



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

EA-24-084

August 7, 2024

Nicole Flippin
Site Vice President
Catawba Nuclear Station
Duke Energy Carolinas, LLC
4800 Concord Road
York, SC 29745-9635

SUBJECT: CATAWBA NUCLEAR STATION – INTEGRATED INSPECTION REPORT
05000413/2024002 AND 05000414/2024002 AND APPARENT VIOLATION

Dear Nicole Flippin:

On June 30, 2024, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Catawba Nuclear Station. On August 5, 2024, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

Section 71111.15 of the enclosed report discusses a finding with an associated apparent violation for which the NRC has not yet reached a preliminary significance determination. This finding involved a failure to implement replacement preventive maintenance strategies for the R1A relay in the emergency diesel generator start control circuitry, which resulted in the 2A emergency diesel generator being inoperable.

We are currently evaluating the significance of this finding and will notify you in a separate correspondence once we have completed our preliminary significance review. We ask that you promptly provide any relevant information that you would like us to consider in making our determination. You will be given an additional opportunity to provide additional information prior to our final significance determination unless our review concludes that the finding has very low safety significance (i.e., Green). The NRC's significance determination process (SDP) is designed to encourage an open dialogue between your staff and the NRC; however, neither the dialogue nor the written information you provide should affect the timeliness of our final determination.

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

If you contest the 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 Catawba Nuclear Station.

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 Carman, Paul
on 08/07/24

Paul J. Carman, Acting Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos. 05000413 and 05000414
License Nos. NPF-35 and NPF-52

Enclosure:
As stated

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SUBJECT: CATAWBA NUCLEAR STATION – INTEGRATED INSPECTION REPORT
05000413/2024002 AND 05000414/2024002 AND APPARENT VIOLATION
DATED AUGUST 7, 2024

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NAME	D. Rivard	D. Jackson	P. Carman		
DATE	8/6/2024	8/6/2024	8/7/2024		

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 05000413 and 05000414

License Numbers: NPF-35 and NPF-52

Report Numbers: 05000413/2024002 and 05000414/2024002

Enterprise Identifier: I-2024-002-0020

Licensee: Duke Energy Carolinas, LLC

Facility: Catawba Nuclear Station

Location: York, South Carolina

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

Inspectors: D. Rivard, Senior Resident Inspector
A. Wang, Resident Inspector
S. Battenfield, Operations Engineer
T. Griffin, Project Engineer
B. Kellner, Senior Health Physicist
M. Kennard, Senior Operations Engineer
A. Nielsen, Senior Health Physicist
D. Restrepo, Health Physicist
M. Riley, Senior Project Engineer
J. Walker, Senior Emergency Preparedness Inspector

Approved By: Paul J. Carman, Acting Chief
Reactor Projects Branch 1
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting an integrated inspection at Catawba Nuclear Station, 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

Procedures Not Appropriate to the Circumstances Result in Seal Water Injection Filter Housing Failure			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000413,05000414/2024002-01 Open/Closed	None (NPP)	71111.12
The inspectors identified a Green finding and associated non-cited violation (NCV) of Technical Specification (TS) 5.4, “Procedures,” for the licensee’s failure to implement procedures appropriate to the circumstances for replacing reactor coolant pump seal water injection filters in accordance with Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Specifically, licensee procedure MP/0A/7150/060, “Pall-Trinity Filter Removal and Replacement,” did not contain instructions consistent with licensee procedure CNS-1206.02.01-0002, “Torque Requirements for Bolted Flange Joints,” to assess the conditions of the seal water injection filter housing studs/bolts.			

Failure to Implement Replacement Preventive Maintenance Strategies for Emergency Diesel Generator Run Relays			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Pending AV 05000413,05000414/2024002-02 Open EA-24-084	None (NPP)	71111.15
A self-revealed finding with its safety significance as yet to be determined (pending) and an associated apparent violation of TS 5.4, “Procedures,” was identified for the licensee’s failure to implement licensee procedures for preventive maintenance in accordance with Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Specifically, the licensee failed to develop replacement preventive maintenance strategies for relay R1A in the emergency diesel generator start control circuitry, in accordance with licensee procedure AD-EG-ALL-1202, “Preventive Maintenance and Surveillance Testing Administration.”			

Additional Tracking Items

None.

PLANT STATUS

Unit 1 operated at or near 100 percent rated thermal power (RTP) for the entire inspection period.

Unit 2 started the inspection period in a scheduled refueling outage. On April 16, 2024, the unit was returned to at or near 100 percent RTP and remained at or near 100 percent 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

71111.04 - Equipment Alignment

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

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

- (1) 1B emergency diesel generator (EDG) during 1A EDG inoperability for control power battery equaling charge on June 7, 2024
- (2) 1A and 2B auxiliary feedwater (CA) pumps during #2 turbine driven auxiliary feedwater pump testing on June 13, 2024

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 20: Unit 2 auxiliary building, elevation 594, and Unit 1 electrical penetration room (room 576) on April 5, 2024
- (2) Fire area 12: Unit 2, auxiliary building, elevation 577, electrical penetration room (room 484) on April 25, 2024
- (3) Fire area 40: Unit 1, auxiliary building, elevation 543, CA pump (room 254) on May 28, 2024

- (4) Fire area 26: 1B EDG (room 304) on June 7, 2024
- (5) Fire area 39: Unit 2 auxiliary building, elevation 543, CA pump (room 264) on June 13, 2024
- (6) Fire area 25: 1A EDG (room 302) on June 18, 2024

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

- (1) The inspectors evaluated the onsite fire brigade training and performance during an unannounced fire brigade drill in the Unit 1 turbine building on April 26, 2024.

71111.07A - Heat Exchanger/Sink Performance

Annual Review (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness and performance of:

- (1) 2B component cooling (KC) heat exchanger tube

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 during the performance of PT/1/A/4250/02C, "Turbine Control Valve Movement," on May 18, 2024.

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

- (1) The inspectors observed and evaluated an active simulator examination and critique on June 12, 2024.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

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

- (1) Nuclear condition report (NCR) 02507597, seal water injection filter failure
- (2) NCR 02507763, 2A EDG failed to generate voltage on automatic start

Quality Control (IP Section 03.02) (1 Sample)

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

- (1) Engineering change (EC) 418780, EDG room ventilation controller commercial grade dedication process following 2A EDG controller failure

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (2 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) Risk profile evaluation for work order (WO) 20615068, inspect breaker for battery charger, SDSC1, on May 13, 2024
- (2) Protected equipment plan, PRTT-1-24-1B EDG OOS-0146, for extended maintenance window for 1B EDG, on June 18, 2024

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (2 Samples)

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

- (1) NCR 02507763, 2A EDG failed to generate voltage on automatic start
- (2) NCR 02509245, motor-operated isolation valve, 2KF101B, failed 2B engineered safety feature testing

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modification:

- (1) EC 424095, adjusting bias on remaining 'A' loop resistance temperature detectors (RTDs) due to 2A3 RTD out of service

71111.20 - Refueling and Other Outage Activities

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

- (1) The inspectors evaluated refueling outage C2R26 activities from April 1, 2024, to April 13, 2024.

71111.24 - Testing and Maintenance of Equipment Important to Risk

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

Surveillance Testing (IP Section 03.01) (3 Samples)

- (1) PT/0/A/4400/008 B, "RN Flow Balance Train B," on May 25, 2024
- (2) IP/1/A/3200/001B, "Unit 1 B Train Solid State Protection System Periodic Test," on May 30, 2024
- (3) PT/2/A/4250/003 C, "Turbine Driven Auxiliary Feedwater Pump #2 Performance Test," on June 13, 2024

Inservice Testing (IST) (IP Section 03.01) (3 Samples)

- (1) 1A CA pump inservice test, WO 20646260
- (2) PT/2/4200/013 E, "CA (Auxiliary Feedwater) Valve Inservice Test (QU)," on June 11, 2024
- (3) PT/2/A/4200/029, "SA (Steam Supply to Auxiliary Equipment) Valve Inservice Test (QU)," on June 12, 2024

Ice Condenser Testing (IP Section 03.01) (1 Sample)

- (1) MP/0/A/7150/005, "Ice Basket Weigh Determination," on April 1, 2024

71114.01 - Exercise Evaluation

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

- (1) The inspectors evaluated the biennial emergency plan exercise during the week of May 6, 2024. The simulated scenario began with a crane motor fire during movement of a spent fuel cask to dry storage from the spent fuel pool. Due to the location at the time of the fire, an Unusual Event was declared. The scenario simulated escalation of the event which required declaration of an Alert, followed by declaration of a Site Area Emergency due to lowering spent fuel pool level. The scenario also included an event which required offsite response organizations to demonstrate their ability to implement emergency actions.

71114.04 - Emergency Action Level and Emergency Plan Changes

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

- (1) The inspectors evaluated submitted emergency action level, Emergency Plan, and Emergency Plan Implementing Procedure changes during the week of May 6, 2024. This evaluation does not constitute NRC approval.

71114.08 - Exercise Evaluation - Scenario Review

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

- (1) The inspectors reviewed and evaluated in-office, the proposed scenario for the biennial emergency plan exercise at least 30 days prior to the day of the exercise.

RADIATION SAFETY

71124.04 - Occupational Dose Assessment

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

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

External Dosimetry (IP Section 03.02) (1 Sample)

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

Internal Dosimetry (IP Section 03.03) (2 Samples)

The inspectors evaluated the following internal dose assessments:

- (1) Internal dose assessment for worker RP# 207563 (10/03/2022)
- (2) Tritium bioassay baseline and post dive analysis and documentation for three divers in the refuel pool (3/14 to 3/21/2022)

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

The inspectors evaluated the following special dosimetric situations:

- (1) Multi-badging documentation for three divers in the refuel pool (3/14 to 3/21/2022)
- (2) Monitoring documentation for four declared pregnant workers monitored during the period 09/01/2022 to 5/1/2024

71124.05 - Radiation Monitoring Instrumentation

Walkdowns and Observations (IP Section 03.01) (8 Samples)

The inspectors evaluated the following radiation detection instrumentation during plant walkdowns:

- (1) Portable ion chambers stored for use
- (2) Portable telepoles stored ready for use
- (3) Personnel contamination monitors at the radiologically controlled area (RCA) exit
- (4) Portal monitors at the RCA exit
- (5) Small article monitors at the RCA exit
- (6) Continuous air monitors in the auxiliary building
- (7) Area radiation monitors in the auxiliary building
- (8) Count room instruments (gamma spectroscopy, liquid scintillation, and automated smear counters)

Calibration and Testing Program (IP Section 03.02) (13 Samples)

The inspectors evaluated the calibration and testing of the following radiation detection instruments:

- (1) 2-EMF-53A, containment high-range area radiation monitor, A-train, 12/02/2021 and 05/27/2023
- (2) 2-EMF-53B, containment high-range area radiation monitor, B-train, 12/02/2021 and 05/27/23
- (3) Ludlum Model 9-3 ion chamber, EnRad ID 11977, 01/29/2024
- (4) Mirion Telepole, EnRad ID 11815, 9/11/2023
- (5) Mirion GMP-12GSD smart probe, EnRad ID 16260, 10/16/2023
- (6) 1-EMF-12, control room radiation monitor, 5/17/2016 and 06/07/2021
- (7) ARGOS, personnel contamination monitor, EnRad ID 12887, 06/21/2023
- (8) ARGOS, personnel contamination monitor, EnRad ID 12888, 06/21/2023
- (9) Chronos, small article monitor, EnRad ID 12244, 06/21/2023
- (10) Chronos, small article monitor, EnRad ID 12246, 06/21/2023
- (11) GEM-5, portal monitor, EnRad ID 13560, 11/20/2023
- (12) iCAM, continuous air monitor, EnRad ID 13257, 02/14/2024
- (13) Detector #1, gamma spectroscopy unit, 10/20/2023

Effluent Monitoring Calibration and Testing Program Sample (IP Section 03.03) (3 Samples)

The inspectors evaluated the calibration and maintenance of the following radioactive effluent monitoring and measurement instrumentation:

- (1) 2-EMF-36, plant vent gas, 06/29/2021 and 07/05/2023
- (2) 0-EMF-49, liquid radwaste discharge low range and high range monitor channels, 05/17/2022 and 03/02/2024
- (3) Unit 1 containment purge filter train performance test, trains A and B, 04/18/2023 and 06/13/2023

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

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

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

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

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

MS08: Heat Removal Systems (IP Section 02.07) (2 Samples)

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

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

- (1) July 1, 2023, through March 31, 2024

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

- (1) July 1, 2023, through March 31, 2024

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

- (1) July 1, 2023, through March 31, 2024

INSPECTION RESULTS

Procedures Not Appropriate to the Circumstances Result in Seal Water Injection Filter Housing Failure			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000413,05000414/2024002-01 Open/Closed	None (NPP)	71111.12
<p>The inspectors identified a Green finding and associated NCV of TS 5.4, "Procedures," for the licensee's failure to implement procedures appropriate to the circumstances for replacing reactor coolant pump seal water injection filters in accordance with Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Specifically, licensee procedure MP/0A/7150/060, "Pall-Trinity Filter Removal and Replacement," did not contain instructions consistent with licensee procedure CNS-1206.02.01-0002, "Torque Requirements for Bolted Flange Joints," to assess the conditions of the seal water injection filter housing studs/bolts.</p>			
<p>Description: On March 4, 2024, at 1528, the Unit 2 control room received annunciator 2AD-7/C-4 'NCP Seal Water Lo Flow.' All four Unit 2 reactor coolant pump seal water flows were observed to have lowered by approximately 0.5 gpm. The licensee entered AP/2/A/5500/008, "Reactor Coolant Pump Malfunction," based on the low seal water flow alarm. Operators dispatched to investigate the status of the Unit 2 seal water injection filters and piping, reported visible observation of leakage suspected to be from the 2A seal water injection filter. The control room operators entered procedure AP/2/A/5500/10, "Reactor Coolant System Leak," based on the observed leakage and Unit 2 volume control tank (VCT) level trends. Leakage attributed to the 2A seal water injection filter leak reached approximately 5 gpm based on Unit 2 VCT level trending. The 2A seal water injection filter was isolated per AP/2/A/5500/10. The 2B seal water injection filter was placed in service and Unit 2 charging and letdown flows were restored to normal.</p>			
<p>Licensee assessment of previous failures on the 2B seal water injection filter in 2018 identified issues with torque applied to the trunnion bolts. The torque over time caused wear on the filter housing lid in conjunction with yielding/deformation of the trunnion bolts, which</p>			

resulted in a gap in the lid to the filter housing joint, which allowed the 2B seal injection filter to fail at the O-ring. Licensee corrective actions in 2018 included replacing the seal injection filter housings and associated hardware for both Units 1 and 2. The 2A seal water injection filter was last replaced in February 2019. Corrective action also included reducing torque values from 275 ft-lbs to 150 ft-lbs to increase margin to yield stress.

Failure of the 2A seal injection filter also showed plastic deformation on the bolts and failure at the seal injection filter O-ring, but there was no gap or deformation identified in the housing joint. The licensee noted that there was considerably less damage associated with the O-ring rupture than in the previous 2B failure. The licensee attributed the failure of the 2A seal water injection filter to inadequate margin to both the yield stress and minimum required closure force due to the material limitations of the bolting material.

CNS-1206.02.01-0002, "Torque Requirements for Bolted Flange Joints," provides details regarding the torquing of flanged joints. Procedure step 5.1, "Stud and Nut Condition," stated, "Check studs and nuts visually for condition of threads. Threads should be clean and thread conditions should be such that the nut can be freely run on by hand. Nut face and the matching joint surface should be smooth and free of pits, gouges, or other imperfections."

The licensee used procedure MP/0A/7150/060, "Pall-Trinity Filter Removal and Replacement," to replace seal water injection filters and the associated hardware. The filter replacement involved loosening the securing bolts to access the filter and replace it but did not require an assessment of the bolt conditions. During the removal of the filter for replacement, step 11.3.2 states to, "Loosen swing bolts securing cover assembly to vessel with socket wrench and extension, NO more than 2 to 3 turns." There is an additional note which states, "IF bolts are not replaced, do NOT attempt to remove bolts." By limiting the positioning of the bolts, the ability to perform inspection of the bolts is limited. The procedure did not provide instructions to inspect the condition of the bolts for degradation. Step 11.4.1 provided instructions on how to replace the bolting, but there were no guidelines as to what would warrant replacement of the bolting.

Corrective Actions: The licensee replaced the bolts on 2A seal injection filter housing unit. Work requests were also generated for the replacement of the 1A, 1B, and 2B filter housing bolts. Additionally, the licensee plans to assess replacing the bolts with alternate bolting material to gain additional margin to yield strength. The licensee also plans to evaluate the maintenance strategy to consider practices such as checking gaps in housing-to-housing cover joint, checking washers for galling, cleaning, sealing, and seating surfaces, and ensuring bolts are properly lubricated and free of debris.

Corrective Action References: NCR 02190684, NCR 02507597, EC 413352

Performance Assessment:

Performance Deficiency: The licensee's failure to visually check the condition of the seal water injection filter bolts in accordance with licensee procedure CNS-1206.02.01-0002, was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Procedure Quality attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the lack on visual inspection on the bolts during filter

replacements allowed the degraded condition of the bolts to go undetected. The plastic deformation of the bolts eventually resulted in failure of the seal water injection filters and low reactor coolant pump (RCP) seal flow. Additionally, the process to identify and isolate the seal water injection filter leak created adverse plant conditions (low seal injection flow which led to high RCP vibrations), which if prolonged would have required the operators to trip the reactor.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using IMC 0609 Exhibit 1, "Initiating Events Screening Questions," inspectors determined the finding was of very low safety significance (Green), because after a reasonable assessment of degradation, the inspectors determined the finding likely would not have affected other systems used to mitigate a loss of coolant accident.

Cross-Cutting Aspect: Not present performance (NPP). No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: TS 5.4.1, states in part, written procedures shall be established, implemented, and maintained covering applicable procedures recommended in Regulatory Guide (RG) 1.33, Revision 2, Appendix A, February 1978. RG 1.33, Section 9, requires in part that maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances.

Licensee procedure MP/0A/7150/060, "Pall-Trinity Filter Removal and Replacement," was used to replace seal water injection filters and the associated hardware. Licensee procedure CNS-1206.02.01-0002, "Torque Requirements for Bolted Flange Joints," provides details regarding bolting material for flanged joints. Step 5.1, "Stud and Nut Condition," states, "Check studs and nuts visually for condition of threads. Threads should be clean and thread conditions should be such that the nut can be freely run on by hand. Nut face and the matching joint surface should be smooth and free of pits, gouges, or other imperfections."

Contrary to the above, since at least 2012, the licensee failed to implement procedures appropriate to the circumstances during maintenance activities to replace the reactor coolant pump seal water injection filters. Specifically, licensee procedure MP/0A/7150/060, did not contain instructions consistent with licensee procedure CNS-1206.02.01-0002, to assess the conditions of the seal water infection filter housing studs/bolts; nor did it contain instructions on when to replace the studs/bolts.

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

Failure to Implement Replacement Preventive Maintenance Strategies for Emergency Diesel Generator Run Relays			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Pending AV 05000413,05000414/2024002-02 Open EA-24-084	None (NPP)	71111.15
<p>A self-revealed finding with its safety significance as yet to be determined (pending) and an associated apparent violation of TS 5.4, "Procedures," was identified for the licensee's failure to implement licensee procedures for preventive maintenance in accordance with Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Specifically, the licensee failed to develop replacement preventive maintenance strategies for relay R1A in the emergency diesel generator (EDG) start control circuitry, in accordance with licensee procedure AD-EG-ALL-1202, "Preventive Maintenance and Surveillance Testing Administration."</p> <p><u>Description:</u> On March 5, 2024, during performance of procedure PT/2/A/4350/002 A, "Diesel Generator 2A Operability Test," Enclosure 13.1, for surveillance with start signal provided by procedure PT/2/A/4200/009 A, "Auxiliary Safeguards Test Cabinet Periodic Test," Enclosure 13.19, safety injection (K-608) – train A, 2A EDG failed to flash the generator field. Therefore, 2A EDG was declared inoperable; TS limiting condition for operation condition 3.8.1.B was entered.</p> <p>The cause of the failure of 2A EDG was attributed to R1A relay in the start control circuit. Analysis showed a set of normally open contacts of relay R1A exhibited high and unstable resistance at times with the relay latched. Relay R1A is normally de-energized and it allows an emergency shutdown reset to the voltage regulator with the relay latched. Without the reset, voltage will not be developed on startup and the diesel cannot perform its function. Relay R1A for 2A EDG was installed at initial construction and had approximately 38 years of service life at the time of failure.</p> <p>DPC-1381.05-00-0018, "Cutler-Hammer Relay Qualified Life Analysis" dated April 1997, evaluates the estimated life of the relay based on the ambient temperature conditions as well as the percent of time the relay is energized. Higher temperatures and higher utilization of the relay correlate to a lower estimated lifespan of the relay. The normally de-energized R1A relay is infrequently energized during EDG surveillance testing. The estimated lifespan can vary from 17.24 years assuming constant ambient temperatures of 120°F and a 20 percent duty cycle to as long as 339.7 years assuming constant ambient temperatures of 80°F and a five percent duty cycle. The licensee calculated a service life of 77 years based on an ambient temperature of 100°F and a duty cycle of 10 percent.</p> <p>WCAP-15977-NP, "Reliability Assessment of Cutler-Hammer D26MR802A Relays Used as SSPS Slave Relays," dated June 2003, is a Westinghouse reliability assessment of normally de-energized D26 series Cutler-Hammer relays. WCAP-15977 discusses that given appropriate conditions including cleanliness, temperature, and humidity, normally de-energized D26 series Cutler-Hammer relays can be expected to last at least for a plant's 40-year life span, and that factors such as high temperatures and high relative humidity can contribute to the accelerated failure mechanism of high resistance on relay contacts via pitting, corrosion, or contamination. Although the EDG room that the relay is located in has a ventilation system to control ambient temperature, the humidity of the room is not controlled and varies based on outside air that is drawn into the room.</p>			

In 2015, Calculation CNC -1301.00-00-0009, "Emergency Diesel Generator Controls Failure Modes and Effects Analysis," (FMEA) was prepared to support the maintenance strategy for the EDG control system components including relays. Replacement preventive maintenance was recommended if failure of the component resulted in the EDG not being able to perform its function and failure of the component is not detected immediately. The licensee identified a failure mode for relay R1A that would make the EDG inoperable and would not be detected immediately (i.e., until the next monthly EDG surveillance). However, relay R1A was incorrectly classified as having failure modes that are detectable immediately upon failure in Calculation CNC -1301.00-00-0009. Therefore, the licensee did not consider relay R1A for replacement as prescribed by the preventive maintenance strategy in procedure AD-EG-ALL-1202, "Preventive Maintenance and Surveillance Testing Administration, Rev. 13." Procedure AD-EG-ALL-1202 states, "ER [equipment reliability] Classification 1, Critical, equipment has the highest reliability goal of no failures that result in unacceptable consequences for nuclear safety or generation." The R1A relay is classified as ER Classification 1.

Corrective Actions: The licensee developed a one-time replacement preventive maintenance strategy and replaced the R1A relay in the 2A EDG. Corrective actions were initiated to also replace the R1A relay in the remaining EDGs.

Corrective Action References: Nuclear Condition Report 02507690

Performance Assessment:

Performance Deficiency: The licensee's failure to develop preventive maintenance strategies for the replacement of the R1A relay in the EDG start control circuitry in accordance with licensee procedure AD-EG-ALL-1202 is a performance deficiency.

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, a failure mode was identified for the R1A relay that rendered the diesel generator inoperable and could remain undetected at the time of failure.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating Systems Screening Questions," the inspectors determined a detailed risk evaluation was required because the condition represents a loss of the PRA function of one train of a multi-train TS system for greater than its TS allowed outage time. The significance determination for the finding is pending an initial significance characterization.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: TS 5.4, "Procedures," states in part, written procedures shall be established, implemented, and maintained covering applicable procedures recommended in Regulatory Guide (RG) 1.33, Revision 2, Appendix A, February 1978. Section 9.b. of RG 1.33, requires in part that, the preventive maintenance schedules should be developed to specify

replacement of such items that have a specific lifetime. Licensee procedure AD-EG-ALL-1202, "Preventive Maintenance and Surveillance Testing Administration," Rev. 13, Section 5.2.3 2. requires in part the development of maintenance strategies with the goal of no failures that result in unacceptable consequences to nuclear safety or generation.

Contrary to the above, since 2015, the licensee failed to develop preventive maintenance strategies for the replacement of items with a specific lifetime. Specifically, the licensee did not develop replacement preventive maintenance strategies (i.e., replacement schedule) in accordance with procedure AD-EG-ALL-1202 for relay R1A. Consequently, relay R1A remained installed past the licensee-determined replacement frequency and experienced an undetectable failure that rendered the 2A EDG inoperable.

Enforcement Action: This violation is being treated as an apparent violation pending a final significance (enforcement) determination.

EXIT MEETINGS AND DEBRIEFS

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

- On May 9, 2024, the inspectors presented the emergency preparedness exercise inspection results to Nicole Flippin and other members of the licensee staff.
- On May 9, 2024, the inspectors presented the radiation safety inspection results to Nicole Flippin and other members of the licensee staff.
- On August 5, 2024, the inspectors presented the integrated inspection results to Nicole Flippin and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.05	Corrective Action Documents		02514151, 02517770	
71114.01	Procedures	AD-EP-ALL-0109	Offsite Protective Action Recommendations	11
71114.01	Procedures	AD-EP-ALL-0202	Emergency Response Offsite Dose Assessment	9
71114.01	Procedures	AD-EP-ALL-0304	State and County Notifications	7
71114.04	Miscellaneous	EREG 02486363	10 CFR 50.54(q) Review Form for AD-EP-ALL-0203, Field Monitoring During Declared Emergency, Rev. 8	09/18/2023
71114.04	Miscellaneous	EREG 02504878	10 CFR 50.54(q) Review Form for AD-EP-ALL-0109, Offsite Protective Action Recommendations, Rev. 10	02/26/2024
71114.04	Procedures		Catawba EAL Technical Basis	5
71114.04	Procedures	AD-EP-ALL-0203	Field Monitoring During Declared Emergency	8
71114.08	Procedures	CSD-EP-CNS-0101-02	Catawba EAL Wallchart - HOT & COLD	2
71114.08	Procedures	EP-ALL-EPLAN	Duke Energy Common Emergency Plan	5
71114.08	Procedures	EP-CNS-EPLAN-ANNEX	Duke Energy Catawba Emergency Plan Annex	2
71114.08	Self-Assessments	22-05	CNS 2022 NRC Graded Exercise	09/15/2022
71124.04	Calculations		CNS ISFSI Neutron to Gamma Ratio Characterization	Unknown
71124.04	Calculations		CNS Alpha Program Information	08/29/2023
71124.04	Calculations	CSD-RP-ALL-4002	Catawba Passive Whole-Body Sensitivity Study	2
71124.04	Calibration Records	AD-RP-ALL-4013, Attachment 1	Area DLR Monitoring Report(s) for the period 6/16/2022 through 2/18/2024	Various
71124.04	Corrective Action Documents		AR 02441703, 02451448, 02452339, 02459533, 02467917, 02471768, 02474807, 02477984, and 02487588	Various
71124.04	Miscellaneous		Duke Energy Dosimetry Laboratory NVLAP Certificates of Accreditation to ISO/IEC 17025:2017. NVLAP LAB CODE: 100505-0 for the period 04/01/2022 through 03/31/2025	Various
71124.04	Procedures	AD-RP-ALL-7009	Whole Body Counter Cross Checks	0
71124.04	Procedures	CSD-RP-ALL-4002	Catawba Passive Whole-Body Sensitivity Study	2

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71124.04	Self-Assessments	AR 02405708	2022 Internal Dosimetry Program Assessment	11/05/2022
71124.04	Self-Assessments	AR 02448679	2023 Dosimetry Lab Internal Audit [Performed by corporate audit group]	05/11/2023
71124.04	Self-Assessments	AR 02451290	2022 Dosimetry Lab NVLAP On-Site Assessment [Performed by NIST]	11/22/2022
71124.05	Corrective Action Documents Resulting from Inspection	AR 02515524	Mirion Hand & Foot monitor #12576 failed weekly source check	
71124.05	Corrective Action Documents Resulting from Inspection Procedures	AR 02515561	Security Door not working properly (repaired under WR 20268684)	05/08/2024
71124.05	Corrective Action Documents Resulting from Inspection	AD-EP-ALL-1000	Conduct of Emergency Preparedness	05/08/2024
71151	Procedures Calculations	AD-PI-ALL-0100	Corrective Action Program	11
71151	Procedures	CN-1381.05-00-0001	MPR Evaluation of EDG Transient Response to Off Normal Voltage	30
71152A	Calculations Miscellaneous	CNC-1301.00-00-0009	Emergency Diesel Generator Controls Failure Modes and Effects Analysis (FMEA)	08/03/2018
71152A	Calculations	DPC-1381-05-00-0018	Cutler-Hammer Relay Qualified Life Analysis	11
71152A	Calculations	1A EDG Load Reject Voltage Recording		0
71152A	Miscellaneous Procedures	AR 02493138	Part 21 Discovery Checklist	12/12/2023
71152A	Miscellaneous	AD-EG-ALL-1206	Equipment Reliability Classification	09/20/2023
71152A	Work Orders	20639995		7