



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

July 29, 2025

Eric S. Carr
President, Nuclear Operations
and Chief Nuclear Officer
Dominion Energy
Innsbrook Technical Center
5000 Dominion Blvd., Floor: IN-3SE
Glen Allen, VA 23060-6711

SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2 – INTEGRATED
INSPECTION REPORT 05000338/2025002 AND 05000339/2025002

Dear Eric S. Carr:

On June 30, 2025, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at North Anna Power Station, Units 1 and 2. On July 17, 2025, the NRC inspectors discussed the results of this inspection with Mr. James Jenkins, Site Vice President, 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. Two of these 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 II; the Director, Office of Enforcement; and the NRC Resident Inspector at North Anna Power Station, Units 1 and 2.

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

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,



Signed by Smith, Steven
on 07/29/25

Steven P. Smith, Chief
Reactor Projects Branch 6
Division of Operating Reactor Safety

Docket Nos. 05000338 and 05000339
License Nos. NPF-4 and NPF-7

Enclosure:
As stated

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers: 05000338 and 05000339

License Numbers: NPF-4 and NPF-7

Report Numbers: 05000338/2025002 and 05000339/2025002

Enterprise Identifier: I-2025-002-0024

Licensee: Dominion Energy

Facility: North Anna Power Station, Units 1 and 2

Location: Mineral, Virginia

Inspection Dates: April 01, 2025, to June 30, 2025

Inspectors: J. Bell, Senior Health Physicist
K. Carrington, Senior Resident Inspector
W. Deschaine, Senior Project Engineer
C. Even, Senior Project Engineer
J. Rivera, Health Physicist
A. Rosebrook, Senior Reactor Analyst
D. Turpin, Resident Inspector

Approved By: Steven P. Smith, Chief
Reactor Projects Branch 6
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 North Anna Power Station, Units 1 and 2, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

Failure to Follow Procedure Results in Level Indication Issues During Reactor Vessel Drain Down			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000339/2025002-01 Open/Closed	[H.11] - Challenge the Unknown	71111.20
A finding of very low safety significance (Green) and associated Non-cited Violation (NCV) of Title 10 of the <i>Code of Federal Regulations</i> Part 50 (10 CFR 50), Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed on March 5, 2025, due to the licensee's failure to follow procedures associated with an activity affecting quality. Specifically, during reactor coolant system (RCS) drain down activities on Unit 2, the reactor head was not properly vented and reactor vessel water level indication became unreliable as a result of the reactor vessel standpipe hose being configured to the wrong piping contrary to Dominion Procedure, 2-OP-5.4, "Draining the Reactor Coolant System."			

Failure to Prescribe Instructions Appropriate for Verifying Disk-to-Magnet Clearance Results in Relay Failure			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000338/2025002-02 Open/Closed	[H.12] - Avoid Complacency	71153
A finding of very low safety significance (Green) and NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed on November 12, 2024, when the 4160V Bus 1F undervoltage relay, 01-EP-27A-1NNSF05-RELAY-F(0A-B), failed to actuate during testing. Specifically, licensee procedure 1-PT-36.17A, "Channel Calibration for Station Blackout - Unit 1 Train A Bus 1D and Bus 1F," did not prescribe instructions appropriate for verifying adequate clearance between the relay's induction disk and magnet/coil assembly resulting in a frictional interference that prevented the relay from performing its function. As a result of the failure, the loss of power transfer bus system was declared inoperable in accordance with Technical Specifications (TS) Limiting Condition for Operations (LCO) 3.0.1 and 3.3.2.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000338/2024-003-00	LER 2024-003-00 for North Anna Power Station, Unit 1, Loss of Offsite Power Train A Relay Failure During Surveillance Testing	71153	Closed
LER	05000338/2024-003-01	LER 2024-003-01 for North Anna Power Station, Loss of Offsite Power Train A Relay Failure during Surveillance Testing	71153	Closed

PLANT STATUS

Unit 1 operated at or near rated thermal power throughout the entire inspection period.

Unit 2 began the inspection period shut down for refuel outage 2R30. The unit was restarted on April 5, 2025, and returned to rated thermal power on April 10, 2025, where it continued to operate 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 Sample (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness for seasonal extreme weather conditions prior to the onset of seasonal hot temperatures for the following systems:

- (1) Both units' emergency diesel generator systems and shared station blackout diesel generator system, on June 24, 2025.

71111.04 - Equipment Alignment

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

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

- (1) Unit 2 'A' and 'B' motor driven auxiliary feedwater system following testing, on April 17, 2025
- (2) Unit 2 'B' charging pump system during 'A' charging system planned maintenance, on May 28, 2025
- (3) Unit 1, boric acid transfer system following 'D' boric acid transfer pump testing, on June 17, 2025

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (6 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) Fire Area 12, service water pump house, on April 16, 2025
- (2) Fire Area 15-2, Unit 2, quench spray pump house (271' elevation), on April 17, 2025
- (3) Fire Area 6-1, Unit 1, emergency switchgear room and air conditioning room, on May 30, 2025
- (4) Fire Area 6-2, Unit 2, emergency switchgear room and air conditioning room, on May 30, 2025
- (5) Fire Area 9A-1, Unit 1, 'H' emergency diesel generator room, on June 20, 2025
- (6) Fire Area 9A-2, Unit 2, 'H' emergency diesel generator, on June 20, 2025

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

- (1) The inspectors evaluated the onsite fire brigade training and performance during announced fire drill 2-2 in the Unit 1, 'H' emergency diesel generator room, on May 30, 2025.

71111.06 - Flood Protection Measures

Flooding Sample (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated internal flooding mitigation protections in the Unit 2 safeguards building.

71111.07A - Heat Exchanger/Sink Performance

Annual Review (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness and performance of:

- (1) Unit 1, 'B' component cooling water heat exchanger, 1-CC-E-1B, under WO59203443656, on June 9, 2025

71111.11Q - Licensed Operator Regualification 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 main control room during the Unit 2 startup following refueling outage 2R30, on April 4-5, 2025.

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

- (1) The inspectors evaluated just-in-time training for Unit 2 startup activities from refueling outage 2R30, on March 26, 2025

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (1 Sample)

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

- (1) Periodic evaluation (March 1, 2023 - September 1, 2024)

71111.13 - Maintenance Risk Assessments and Emergent Work Control

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

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

- (1) Both units aggregate online risk in preparation for 'C' reserve station transformer (RSST), transformer 3, and transformer 5 planned outages, the week of April 11, 2025
- (2) Both units aggregate online risk, during transformer 5 and 'C' RSST out of service, 1J EDG fast start surveillance, U2 'A' steam dump valve stem to disc separation, the week of April 20, 2025
- (3) Both units aggregate online risk during emergent troubleshooting of the station blackout (SBO) battery charger after failed surveillance, and U2 'A' train steam dumps isolation, the week of April 28, 2025,
- (4) Unit 2 aggregate online risk during 'B' RSST outage, Unit 2 train A' steam dump isolation, and Unit 2 emergency diesel fast start surveillance, the week of May 12, 2025
- (5) Unit 1 aggregate online risk during, service water spray array piping and mechanical expansion joint replacements, and 'J' emergency diesel generator unplanned inoperability, the week of May 19, 2025

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (11 Samples)

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

- (1) CR1282870, 0-BSA-LU-1 Lubricator Has No Oil in Sight Glass and CR1282867, 0-BSA-LU-2 Lubricator Has No Oil in Sight Glass, on April 1, 2025
- (2) CR1285240, 2-FH-1 Valve Open Limit Switch Intermittent Actuation, on April 1, 2025
- (3) CR1288275, Multiple Fuel Oil Leaks 1-EE-EG-1H, on April 10, 2025
- (4) CR1289002, Partial Loss of U2 Pressurizer Heaters, on May 6, 2025
- (5) CR1288945, 1-CC-P-1A ('A' Component Cooling Pump) Pump Inboard Oil Level is <1/4; and CR1288944, 1-CC-P-1B ('B' Component Cooling Pump) Pump Inboard Oil Level is at <1/4, on May 23, 2025
- (6) CR1285945, 2-SI-MOV-2860A Exceed Test Plan Maximum Thrust During First Stroke, on June 12, 2025
- (7) CR1291978, Control Rods Did Not Step in on Program in Auto During TVFT, on June 12, 2025

- (8) CR1286212, Aux Building Central Exhaust Flow Did Not Rise As Expected During 0-PT-77.15B, on June 16, 2025
- (9) CR1294546, Loss of 'A' RSST and Auto-start of 1J EDG & 1-CH-P-1A, on June 23, 2025
- (10) CR1293409, Service Water Technical Specification Entered Unnecessarily, on June 26, 2025
- (11) CR1292604, 2-CH-P-1A Inboard Pump Bearing Oil Leak, on June 30, 2025

71111.20 - Refueling and Other Outage Activities

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

- (1) The inspectors evaluated Unit 2 refueling outage 2R30 activities from April 1 to April 10, 2025.

71111.24 - Testing and Maintenance of Equipment Important to Risk

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

Post-Maintenance Testing (PMT) (IP Section 03.01) (6 Samples)

- (1) Unit 1, 'A' motor driven auxiliary feedwater (AFW) pump and valve test, following motor operated valve 02-FW-MOV-200B-VALVOP stem inspection and lubrication under WO59203317707, on April 15, 2025
- (2) Unit 1, 'A' AFW steam generator hand control valve (HCV), 1-FW-HCV-100B, transmitter replacement and calibration following maintenance under tag request 1-25-FW-0005, on April 29, 2025
- (3) Unit 1, 'B' charging pump lube oil cooler service water temperature controller PMT, following maintenance under WO5910282185, on May 15, 2025
- (4) Unit 1, 'J' emergency diesel generator battery PMT, following maintenance under WO59203462587, on May 20, 2025
- (5) Unit 1, component cooling water heat exchanger PMT, following tube cleaning under WO59203443656, on June 13, 2025
- (6) Unit 2, 'C' main control room chiller PMT, following pressure control valve air line replacement under WO59203402304, on June 20, 2025

Surveillance Testing (IP Section 03.01) (3 Samples)

- (1) 1-PT-15.1, Boric Acid Transfer Pump (1-CH-P-2A) Test, on April 15, 2025
- (2) 2-PT-82J, 2J Emergency Diesel Generator Slow Start Test, on April 16, 2025
- (3) 2-PT-57.1A, Emergency Core Cooling Subsystem - Low Head Safety Injection Pump Test (2-SI-P-1A), on April 29, 2025

Inservice Testing (IST) (IP Section 03.01) (2 Samples)

- (1) 2-PT-71.1Q.1, 2-FW-P-2, Turbine Driven Auxiliary Feedwater IST Comprehensive Pump and Valve Test, following maintenance under WO59102966619, on April 4, 2025
- (2) 1-PT-71.2Q, 1-FW-P-3A, 'A' Motor-Driven AFW Pump and Valve Test, on April 11, 2025

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

- (1) 0-MPM-2000-01, 2/Year Full Load Test of Flex Equipment, on June 30, 2025

RADIATION SAFETY

71124.06 - Radioactive Gaseous and Liquid Effluent Treatment

Walkdowns and Observations (IP Section 03.01) (3 Samples)

The inspectors evaluated the following radioactive effluent systems during walkdowns:

- (1) 'A' and 'B' vent stack radiation monitors VG-RM-179 and VG-RM-180 and gaseous process vent monitor GW-RM-178.
- (2) Liquid radiological waste processing system equipment in the waste disposal building, including low level waste drain tanks, clarifier, clarifier proportional tank, and associated process radiation monitors.
- (3) Boron recovery tanks.

Sampling and Analysis (IP Section 03.02) (4 Samples)

Inspectors evaluated the following effluent samples, sampling processes and compensatory samples:

- (1) Clarifier proportional tank weekly sample.
- (2) Boron recovery tank vent weekly tritium and noble gas sample.
- (3) Plant vent stack weekly particulate, iodine, noble gas, and tritium sample.
- (4) Compensatory sampling records of gas sampling for plant vent stack radiation monitor 1-VG-RM-180 out of service from September 6, 2023, to September 11, 2023.

Dose Calculations (IP Section 03.03) (2 Samples)

The inspectors evaluated the following dose calculations:

- (1) Liquid waste release permit 25-CE-05
- (2) Gaseous waste release permit 25-MGR-56

Abnormal Discharges (IP Section 03.04) (2 Samples)

The inspectors evaluated the following abnormal discharges:

- (1) Abnormal gaseous release 22-AGR-01
- (2) Abnormal gaseous release 24-AGR-01

71124.07 - Radiological Environmental Monitoring Program

Environmental Monitoring Equipment and Sampling (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated environmental monitoring equipment and observed collection of environmental samples.

Radiological Environmental Monitoring Program (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the implementation of the licensee's radiological environmental monitoring program.

GPI Implementation (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated the licensee's implementation of the Groundwater Protection Initiative (GPI) program to identify incomplete or discontinued program elements.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS07: High Pressure Injection Systems (IP Section 02.06) (2 Samples)

- (1) Unit 1: High Pressure Injection Systems (April 1, 2024, to March 31, 2025)
- (2) Unit 2: High Pressure Injection Systems (April 1, 2024, to March 31, 2025)

MS10: Cooling Water Support Systems (IP Section 02.09) (2 Samples)

- (1) Unit 1: Cooling Water Systems (April 1, 2024, to March 31, 2025)
- (2) Unit 2: Cooling Water Systems (April 1, 2024, to March 31, 2025)

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

- (1) March 29, 2024, through June 27, 2025

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 corrective action program related to the following issue:

- (1) CR1238786, Exciter field breaker failed to open, review completed on June 11, 2025. The inspectors reviewed the condition report, logs, and wiring diagrams associated with the exciter field breaker failure and determined that a performance deficiency did not exist based on the event not being foreseeable or preventable. Specifically, through review of the vendor drawings, the licensee was able to determine that the vendor failed to correctly wire the internals of the exciter field breaker. Following identification, the licensee rewired, tested, and returned the breaker to service.

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 reports (LERs):

- (1) LER 05000338/2024-003-00, -01, Unit 1, Loss of Offsite Power Train A Relay Failure During Surveillance Testing (ADAMS Accession No. ML25009A028/ML25077A289). The inspection conclusions associated with this LER are documented in this report under Inspection Results Section IP 71153. One NCV of NRC requirements was identified. This LER and its associated supplement are closed.

INSPECTION RESULTS

Failure to Follow Procedure Results in Level Indication Issues During Reactor Vessel Drain Down			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000339/2025002-01 Open/Closed	[H.11] - Challenge the Unknown	71111.20
<p>A finding of very low safety significance (Green) and associated NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed on March 5, 2025, due to the licensee's failure to follow procedures associated with an activity affecting quality. Specifically, during reactor coolant system (RCS) drain down activities on Unit 2, the reactor head was not properly vented, and reactor vessel water level indication became unreliable as a result of the reactor vessel standpipe hose being configured to the wrong piping contrary to Dominion Procedure, 2-OP-5.4, "Draining the Reactor Coolant System."</p>			
<p><u>Description:</u> On March 5, 2025, while North Anna Unit 2 was shut down, in Mode 5 (Cold Shutdown) for its periodic refueling and maintenance outage, the licensee commenced activities to transition the unit into Mode 6 (Refueling- at least one reactor vessel head bolt is de-tensioned) for lifting of the reactor vessel head. These activities included draining water from the Unit 2 reactor coolant system in accordance with 2-OP-5.4, "Draining the Reactor Coolant System."</p> <p>Because of the infrequent, high-risk nature of this evolution and due to the potential to vent the reactor head or excessively drain the reactor coolant system to a level that could lead to uncovering or boiling in the reactor vessel core, operators rely on the reactor vessel level indication system (RVLIS) to assist in monitoring reactor water level and core cooling during this evolution. For the system to be reliable at its full range, the licensee must ensure the reactor standpipe tygon hose connection is properly configured and absent of any loop seals or kinks. Therefore, prior to commencing drain down, Dominion Procedure, 2-OP-5.4, "Draining the Reactor Coolant System," directs the licensee to ensure the system is ready for use by installing a flexible tygon hose on 2-DA-1009 and independently performing a walkdown of the system to ensure valves are properly aligned.</p> <p>On the morning of March 5, the licensee completed installation of the tygon hose and set up of the reactor vessel standpipe level indication system. At 0145, the licensee commenced draining water in the reactor coolant system from approximately 28% level in the pressurizer (301 inches above centerline) to a targeted water level of 74 inches in accordance with 2-OP-</p>			

5.4. Approximately four hours into the drain down, control room operators noted an anomaly between reactor water level indications. The licensee's cold shutdown RCS level transmitter, 2-RC-LT-203, stopped lowering at 163 inches and began to rise. As a result of this anomaly, the control room supervisor directed drain down activities to be momentarily suspended, and troubleshooting commenced to determine the cause. The licensee vented the suspected bubble by cycling vacuum breakers and noticed level immediately recover and stabilize at 196 inches. After observing RCS level stabilize, the licensee re-commenced drain down activities.

Within an hour of recommencing drain down activities, the operators observed the actual rate of drain down appeared to be faster than the calculated rate of drain down based on a graph and table in 2-OP-5.4 showing the volume of water that had been displaced. Due to the unexpected deviation between the indicated and calculated values, the licensee suspended drain down activities.

The licensee walked down the system and discovered the reactor standpipe tygon hose for the reactor head vent was configured to the pressurizer target rock solenoid vent valve instead of the reactor head standpipe hose connection, 2-DA-1009. The pressurizer target rock solenoid vent valve was closed at that time and was unable to provide a vent path for the reactor vessel head during drain down. This installation error caused the reactor vessel standpipe to pull a vacuum during reactor vessel drain down which caused the level indication in the reactor vessel standpipe to be inaccurate and unreliable. The licensee subsequently disconnected the hose from the incorrect location and installed it in the correct location. Drain down activities re-commenced that afternoon from 131 inches reactor water level with no issues.

The licensee captured this issue in its corrective program.

Corrective Actions: After identifying the anomalies during drain down, the licensee suspended drain down activities and performed a walk down of the affected reactor vessel level indication instruments and standpipe connections. A human performance review investigation was performed to understand the gaps contributing to the event. Enhancements were also made to in-field labeling to the standpipe hose connection to aid in easy identification of the connection.

Corrective Action References: CR1284788, CR1284883

Performance Assessment:

Performance Deficiency: The inspectors determined the licensee's failure to follow Dominion Procedure 2-OP-5.4, "Draining the Reactor Coolant System," Step 5.1.10.i was within the licensee's ability to foresee and correct and was therefore a performance deficiency. Specifically, the licensee installed the reactor head vent standpipe tygon hose to the piping between 2-RC-36 and the Unit 2 pressurizer head solenoid vent valve instead of to the piping between 2-RC-36 and 2-DA-1009.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Configuration Control 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, absent operator intervention, unreliable level indication could

lead to reactor water level falling below the reactor vessel flange, reducing time to core boiling, and ultimately impacting the shutdown key safety function of inventory.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix G, "Shutdown Operations Significance Determination Process." The inspectors referred to Attachment 1 of IMC 0609, App. G, for a Phase 1 Assessment to determine if the finding screened to Green.

The inspectors referred to Attachment 1, Exhibit 2, Part C- "Transient Initiators," and answered Question 9, "Loss of Level Control (LOLC) or Over Drain (OD) - For PWRs- did the initiator occur when reactor level was in reduced inventory? i.e. over drain, loss of inventory, or loss of level control? Working with the regional senior reactor analyst (SRA), the inspectors used Table G1 of the IMC and determined that the performance deficiency did not meet the screening criteria to go to Phase 2 as actual level was estimated to be approximately 122 inches and the lowest indicated level was 78 inches. Based on this information, the inspectors concluded that the performance deficiency did not result in entry into reduced inventory as defined by the IMC, and the finding screened to Green.

Cross-Cutting Aspect: H.11 - Challenge the Unknown: Individuals stop when faced with uncertain conditions. Risks are evaluated and managed before proceeding. During the human performance investigation, the licensee discovered the actual hose connection was obstructed from view due to nearby equipment in the vicinity. Additionally, the licensee also found that the labeling of the hose connection was inconsistent from the other unit's labeling and less conspicuous for operator identification. The inspectors found there were also some elements of complacency bias and proceeding in the face of uncertainty since the operators conducted independent verifications and were blindsided by the fact that the pressurizer piping fit perfectly for the standpipe hose connection and had not been aware that the standpipe hose and 2-DA-1009 piping connection requires a reducer be installed to allow proper fitment of the hose. Additionally, the licensee found that their staff did not have a questioning attitude regarding the labeling in the field which should have prompted the operators to stop or question in field conditions.

Enforcement:

Violation: 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," states, in part, that activities affecting quality shall be prescribed by documented instructions of a type appropriate to the circumstances, and shall be accomplished in accordance with these instructions, procedures, or drawings.

Dominion Procedure, 2-OP-5.4, "Draining the Reactor Coolant System, " Revision 81, step 5.1.10.i, requires, in part, that the reactor vessel head vent hose be installed from 2-RC-36 to 2-DA-1009.

Contrary to the above, on March 5, 2025, the licensee failed to accomplish an activity affecting quality when it did not ensure the reactor vessel level indication system was ready for use by installing the reactor vessel head vent hose from 2-RC-36 to 2-DA-1009 in accordance with Dominion procedure 2-OP-5.4, "Draining the Reactor Coolant System," Step 5.1.10.i. As a result, during drain down activities, the licensee failed to vent the reactor vessel, and electronic reactor water level indication became unreliable until actions were taken to restore level indication to normal.

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

Failure to Prescribe Instructions Appropriate for Verifying Disk-to-Magnet Clearance Results in Relay Failure

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000338/2025002-02 Open/Closed	[H.12] - Avoid Complacency	71153

A finding of very low safety significance (Green) and NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed on November 12, 2024, when the 4160V Bus 1F undervoltage relay, 01-EP-27A-1NNSF05-RELAY-F(0A-B), failed to actuate during testing. Specifically, licensee procedure 1-PT-36.17A, "Channel Calibration for Station Blackout - Unit 1 Train A Bus 1D and Bus 1F," did not prescribe instructions appropriate for verifying adequate clearance between the relay's induction disk and magnet/coil assembly resulting in a frictional interference that prevented the relay from performing its function. As a result of the failure, the loss of power transfer bus system was declared inoperable in accordance with TS LCO 3.0.1 and 3.3.2.

Description: On November 12, 2024, while the licensee was performing 1-PT-71.14 "Loss of Offsite Power - Train A Operational Test for Auxiliary Feedwater Pumps," it was expected that all four undervoltage relays would de-energize, triggering the intended system response. However, during step 6.10 of the test, it was observed that the expected system responses did not occur. Upon closer inspection, it was identified that one of the four undervoltage relays, 01-EP-27A-1NNSF05-RELAY-F(0A-B), failed to fully de-energize preventing the completion of the logic sequence.

The transfer bus undervoltage relays provide an anticipatory signal to actuate the following for the associated train on a loss of power to the unit's transfer buses:

Service Water Pump Auto Start
 Auxiliary Feed Pump Auto Start
 Stream Driven Auxiliary Feedwater Pump Inlet Steam Valve Open
 Air Ejector Steam Inlet Valve Close
 SBO Diesel Generator Start
 SBO Diesel Generator Output Breaker Close

The licensee determined the failure was caused by a mechanical misalignment of the relay disk. The disk was in slight contact with the coil/magnet assembly, introducing mechanical resistance that hindered its ability to rotate freely. As a result, the relay remained energized, preventing it from fully dropping out. Since the logic scheme requires all four relays to de-energize, this single failure interrupted the sequence, stopping the protective logic from actuating.

The failed relay was installed on August 14, 2024, in accordance with work order (WO)59203276966. The post maintenance test for this work order was the performance of 1-PT-36.17A, which performed the relay calibration. In addition, the relay was functionally tested in accordance with 1-PT-71.14 on August 26, 2024, with no issues noted. While the relay was satisfactorily functionally tested following installation, if the induction disk was sufficiently close to the magnet/coil assembly even minor drift can cause sufficient resistance

to impede rotation. This drift was the most likely source of the misalignment. The absence of explicit procedural guidance for verifying mechanical clearances allowed this condition to go undetected, highlighting a gap in existing calibration protocols.

Following an interview of personnel who normally perform the relay calibrations and installations, it was revealed that a guidance document is typically referenced during installation of the undervoltage relays. However, nothing requires the licensee to review/use the guidance document, and the licensee could not provide any evidence that it had been used during installation of the failed undervoltage relay on August 14, 2024. The guidance document includes specific instructions for space gap centering of the undervoltage relays. A copy of the document was provided to the inspectors for review.

Section III.I.4 of the guidance document states, in part, "Verify the disk is centered in the air gaps of the U-magnet and the drag magnet. The gap above and below the disk should be at least approximately 0.010 in."

The inspectors reviewed condition reports to determine whether the undervoltage relay has a history of similar failures and found no evidence of similar failures that would imply vendor quality issues.

Corrective Actions: The licensee replaced the relay and established corrective actions to revise procedures to include inspections verifying that the induction disk is free from obstructions.

Corrective Action References: CR1275932

Performance Assessment:

Performance Deficiency: The inspectors determined the licensee's failure to include appropriate acceptance criteria for calibration of the 4160V Bus 1F undervoltage relay, 01-EP-27A-1NNSF05-RELAY-F(0A-B), was a performance deficiency. Specifically, the licensee failed to include quantitative or qualitative acceptance criteria for verifying moving parts were unobstructed resulting in improper disk to magnet clearance and subsequent failure of the relay to actuate during testing.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Procedure Quality attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to include appropriate acceptance criteria for calibration of the 4160V Bus 1F undervoltage relay could have prevented an auto start signal to the 'A' motor driven AFW pump and the SBO diesel.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," the inspectors answered "yes" to Question 3, "Does the degraded condition represent a loss of the probabilistic risk assessment (PRA) function of one train of a multi-train TS system for greater than its TS-allowed outage time" and determined a detailed risk evaluation (DRE) by a SRA was warranted.

The SRA used SAPHIRE 8, version 8.2.11; the North Anna SPAR model, version 8.82, dated

September 26, 2023; NRC Inspection Manual Chapter 0609, Appendices A and F; and the Risk Assessment Standardization Project Manual, Volumes 1 and 2.

The SRA considered the failure of the undervoltage relay to be an actuation system failure for multiple components. This failure of the actuation system was modeled as failures to start for the 'A' motor driven auxiliary feedwater (MDAFW) pump, 'A' turbine driven auxiliary feedwater (TDAFW) steam admission valve failing to open, and the SBO diesel failing to start. Other components which received an actuation signal from this relay were not modeled since the equipment was normally running or the breakers were normally open thus the loss of those actuation signals would have negligible impact on plant risk.

The SRA gave credit for manual operator actions to recover the components that failed to start since plant procedures would direct operators to manually start those components if they failed to start automatically. Automatic implied changes to the SPAR due to a Failure to Start were overridden and returned to nominal values to allow for recovery, and the common cause component groups (CCCG) were conservatively adjusted from a population of two to a population of four for the MDAFW pump and TDAFW steam admission valve since there are multiple actuation signals sent to these components and the actuation system is not explicitly modeled in the SPAR. A larger CCCG results in a more realistic Common Cause Failure adjustment given an actuation signal failure vice an electrical or mechanical failure of the pump or valve itself. The SPAR model does not have any fire sequences for North Anna and the licensee does not have a complete Regulatory Guide 1.200 compliant fire PRA. However, the licensee is developing a fire PRA for a future 10 CFR 50.69 program Licensee Amendment Request. While this model has not yet been peer reviewed to meet the requirements of Regulatory Guide 1.200, it is considered the best available information for determining fire risk. This model was previously used in North Anna Unit 1 EDG K1 Relay failure SDP as the best available information. Based off this previous DRE, a ratio range of fire to internal events of 2.5-3.0 times the Internal event risk can be used to provide a conservative bounding value for fire risk.

The dominant accident sequence was a plant transient with a failure of all auxiliary feedwater, operators failing to restore main feedwater, and operators failing to align feed and bleed- the primary for decay heat removal for internal events. Cumulative risk for internal and external events was less than 1E-6 for change in core damage frequency; therefore, this finding is characterized as very low safety significance (GREEN).

Cross-Cutting Aspect: H.12 - Avoid Complacency: Individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Individuals implement appropriate error reduction tools. The vendor technical manual (VTM) associated with the undervoltage relays is used as a reference during installation. The VTM contains specific instructions for space gap centering of the undervoltage relays and provided the licensee an opportunity to incorporate the instructions to reduce risk and the possibility of mistakes.

Enforcement:

Violation: Title 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

Dominion Procedure 1-PT-36.17A, "Channel Calibration for Station Blackout- Unit 1 Train A

Bus 1D and Bus 1F,” is the procedure which provides instructions for performing channel calibration of the undervoltage protective relay 01-EP-27A-1NNSF05-RELAY-F(0A-B), an activity affecting quality.

North Anna TS LCO 3.0.1 requires, in part, that LCOs shall be met during the modes of applicability. TS LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,” requires, one channel/train of Auxiliary Feedwater - Loss of Offsite Power protection per bus (two buses) while in Modes 1, 2, and 3.

Contrary to the above, prior to November 12, 2024, the licensee failed to include appropriate quantitative or qualitative acceptance criteria for determining that 1-PT-36.17A, “Channel Calibration for Station Blackout – Unit 1 Train A Bus 1D and 1F,” was satisfactorily accomplished. Specifically, the licensee failed to have acceptance criteria to verify the disk to magnet air gap clearance for the 27A, phase A-B, 4160V Bus 1F undervoltage relay to ensure the disk was unobstructed. As a result of an obstruction, the relay was inoperable from August 26, 2024, to November 12, 2024, resulting in the licensee’s failure to meet TS LCOs 3.0.1 and 3.3.2, which requires one channel/train of Auxiliary Feedwater - Loss of Offsite Power protection per bus on Unit 1, while in the modes of applicability of the TS.

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

EXIT MEETINGS AND DEBRIEFS

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

- On July 17, 2025, the inspectors presented the integrated inspection results to Mr. James Jenkins, Site Vice President, and other members of the licensee staff.
- On June 27, 2025, the inspectors presented the radiation protection baseline inspection exit meeting inspection results to James Jenkins and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Procedures	0-GOP-4.1	Hot Weather Operations	Revision 49
		0-GOP-5.5	EDG Hot Weather Operations	Revision 14
71111.04	Drawings	12050-FM-095B SH-001	Flow/Valve Operating Numbers Diagram Chem and Volume Control System North Anna Power Station - Unit 2	Revision 44
		12050-FM-095B SH-002	Flow/Valve Operating Numbers Diagram Chem and Volume Control System North Anna Power Station - Unit 2	Revision 50
		12050-FM-096A SH-002	Flow/Valve Operating Numbers Diagram Safety Injection System North Anna Power Station - Unit 2	Revision 40
		12050-FM-096A SH-003	Flow/Valve Operating Numbers Diagram Safety Injection System North Anna Power Station Unit 2	Revision 34
	Procedures	1-OP-6.2A	Valve Checkoff – 1J Engine Cooling Water	Revision 10
		1-OP-6.4A	Valve Checkoff – 1J Lube Oil System	Revision 8
		1-OP-6.5A	Valve Checkoff – Post Operational Check	Revision 50
		1-OP-6.6A	Valve Checkoff – Pre-operational checks	Revision 30
		1-OP-6.7A	Valve Checkoff – Diesel Air	Revision 7
		2-OP-7.2A	Valve Checkoff – High Head Safety Injection System	Revision 16
		2-OP-8.1A	Valve Checkoff – Chemical and Volume Control, Auxiliary Building	Revision 38
71111.05	Drawings	11715-FAR-200	Site Fire Boundaries- Appendix 'R' Key Plan	Revision 10
		11715-FAR-206	Equipment Location - Appendix R	
	Miscellaneous	EP-0015	Fire Protection Information Relating to Appendix A to BTP 9.5-1, 1979 FP-SER and National Fire Protection Association (NFPA) Codes	Revision 0
71111.07A	Drawings	11715-FV-091B	Component Cooling Heat Exchangers Tube Sheet Bundle - Tube Identification, 1- CC-E-1B	Revision 3
	Procedures	0-MCM-0801-01	Cleaning and Plugging of Component Cooling Heat Exchanger Tubes	
	Work Orders	59203443656	Heat Exchanger Cleaning/Inspections/Tube Plugging	06/12/2025
71111.11Q	Procedures	2-OP-1.1	Unit Startup from Mode 5 at less than 140F to mode 5 at less than 200F	Revision 78
71111.12	Procedures	PIR1261993	Maintenance Rule a(3) Self Assessment for the period of 3/1/2023 - 9/1/2024	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.13	Procedures	1-OP-6.2	Operation of No. 1J Emergency Diesel Generator From Control Room	Revision 58
		OP-NA-601	Protected Equipment	Revision 17
71111.15	Calculations	EE-0511	North Anna Station Blackout 125vdc Battery System Design	07/26/2017
	Corrective Action Documents	CR1285945		
		CR1286212		
		CR1288945		
		CR1289002		
		CR1290602	00-AAC-BC-1 Unable to Supply 40 Amps at 125 vdc for at least 4 hours	05/01/2025
		CR1291978		
		CR1292604		
		CR1293409		
		CR1294546		
	Procedures	0-AP-10	Loss of Electrical Power	Revision 100
71111.24	Procedures	1-PT-15.1	Boric Acid Transfer Pump (1-CH-P-2A) Test	04/15/2025
		1-PT-71.2Q	1-FW-P-3A, A Motor-Driven AFW Pump and Valve Test	Revision 52
		2-PT-57.1A	Emergency Core Cooling Subsystem - Low Head Safety Injection Pump Test (2-SI-P-1A)	04/29/2025
		2-PT-82J	2J Emergency Diesel Generator Slow Start Test	4/16/2025
	Work Orders	59102966619		
		59203317707		
		59203402304		
		59203443656		
		59203443786		
		59203462587		
71124.06	Corrective Action Documents	CRs 1197850, 1243806, 1259438, 1272820, 1280276, and 1280634.		
71124.07	Corrective Action	CRs 1178506,		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Documents	1183283, 1183769, 1190294, 1190331, 1191168, 1199022, 1218445, and 1222879.		
	Procedures	0-ICP-MM-MIS-001P	Primary Meteorological Tower Instrumentation Calibration	Rev. 15
		HP-3051.010	Radiological Environmental Monitoring Program	Rev. 34
		HP-3051.020	Groundwater Protection Program	Rev. 16
	Work Orders	59203444978	Primary Meteorological Tower Instrument Calibration	02/19/2025
71151	Procedures	TEC-SE-0007	NRC Mitigating System Performance Index (MSPI) Basis Document North Anna Power Station Units 1 and 2	Revision 3
71152A	Corrective Action Documents	CR1238786		
71153	Miscellaneous	LER 05000338/2024-003-00, -01		