. In addition, the vendor guidance and IEEE 1188-2005 both describe performing such cell inspections, including the taking of cell internal ohmic resistance measurements and trending/comparing these measurements to baseline values, and describe that a significant change from baseline values (50 percent per vendor) warrants a performance test (or cell replacement or other corrective action). Notably, the battery inspection procedures, which are used to perform the PMs required by CC-AA-118, list IEEE 1188-2005 as a governing commitment for performing such inspections.

Engineering determined that no trending/comparing of cell internal ohmic resistance measurements had been performed, and no performance test had ever been performed on the HCVS battery, which was installed in 2016. IEEE 1188-2005 states that a performance test of the battery capacity should be made upon installation and that batteries should undergo additional performance tests periodically. Further, when establishing the interval between tests, factors such as design life and operating temperature should be considered and it is recommended that the performance test interval should not be greater than 25 percent of the expected service life or two years, whichever is less. A routine performance test was not required by CC-AA-118. However, given that no routine performance testing was being performed, when the internal cell ohmic resistance measurements changed by more than 50 percent above baseline and Constellation did not perform a reactive performance test (or cell replacement or other corrective action), there was no battery discharge testing to credit for meeting PM requirements.

Corrective Actions: As a result of the inspector's questions, Constellation determined that a performance test was required, as described by the vendor and IEEE 1188-2005, to accurately assess the HCVS battery health due to the change in internal cell resistances. Constellation initiated an issue report based on the inspectors' questions and created actions to revise the annual inspection with acceptance criteria and create and implement a battery performance test procedure as soon as practical within the work scheduling process.

Corrective Action References: IR 04559029

Performance Assessment:

Performance Deficiency: The inspectors identified a Green finding and associated NCV because Constellation did not perform a battery performance test (or cell replacement or other corrective action) when the HCVS battery cell internal ohmic resistance measurements significantly changed by greater than 50 percent above baseline.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance 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, since Constellation had not conducted a performance test of the HCVS battery from installation in 2016 and the battery cell internal

resistances did exhibit significant deviation from baseline values, as defined by the vendor, there was reasonable doubt that the equipment maintained the capability to perform within sufficient margin to meet the electrical requirements of the associated FLEX strategies (i.e., that no portable equipment should be required to operate the HCVS within the first 24 hours).

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding screened as of very low safety significance (Green) because it did not involve equipment, training, procedures, and/or other programmatic aspects credited in any Phase 1 or 2 FLEX strategy such that any FLEX function (such as extended HPCI/RCIC/auxiliary feedwater operation, providing FLEX DC power, FLEX AC power, or FLEX RCS feed) could not be completed in accordance with existing plant procedures within the time allotted for an exposure period of greater than 21 days. Specifically, the inspectors determined that a reasonable best estimate of battery capacity given the initial margin established by design and observed battery conditions would reasonably result in the FLEX generator supplementing and recharging the battery to support operation of the vent valves before the battery was depleted.

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. (WP.2). A factor described in NUREG-2165, "Safety Culture Common Language," WP.2, is that safety-related equipment is operated and maintained well within design requirements. The testing procedures and monitoring that were established and being performed did not carefully guard and maintain the design margins of the HCVS battery well within design requirements.

Enforcement:

Violation: NRC Order EA-13-109 is only applicable to operating boiling-water reactors (BWRs) with Mark I and Mark II containments. Constellation received NRC Order EA-13-09 for PBAPS because the reactors at PBAPS are General Electric BWRs with Mark I containments. NRC Order EA-13-109, Attachment 2, Section 1.2.13, states, in part, the HCVS shall include features and provisions for testing, inspection and maintenance adequate to ensure that reliable function and capability are maintained.

Constellation program documents CC-AA-118, "Diverse and Flexible Coping Strategies (FLEX), SFPI, and HCVS Program Document," Revision 9, and CC-PB-118-1004, "HCVS Final Integrated Plan," Revision 2, describe the compliance of PBAPS with NRC Order 13-109 and state that compliance with NRC Order 13-109 utilizes the endorsed guidance in NEI 13-02, Revision 1, and the related endorsed HCVS-Frequently Asked Questions and HCVS-White Papers documents. The NRC endorsed the guidance in JLD-ISG-2015-01, "Compliance with Phase 2 of Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Performing under Severe Accident Conditions." NEI 13-02, Revision 1, states, in part, that periodic testing and frequency should be determined based on equipment type and expected use and that testing should be done to verify design requirements and/or basis, and the basis should be documented and deviations from vendor recommendations and applicable standards should be justified. In addition, CC-AA-118, Attachment 3, lists preventive maintenance requirements and bases for FLEX, SFPI, and HCVS equipment and includes a quarterly cell inspection and annual detailed cell inspection for VRLA batteries. The vendor guidance and IEEE 1188-2005 describe the cell inspections listed in CC-AA-118 that include cell internal ohmic resistance measurements and

describe that a significant change from baseline values (50 percent per vendor) warrants a performance (discharge) test (or cell replacement or other corrective action).

Contrary to this, since January 21, 2020, Constellation did not provide provisions for testing, inspection, and maintenance adequate to ensure that the reliable function and capability of the HCVS battery were maintained. Constellation did not determine periodic testing and frequency based on equipment type and expected use, did not perform testing to verify design requirements and/or basis, and did not document the basis for deviations from vendor recommendations and applicable standards. Specifically, the HCVS battery inspections deviated from the vendor recommendations and the applicable standard, IEEE 1188-2005, when the measured HCVS battery internal cell resistances significantly changed from baseline by more than 50 percent, and Constellation did not conduct a performance test, cell replacement, or other corrective action, and did not evaluate and justify the deviation.

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

Observation: Annual Review of Corrective Actions and Extent of Condition of Review as a Result of Non-Conservative Off Rated Power Dependent Thermal Limits	71152A
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The inspectors reviewed Constellation’s evaluation and corrective actions associated with non-conservative off rated power dependent thermal limits for both Units 2 and 3. Specifically, inspectors focused on the corrective action program (CAP) evaluation associated with issue report 04524984.

The inspectors reviewed the extent of condition, both the station and corporate procedures, standing orders, relevant condition reports, engineering and design calculations, core operating limits reports, power history and associated plant guidance, and interviewed the licensee subject matter expert on the topic.

Based on the documents reviewed and discussions with personnel, the NRC inspectors noted that corrective actions were timely and appropriate.

Inadequate Corrective Actions for Safety/Relief Valve-71B Following Filter Plug Leakage

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000277/2023001-02 Open/Closed	[P.2] - Evaluation	71153

A Green self-revealing finding and associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Actions,” was identified when Constellation did not ensure a CAQ associated with the degraded filter plug for the 71B SRV was promptly identified and corrected. Specifically, Constellation documented a small leak identified on SRV-71B in an IR but did not correct the condition. Consequently, SRV-71B was discovered to be inoperable during the P2R24 RFO due to a water leak on October 17, 2022.

Description: PBAPS has eleven 3-stage Target Rock SRVs per unit. An SRV provides a pressure relief function or system depressurization at full rated flow with a set pressure range of 900 - 1100 psig. Additionally, five of the eleven SRVs are ADS valves. The purpose of ADS valves is to rapidly depressurize the reactor pressure vessel to allow low pressure emergency core cooling system to provide core cooling.

On May 18, 2021, a drywell entry was performed to repair a nitrogen leak on SRV-71K. Maintenance personnel performed inspections of all other SRVs as a result of hose fretting leakage found on SRV-71K. Subsequently, IR 04424264 was written, and screened as N-CAP, for a small water leak identified on SRV-71B via rust spot at the pilot filter port plug. Work order (WO) 5186520 was generated to perform an inspection of SRV-71B during the next RFO, P2R24, in October 2022.

On October 17, 2022, during the P2R24 RFO, IR 4529976 was written for water that was identified leaking from the fastener on the SRV-71B body. The cause of the leak was due to steam cutting around the O-ring area of the pilot filter plug. The leakage was determined to be active and wetting the insulation surrounding the valve. The location was determined to be from the pilot filter plug threaded connection and not a through-wall pressure boundary location.

Vendor testing of the SRV air operator identified substantial leakage, such that the ADS function of SRV-71B was not functional. Examination of the air operator showed that the diaphragm elastomer had embrittled, and other soft parts were disintegrated. The vendor testing determined that the air operator likely failed because of wet steam heating.

PBAPS had previously experienced SRV pilot filter plug leakage. Apparent Causal Report 1421109 documented that, on September 24, 2012, during the P2R19 RFO, SRV-71E and SRV-71H failed to actuate during as-found testing. Inspection of the air operator revealed that the diaphragm exhibited a loss of resiliency and was hardened. Constellation determined that the apparent cause of the manual lift failures for SRV-71E and SRV-71H was related to filter plug leakage. In addition, a SRV-71J diaphragm failure in 2PR17 RFO was attributed to the leaking filter plug. The two probable degradation mechanisms were that (1) leakage from the plug induced a chimney effect through the insulation such that high energy steam impinged on the air operator leading to accelerated degradation of the diaphragm, or (2) steam leakage resulted in sufficient wetting of the installed insulation, degrading its insulating capabilities and enabling process steam heat from the SRV to cause accelerated degradation of the diaphragm.

The inspectors reviewed Constellation's WGE, WOs, maintenance, and CAP procedures in response to the SRV-71B failure in October 2022. As discussed above, IR 04424264, dated May 18, 2021, captured a small leak and a rust spot at the pilot filter port plug on SRV-71B. Constellation screened this IR as N-CAP; however, the inspectors determined that it should have been screened as a CAQ, per Constellation procedures. Specifically, Constellation procedure PI-AA-120, "Issue Identification and Screening Process," Revision 13, Attachment 2 provides a listing of CAQs that Constellation has determined require specific management screening to ensure the issues are addressed. Attachment 2, "Significance Level 3 Guidance," section "Asset Management-Equipment Reliability," bullet "yy" states the following: "CAQ: a degraded condition or non-conformance affecting the safety-related function of a SSC."

Given the PBAPS operating experience demonstrating that filter plug water leakage can lead to SRV inoperability, the inspectors determined that Constellation reasonably should have screened IR 04424264 as a CAQ. In accordance with PI-AA-125, "CAP Procedure," Revision 8, step 4.5.2, classifying IR 04424264 as a CAQ would have led Constellation to "create a corrective action or fleet-wide corrective action and associated passport model template (AR34) in the computer program for any planned action necessary to restore a CAQ."

Based on the information above, the inspectors determined that Constellation did not identify and did not promptly address a CAQ associated with a non-conforming condition on SRV-71B. Specifically, the non-conforming condition of a small water leak on SRV-71B was noted on May 18, 2021, and was documented under IR 04424264. which was not classified as a CAQ. As a result, the non-conforming condition was not promptly addressed, and subsequently SRV-71B failed as-found testing during RFO P2R24.

Corrective Actions: Constellation's corrective actions involved a WGE and replacement of the SRV-71B during RFO P2R24.

Corrective Action References: IR 4529976

Performance Assessment:

Performance Deficiency: The inspectors determined that Constellation did not ensure a CAQ was promptly identified and corrected as required by PI-AA-120, Revision 13, Attachment 2, which was a performance deficiency that was within their ability to foresee and correct, and which should have been prevented.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance 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, Constellation did not correct the SRV-71B filter plug water leakage when it was identified following a drywell walkdown on May 18, 2021. Because this water leakage was not corrected, from time of identification to the RFO on October 17, 2022, the water leakage led to embrittlement of the air operator diaphragm of SRV-71B. Thus, SRV-71B was found to be inoperable during as-found testing during P2R24.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The SDP for Findings At-Power." Exhibit 2 – Mitigating System Screening Questions, Section A for Mitigating SSCs and probabilistic risk analysis (PRA) Functionality, screened the finding to Green, very low safety significance, because there was no degraded condition representing a loss of PRA functionality, design, or qualification of the system. Specifically, although the function of SRV-71B was lost for a time, the PRA function of ADS was not lost with four remaining ADS SRVs and six remaining non-ADS SRVs. Therefore, the degraded condition did not represent a loss of the PRA function for a train or a system and screens to Green.

Cross-Cutting Aspect: P.2 - Evaluation: The organization thoroughly evaluates issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. The organization thoroughly evaluates issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. The inspectors determined that this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because Constellation did not thoroughly evaluate issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, Constellation did not apply previous PBAPS operating experience identified in a 2012 apparent cause evaluation related to water leakage from the filter plug on SRVs to an identified leak on May 18, 2021. Subsequently, SRV-71B was declared inoperable on October 17, 2022, following water leakage from the filter plug. [P.2]

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that measures shall be established to ensure that CAQs, such as deviations and non-conformances, are promptly identified and corrected.

Contrary to the above, between May 18, 2021, and October 17, 2022, Constellation did not ensure that a CAQ associated with a non-conforming condition of SRV-71B was promptly identified and corrected. Specifically, a small water leak was identified on SRV-71B on May 18, 2021, following a drywell walkdown. As a result, SRV-71B failed its as-found testing during RFO P2R24 and was declared inoperable on October 17, 2022.

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

EXIT MEETINGS AND DEBRIEFS

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

- On March 2, 2023, the inspectors presented the Emergency Preparedness program inspection results to David Henry, Site Vice President, and other members of the licensee staff.
- On May 4, 2023, the inspectors presented the integrated inspection results to Ryan Stiltner, Director Site Operations, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Corrective Action Documents	IR 04545974		
71111.04	Corrective Action Documents	04359916		
		IR 04546595		
	Miscellaneous	E-71	Electrical Schematic Diag Emergency, Aux	Revision 31
		E-8	Single Line Meter and Relay Diagram Standby Diesel Gens and 4160 Volt Emergency Power System, Unit 2	Revision 26
		PS-0028	Design Cart to Transport and Support Temp Batteries	Revision 3
	Procedures	M-057-013	125 Volt Station Battery Replacement During Shutdown or At Power	Revision 15
		M-360	P & I Diagram RCIC Pump Turbine Details	Revision 55
ST-O-013-350-3		RCIC Valve Alignment and Filled and Vented Verification	Revision 5	
Work Orders	04897365			
71111.05	Procedures	PF-117	Unit 3 Turbine Building, Emergency Battery SWGR Rooms, Elevation 135'-0"	Revision 11
		PF-127	Unit 2 Turbine Building, Emergency Battery SWGR Rooms, Elevation 135'-0"	Revision 11
		PF-132	Diesel Generator Building, General Area, Elevation 127"-0"	Revision 9
		PF-62	Unit 3 Reactor Building; HPCI Room, Elevation 88'-0	Revision 7
		PF-78H	Turbine Building Common, Cable Spreading and Computer Rooms – Elevation 150'-0"	Revision 9
71111.11Q	Work Orders	WR 1531501		
71111.12	Corrective Action Documents	04530826		
	Procedures	ER-AA-400-1000	SRV Testing, Tracking, and Trending	Revision 3
	Work Orders	04529976 04258110 05302201		
71111.13	Work Orders	05249852		
71111.15	Corrective Action Documents	04534311 04538668 04548645		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		04546657		
		04553119		
		04553104		
		04555318		
		04562695 04564470		
	Miscellaneous	PS-0028	Design Cart to Transport and Support Temp Batteries	Revision 3
		SFCP-U2	Surveillance Frequency Control Program List of Surveillance Frequencies	Revision 50
	Procedures	M-057-013	125 Volt Station Battery Replacement During Shutdown or At Power	Revision 15
		OP-PB-108-103-2	Locked Valve List - PBAPS Unit 2	Revision 15
		RT-O-100-560-2	Unit 2 Locked Equipment Log Sheet	Revision 4
		SO 52A.8.A	Diesel Generator Daily Shutdown Inspection	Revision 66
		ST-I-010-100-2	RHR Loop 'A' Logic System Functional Test	Revision 23
		ST-I-010-105-2	RHR Loop 'B' Logic System Functional Test	Revision 25
		ST-O-010-350-2	RHR Loop 'A' and Crosstie Valve Position and Filled and Vented Verification	Revision 14
		ST-O-052G-975-2	Diesel Generator Lube Oil Inventory Verification	Revision 16
	Work Orders	01532968		
		04840732		
04897365				
04897365				
05337084				
71111.18	Miscellaneous	EC 618424	Installation of CAC PCIV Nitrogen Supply Cylinders	Revision 2
		TCCP 638277	'3A' (B) (C) RFPT Trip Vulnerability Mitigation	Revision 0
	Work Orders	5327042		
71111.24	Corrective Action Documents	04561599		
		04559029		
		04666491		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Miscellaneous	CC-AA-118	Diverse and Flexible Coping Strategies (FLEX), SFPI, and HCVS Program Document	Revision 9
		CC-PB-118-1004	HCVS Order EA-13-109 for PBAPS, Units 2 and 3	Revision 2
		PMC-19-118-118	Replace HCVS 125V DC Battery Every 7 Years	
	Procedures	RT-I-033-631-2	RHR Room Cooler Emergency Service Water Heat Transfer Test	Revision 15
		RT-M-57P-700-2	Containment Emergency Battery Annual Inspection	Revision 4
		RT-O-052-252-2	E-2 Diesel Generator Inspection Post-Maintenance Functional Test	Revision 46
		RT-O-052-750-2	E-2 Diesel Alternative Shutdown Control Functional	Revision 12
		RT-O-23A-450-2	HPCI Lube Oil System Setup and Functional	Revision 13
		RT-O-57P-746-2	Containment Emergency Vent Battery Quarterly Inspection	Revision 4
		SI3K-54-E43-XXFQ	Functional Test of E-43 4kV Undervoltage Relays	Revision 2
		SO 39.1.B	Diesel Driven Portable FLEX Pump Startup and Shutdown	Revision 5
		SO 9A.1.B	SBGT System Manual Startup	Revision 9
		ST-I-010-100-2	RHR Loop 'A' Logic System Functional Test	Revision 23
		ST-I-010-105-5	RHR Loop B Logic System Functional Test	Revision 25
		ST-I-01G-100-2	ADS Channel 'A' Logic System Functional Test	Revision 9
		ST-M-07B-400-3	Functional Test and Breakaway Force Test of RB-Torus Vacuum Breakers (VBV-3-07B-26A and VBV-3-07B-26B)	Revision 6
		ST-O-32-301-2	HPSW Pump, Valve, and Flow Functional and in-Service Test	Revision 44
	Work Orders	04267985		
		04724978		
		04878668		
		05001465		
		05116760		
		05232905		
		04840732		
		04888804		
	05105739			
	05160980			

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		05176131		
		05185169		
		05293054		
		05311763 05337079		
		05301065		
71114.02	Corrective Action Documents Resulting from Inspection	04557928		
	Miscellaneous		PBAPS Public Alert and Notification System Design Report	Revision 1
71114.05	Miscellaneous	EP-AA-1000	Exelon Nuclear Standardized Radiological Emergency Plan	Revision 33
		EP-AA-1007	Exelon Nuclear Radiological Emergency Plan Annex for PBAPS	Revision 35
71153	Corrective Action Documents	01411727		
		04424264		
		04500201		
		04529976 04530826		
	Procedures	CC-AA-309-101	Engineering Technical Evaluations	Revision 16
		PI-AA-120	Issue Identification and Screening Process	Revision 13
PI-AA-125		CAP Procedure	Revision 8	
Work Orders	04529976 04258110 01421109			