



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

April 28, 2020

Mr. Tom Simril
Site Vice President
Duke Energy Carolinas, LLC
5800 Concord Road
York, SC 29745

SUBJECT: CATAWBA NUCLEAR STATION – INTEGRATED INSPECTION REPORT
05000413/2020001 AND 05000414/2020001

Dear Mr. Simril:

On March 31, 2020, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Catawba Nuclear Station. On April 27, 2020, 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.

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

If you contest the violation or the significance or severity of the violation documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC Resident Inspector at Catawba Nuclear Station.

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 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."

T. Simril

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Sincerely,

/RA/

Frank J. Ehrhardt, 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
05000413/2020001 AND 05000414/2020001 Dated April 28, 2020

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ADAMS ACCESSION NUMBER: ML20120A001

OFFICE	RIIDRP	RIIDRP	RIIDRP	RIIDRP
NAME	J. Austin	C. Scott	J. Worosilo	F. Ehrhardt
DATE	4/28/2020	4/28/2020	4/28/2020	4/48/2020

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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: 05000413/2020001 and 05000414/2020001

Enterprise Identifier: I-2020-001-0065

Licensee: Duke Energy Carolinas, LLC

Facility: Catawba Nuclear Station

Location: York, South Carolina

Inspection Dates: January 01, 2020 to March 31, 2020

Inspectors: J. Austin, Senior Resident Inspector
C. Scott, Resident Inspector

Approved By: Frank J. Ehrhardt, 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

Failure to Correct a Significant Condition Adverse to Quality associated with the 1A EDG Connecting Rod Bearing			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000413/2020001-01 Open/Closed	[P.2] - Evaluation	71152
An NRC identified Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified for the licensee's failure to implement effective corrective actions to prevent repetition of a significant condition adverse to quality regarding connecting rod bearing rotations on the 1A diesel generator (EDG). Specifically, the number 3 connecting rod was found rotated approximately 48 degrees following a 24-hour diesel run in November 2019. Previously, the number 6 connecting rod bearing was found rotated approximately 76 and 192.5 degrees on diesel runs in 2014 and 2016, respectively.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000414/2019-004-00	LER 2019-004-00 for Catawba Nuclear Station, Unit 2, Condition Prohibited by Technical Specification and Loss of Safety Function due to Refueling Water Storage Tank Volume Below the Minimum Requirement	71153	Closed
LER	05000414/2019-005-00	LER 2019-005-00 for Catawba Nuclear Station, Unit 2, Containment Spray System Actuation due to Interaction of Procedure Enclosures Performed Concurrently	71153	Closed

PLANT STATUS

Unit 1 began the inspection period at 100 percent rated thermal power (RTP). On February 12, 2020, Unit 1 scrambled in response to a turbine trip caused by a loss of excitation to the generator. The loss of excitation was caused by a loss of electrical continuity between the exciter brushes and collector rings. The licensee repaired the exciter brushes and collector rings, commenced a reactor startup on February 15, 2020, and synchronized to the grid on February 16, 2019. The unit achieved 100 percent on February 17, 2020 and remained at full power through the end of the inspection period.

Unit 2 operated at or near 100 percent RTP for the entire 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/readingrm/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." From January 1 – March 19, 2020, the inspectors performed plant status activities described in IMC 2515, Appendix D, "Plant Status," and conducted routine reviews using IP 71152, "Problem Identification and Resolution." 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.

Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time the resident inspectors performed periodic site visits each week and during that time conducted plant status activities as described in IMC 2515, Appendix D; and observed risk significant activities when warranted. In addition, resident and regional baseline inspections were evaluated to determine if all or portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In the cases where it was determined the objectives and requirements could not be performed remotely, management elected to postpone and reschedule the inspection to a later date."

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Impending Severe Weather Sample (IP Section 03.02) (2 Samples)

- (1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather including heavy rain on February 5, 2020.
- (2) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather with tornado warnings on February 6, 2020.

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (4 Samples)

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

- (1) Walkdown of 2A residual heat removal (ND) pump when 2B ND pump was out of service (OOS) for maintenance on January 21, 2020
- (2) "A" train of control room area ventilation chilled water (VC/YC) on February 2, 2012
- (3) 1A EDG on March 3, 2020
- (4) Unit 1 auxiliary feedwater pumps on March 4, 2020

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) Unit 1 and Unit 2 containment spray (NS) pumps, fire area 1, on January 21, 2020
- (2) Safe shutdown facility (SSF), fire area SSF, on January 29, 2020
- (3) Service water structure, fire area 29, 30, on February 3, 2020
- (4) Unit 1 interior doghouse, fire area 49, on February 12, 2020
- (5) Unit 1 auxiliary building, elevation 596, fire area 22, on February 12, 2020
- (6) Unit 1 electrical penetration room, elevation 594, fire area 20, on March 4, 2020

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 control room during Unit 1 reactor startup on February 14, 2020.

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

- (1) The inspectors observed and evaluated a simulator scenario with loss of main feedwater, reactor trip, 2 rods stuck out, emergency action level classifications, and failed fuel on March 10, 2020.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (3 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) Maintenance Rule (MR) evaluation for condition report (CR) 2310738, 1A EDG field flash failure, on January 28, 2020
- (2) CR 2297753, Safety related valve not stored in accordance with quality assurance, on January 30, 2020
- (3) Work request (WR) 20363152, 1NC-56B Reactor water pump discharge containment isolation valve (CIV) failed to open, on January 30, 2020

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) Yellow risk during Unit 1 turbine building heavy lift (main turbine low pressure rotor), on January 8, 2020
- (2) Work to repair 1A EDG after field did not automatically flash, on January 15, 2020
- (3) Protected equipment plan for 2B ND pump OOS, on January 21, 2020
- (4) Protected equipment plan for the 1B EDG OOS, on January 30, 2020
- (5) Protected equipment plan for SSF OOS, on February 17, 2020

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) CR 2311992, Indication was lost for 2ND1B (ND Pump 2A Suction from Loop B) and 2ND36B, on January 21, 2020
- (2) CR 2313347, Unit 2 solid state protection system (SSPS) wiring discrepancies, on January 30, 2020
- (3) CR 2313372, EDG 1B Technical Specifications fuel oil alarm, on January 30, 2020
- (4) CR 2317271, SSF wire landed on terminal with other side empty, on February 20, 2020
- (5) CR 2319039, Turbine driven auxiliary feed pump minimum flow recirculation, on March 4, 2020
- (6) CR 02321493, Non conservative acceptance criteria for pressurizer heater, on March 19, 2020

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 modifications:

- (1) Engineering Change (EC) 427232, Replacement of Unit 2 standby makeup pump suction dampener, on March 19, 2020

71111.19 - Post-Maintenance Testing

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

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

- (1) Work Order (WO) 20377869, Replace ground detector on ED8-FO1B and perform functional test, on February 17, 2020
- (2) PT/0/A/4200/017A, SSF diesel test following maintenance, on February 21, 2020
- (3) WO 20381268, Replace contactor on breaker EMF-FO2A and perform functional test, on February 25, 2020
- (4) WO 20386098, Adjust vibration switch for the 2B EDG ventilation fan and perform functional test, on March 2, 2020
- (5) WO 20372804, Perform functional test following maintenance on service water valve 1RN-232A, on March 16, 2020
- (6) WO 20389473, Adjust EDG starting air regulator and perform functional test, on March 19, 2020
- (7) WO 20374123, Perform functional test following maintenance associated with the 2B charging pump, on March 25, 2020

71111.20 - Refueling and Other Outage Activities

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

- (1) The inspectors evaluated the startup activities associated with a forced outage from February 12 - 17, 2020.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

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

- (1) PT/0/A/4200/083 RN emergency low - SWAP A & B, on January 24, 2020
- (2) PT/2/A/4350/002 B Diesel Generator 2B Operability test, on February 26, 2020

71114.06 - Drill Evaluation

Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

- (1) A drill scenario which involved a loss of main feedwater, reactor trip, two rods stuck, failed fuel, and emergency action level classification, on March 10, 2020.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 02.03) (2 Samples)

- (1) Unit 1 submittals listed for the period from January 2019 through December 2019
- (2) Unit 2 submittals listed for the period from January 2019 through December 2019

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

- (1) Unit 1 submittals listed for the period from January 2019 through December 2019
- (2) Unit 2 submittals listed for the period from January 2019 through December 2019

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

- (1) Unit 1 submittals listed for the period from January 2019 through December 2019
- (2) Unit 2 submittals listed for the period from January 2019 through December 2019

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

- (1) CR 2310738, 1A EDG field flash did not flash, on January 17, 2020

71153 - Followup of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (2 Samples)

The inspectors evaluated the following licensee event reports (LERs) which can be accessed at <https://lersearch.inl.gov/LERSearchCriteria.aspx>:

- (1) LER 2019-004-00 for Catawba Nuclear Station, Unit 2, Condition Prohibited by Technical Specification and Loss of Safety Function due to Refueling Water Storage Tank Volume Below the Minimum Requirement (ADAMS Accession No. ML19290G728) The inspectors determined that it was not reasonable to foresee or correct the cause discussed in the LER therefore no performance deficiency was identified. The inspectors did not identify a violation of NRC requirements.
- (2) LER 2019-005-00 for Catawba Nuclear Station, Unit 2, Containment Spray System Actuation due to Interaction of Procedure Enclosures Performed Concurrently (ADAMS Accession No. ML19330E808) The inspection conclusions associated with this LER are documented in Inspection Report 05000413/2019004 and 05000414/2019004 under Inspection Results Section (ADAMS Accession No. ML20027A217)

INSPECTION RESULTS

Failure to Correct a Significant Condition Adverse to Quality associated with the 1A EDG Connecting Rod Bearing			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section

Mitigating Systems	Green NCV 05000413/2020001-01 Open/Closed	[P.2] - Evaluation	71152
<p>An NRC identified Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified for the licensee's failure to implement effective corrective actions to prevent repetition of a significant condition adverse to quality regarding connecting rod bearing rotations on the 1A diesel generator (EDG). Specifically, the number 3 connecting rod was found rotated approximately 48 degrees following a 24-hour diesel run in November 2019. Previously, the number 6 connecting rod bearing was found rotated approximately 76 and 192.5 degrees on diesel runs in 2014 and 2016, respectively.</p>			
<p><u>Description:</u> On November 13, 2019, the licensee discovered that the 1A EDG number 3 connecting rod bearing had rotated approximately 48 degrees during a routine inspection following a 24-hour diesel surveillance. The licensee immediately replaced the number 3 bearing resulting in approximately 100 hours of unavailability. The licensee previously found the number 6 bearing rotated in 2014 and again in 2016. During the 2016 root cause evaluation (RCE), the licensee identified that the lube oil pressure was slow to build up during EDG starts and likely contributed to the bearing rotations seen in 2014 and 2016. The slow oil pressure rise causes the connecting rod bearings to experience increased frictional force from the crankpin during starts while having limited inventory to remove heat which could result in localized yielding. In 2016, air voids were found in the engine driven lube oil suction lines and the licensee implemented a modification to ensure the suction lines remained full while the EDGs were in standby. After the 2019 rotation, air voids were found on the discharge side of the engine driven lube oil pump. The licensee concluded that the rotation of the 1A EDG number 3 bearing found on November 13, 2019, was also the result of air voiding in the EDG lube oil (LD) system. The licensee's root cause for the 2019 connecting rod bearing rotation concluded air voids associated with the configurations of all four site LD systems were not adequately mitigated or removed. Specifically, the licensee's actions to address voids in the LD system were not effective because the effectiveness reviews for the 2016 RCE associated with the LD suction voids were narrowly focused and missed the impact of voids in the discharge and cross over sections. Previously, the licensee found air voids in the discharge piping of the 2A and 2B EDGs but did not think they contributed to the bearing rotation in 2016 because significant discharge voids were not found in the 1A EDG piping.</p> <p>Corrective Actions: The licensee immediately replaced the number 3 bearing and initiated corrective actions on all four EDGs to minimize voiding in the lube oil system.</p> <p>Corrective Action References: CR 2302424</p>			
<p><u>Performance Assessment:</u></p> <p>Performance Deficiency: The licensee's failure to adequately mitigate the effect of air voiding in the LD system was a performance deficiency (PD).</p> <p>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. The PD 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</p>			

systems that respond to initiating events to prevent undesirable consequences. Specifically, air voiding in the LD system contributed to the rotation of the 1A EDG number 3 bearing which resulted in approximately 100 hours of unavailability to replace the bearing.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The inspectors assessed the significance of the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," dated October 7, 2016, and IMC 609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," dated December 20, 2019. The inspectors determined that the finding was of very low safety significance (Green) because the finding did not represent a loss of the PRA function of one train of a multi-train TS system for greater than its TS allowed outage time.

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. This finding had a cross-cutting aspect of evaluation, as described in the problem identification and resolution cross-cutting area because the organization did not effectively evaluate the risk of voids in other sections of the LD system and take effective corrective actions to mitigate or eliminate the air voids.

Enforcement:

Violation: 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," requires that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, prior to November 12, 2019, the licensee failed to implement effective corrective actions to preclude repetition of a significant condition adverse to quality regarding the 1A EDG number 3 connecting rod bearing rotations on November 13, 2019. The licensee immediately replaced the number 3 bearing. This resulted in approximately 100 hours of unavailability.

Enforcement Action: This violation is being treated as a non-cited violation, 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 April 27, 2020, the inspectors presented the integrated inspection results to Tom Simril and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Procedures	RP/0/A/5000/007	Natural Disaster and Earthquake	
		RP/0/B/5000/030	Severe Weather Preparations	
71111.04	Procedures	OP/1/A/6350/002	Diesel Generator Operation	
		OP/0/A/6450/011	Control Room Area/Chilled Ventilation and Water System	
		OP/1/A/6250/002	Auxiliary Feedwater System	
		OP/2/A/6200/004	Residual Heat Removal System	
71111.05	Fire Plans	CSD-CNS-PFP-AB-0522-001	Auxiliary Building Elevation 522 Pre-Fire Plan CSD-CNS-PFP-AB-0577-001, Auxiliary Building Elevation 574 and 577	
		CSD-CNS-PFP-EDH1-0000-001	Unit 1 Exterior Doghouse Elevation 577, 594, 619,634 Pre-Fire Plan	
		CSD-CNS-PFP-EDH2-0000-001,	Unit 2 Exterior Doghouse Elevation 577, 594, 619 and 634 Pre-Fire Plan	
		CSD-CNS-PFP-PA-002	Protected Area Northeast	
71111.11Q	Procedures	OP/1/A/6100/001	Controlling Procedure for Unit Startup	
		OP/1/A/6100/005	Unit Fast Recovery	
71111.13	Miscellaneous	AD-WC-ALL-0240	Online Risk Management Process	
71111.20	Procedures	OP/1/A/6100/001	Controlling Procedure for Unit Startup	
71151	Miscellaneous	CN -854.03-1	Unit 1 & Unit 2 Performance Indicator Data, Reactor Coolant System Specific Activity	
		CN-854.02-04	Component Cooling Water (KC) System MSPI Unavailability	
		CN-854.02-06	Nuclear Service Water (RN) System MSPI Unavailability	
71152	Corrective Action Documents	CR 1460604	During D/G1 A break in run, DG had to be tripped due to high vibration	
		CR 1463455	During Removal of the #7 connecting rod bearing shell on the 1B diesel	
		CR 1896987	1A & 1B Emergency Diesel Generator Connecting Rod Bearing Rotation	
71153	Corrective Action Documents	PT/A/4150/002 A	Transient Investigation	

