



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

May 3, 2024

Steven Snider
Site Vice President
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672-0752

SUBJECT: OCONEE NUCLEAR STATION – INTEGRATED INSPECTION REPORT
05000269/2024001 AND 05000270/2024001 AND 05000287/2024001

Dear Steven Snider:

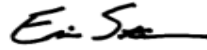
On March 31, 2024, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Oconee Nuclear Station. On May 1, 2024, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. One Severity Level IV violation without an associated finding is documented in this report. 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 Oconee 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 Stamm, Eric
on 05/03/24

Eric J. Stamm, Chief
Reactor Projects Branch 1
Division of Reactor Projects

Docket Nos. 05000269 and 05000270 and 05000287 and 07200004 and 07200040
License Nos. DPR-38 and DPR-47 and DPR-55

Enclosure:
As stated

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SUBJECT: OCONEE NUCLEAR STATION – INTEGRATED INSPECTION REPORT
05000269/2024001 AND 05000270/2024001 AND 05000287/2024001 DATED
MAY 3, 2024

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DATE	4/30/24	5/1/24	5/3/24		

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

Docket Numbers: 05000269, 05000270, 05000287, 07200004 and 07200040

License Numbers: DPR-38, DPR-47 and DPR-55

Report Numbers: 05000269/2024001, 05000270/2024001 and 05000287/2024001

Enterprise Identifier: I-2024-001-0030

Licensee: Duke Energy Carolinas, LLC

Facility: Oconee Nuclear Station

Location: Seneca, South Carolina

Inspection Dates: January 1, 2024, to March 31, 2024

Inspectors: N. Smalley, Senior Resident Inspector
J. Nadel, Senior Resident Inspector
E. Robinson, Resident Inspector

Approved By: Eric J. Stamm, 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 Oconee 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 Adequately Control Transient Combustible Material Near the Independent Spent Fuel Storage Installation (ISFSI)			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000269,05000270,05000287/ 2024001-01 Open/Closed	Not Applicable	71111.05
The inspectors identified a Severity Level IV non-cited violation (NCV) of 10 CFR 72.212, “Conditions of general license issued under 10 CFR 72.210,” for the licensee’s failure to adequately control transient combustible material in accordance with procedure AD-FP-ALL-1520, "Transient Combustible Control," at the independent spent fuel storage installation (ISFSI).			

Failure to Maintain Procedure for Axial Power Shaping Rod and Control Rod Drive Coupling			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000269,05000270,05000287/ 2024001-02 Open/Closed	None (NPP)	71153
A self-revealed finding and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was identified when the licensee failed to ensure procedure MP/0/A/1140/009, “[Control Rod Drive] CRD – [Axial Power Shaping Rods] APSR – Coupling,” included appropriate acceptance criteria to ensure APSRs were coupled to the CRDs. This finding resulted in a violation of technical specification (TS) 3.1.6, Axial Power Shaping Rod (APSR) Alignment Limits, and TS 3.0.3 and TS 3.0.4, Limiting Condition of Operation (LCO) Applicability.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000270/2021-004-00	LER 2021-004-00 for Oconee Nuclear Station, Unit 2, More Than One Axial Power Shaping Rod Not Aligned within Technical Specification Limits	71153	Closed

PLANT STATUS

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

Unit 2 operated at or near 100 percent RTP for the entire inspection period.

Unit 3 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/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)

- (1) The inspectors evaluated readiness for seasonal extreme weather conditions prior to the onset of seasonal cold temperatures for the following systems: low pressure injection (LPI), essential siphon vacuum, and auxiliary building ventilation on January 19, 2024.

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

- (1) The inspectors evaluated the adequacy of the overall preparations to protect risk significant systems from an impending winter storm expected on January 9, 2024, to include heavy rain, gusty winds up to 55 miles per hour and widespread power outages.

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) 1B LPI train while 1A LPI train was out of service (OOS) for planned maintenance on February 5, 2024

- (2) 2A reactor building spray (RBS) system while 2B RBS was OOS for planned maintenance on February 14, 2023
- (3) Trains B and C of low pressure service water (LPSW) for Units 1 and 2 while A LPSW pump was OOS for packing seal test on March 20, 2024

71111.05 - Fire Protection

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

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

- (1) Fire zone 92: Unit 2 equipment room on February 1, 2024
- (2) Fire zone 90: Unit 2 auxiliary building 300 level hallway on February 6, 2024
- (3) Fire zone 34: Unit 1 4160V switchgear on February 7, 2024
- (4) Fire area WPL-002: independent spent fuel storage installation (ISFSI) facility on February 7, 2024
- (5) Fire zone 101: Unit 3 cable room on February 21, 2024

Fire Brigade Drill Performance Sample (IP Section 03.02) (2 Samples)

- (1) The inspectors evaluated the onsite fire brigade training and performance during an unannounced fire drill on February 13, 2024.
- (2) The inspectors evaluated the onsite fire brigade training and performance during an unannounced fire drill on February 28, 2024.

71111.06 - Flood Protection Measures

Flooding Sample (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated external flooding mitigation protections in the:
Protected service water (PSW) underground cable bank

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 LPI pump testing on the Unit 2 "B" and "C" pump trains from the main control room on March 4, 2024.

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

- (1) The inspectors observed and evaluated a simulator exam for an operating crew in accordance with SEG 2323 (ASE1) on February 20, 2024.

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (4 Samples)

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

- (1) Unit 3 green risk due to planned maintenance on unit transformer fire protection system, on January 24, 2024
- (2) Unit 1, 2, and 3 green risk due to various maintenance with increased risk of plant trip the week of January 29, 2024, including CRD breaker testing on Unit 1, and maintenance on the Unit 2 A motor driven emergency feedwater pump and the Unit 3 turbine driven emergency feedwater (TDEFW) pump
- (3) Unit 2 green risk due to 2B RBS pump maintenance, on February 14, 2024
- (4) Unit 3 green risk due to 3B RBS pump maintenance, on March 15, 2024

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (8 Samples)

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

- (1) Nuclear condition report (NCR) 2408835, operability determination of 2NI-5 detector on 2A reactor protection system (RPS) channel prior to unplanned scram
- (2) NCR 2504330, watered PSW cable duct banks found during periodic inspection
- (3) NCR 2505469, high pressure injection valve, 1HP-31, erratic air sounds
- (4) NCRs 2501851, 2503151, air circuit breaker, ACB-1, failed to open on Keowee Hydro Unit 1 (KHU-1) shutdown
- (5) NCR 2505744, 230kV switchyard external grid protection circuit undervoltage relay, 27BRX2, out of tolerance
- (6) NCR 2508418, Unit 2 TDEFW pump following leakage found on valve, 2FDW-89, during visual examination
- (7) NCR 2501532, ultrasonic examination results upstream of valve, 3HPSW-14, below acceptance criteria
- (8) NCR 2510402, spare switchyard battery charger AC power failure

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) 419291, Keowee hydro linear variable differential transformer (LVDT) replacement

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) (5 Samples)

- (1) PT/0/A/0620/009, KHU-1 operability check following replacement of the Teleperm XS (TXS) governor control system card due to air circuit breaker, ACB-1 failure, on January 31, 2024
- (2) PT/3/A/0204/007, "Reactor Building Spray Pump Test," on the 3A train following breaker maintenance, on February 29, 2024
- (3) IP/1/A/0315/014 A, "TXS RPS Interposing Relay Test and Control Rod Drive Breaker Trip Timing Test," following CRD breaker replacement, on March 25, 2024
- (4) PT/0/A/0620/009, KHU-1 operation following replacement of the LVDT on March 25, 2024
- (5) TE-MN-ALL-0202, "Transformer and Apparatus Testing," following spare stand-by transformer, CT-4, inspection and maintenance, on March 27, 2024

Surveillance Testing (IP Section 03.01) (4 Samples)

- (1) PT/1/A/0600/15, "Control Rod Movement," on Unit 1, on February 27, 2024
- (2) PT/1/A/0600/12, "Turbine Driven Emergency Feedwater (TDEFDW) Pump Test," on February 29, 2024
- (3) PT/2/A/0203/006 A, "Low Pressure Injection Pump Test," for both trains B and C, on March 4, 2024
- (4) PT/0/A/0600/021, "Standby Shutdown Facility Diesel-Generator Operation," on March 6, 2024

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

- (1) PT/2/A/0203/006 A, "Low Pressure Injection Pump Test," for train A, on February 20, 2024

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

- (1) FLEX testing, on the week of January 8, 2024

71114.06 - Drill Evaluation

Required Emergency Preparedness Drill (1 Sample)

- (1) Training Drill 2024-01, with emergency response organization team 2 and participation from the emergency operations facility, on March 26, 2024

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 02.01) (3 Samples)

- (1) Unit 1 (January 1, 2023, through December 31, 2023)
- (2) Unit 2 (January 1, 2023, through December 31, 2023)
- (3) Unit 3 (January 1, 2023, through December 31, 2023)

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02) (3 Samples)

- (1) Unit 1 (January 1, 2023, through December 31, 2023)
- (2) Unit 2 (January 1, 2023, through December 31, 2023)
- (3) Unit 3 (January 1, 2023, through December 31, 2023)

IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 02.03) (3 Samples)

- (1) Unit 1 (January 1, 2023, through December 31, 2023)
- (2) Unit 2 (January 1, 2023, through December 31, 2023)
- (3) Unit 3 (January 1, 2023, through December 31, 2023)

MS07: High Pressure Injection Systems (IP Section 02.06) (3 Samples)

- (1) Unit 1 (January 1, 2023, through December 31, 2023)
- (2) Unit 2 (January 1, 2023, through December 31, 2023)
- (3) Unit 3 (January 1, 2023, through December 31, 2023)

71153 - Follow Up of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (1 Sample)

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

- (1) LER 05000270/2021-004-00, "More Than One Axial Power Shaping Rod Not Aligned within Technical Specification Limits" (ADAMS Accession No. ML22038A970). The inspection conclusions associated with this LER are documented in this report under Inspection Results section 71153. This LER is Closed.

INSPECTION RESULTS

Failure to Adequately Control Transient Combustible Material Near the Independent Spent Fuel Storage Installation (ISFSI)			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000269,05000270,05000287/2024001-01 Open/Closed	Not Applicable	71111.05
The inspectors identified a Severity Level IV non-cited violation (NCV) of 10 CFR 72.212, "Conditions of general license issued under 10 CFR 72.210," for the licensee's failure to adequately control transient combustible material in accordance with procedure AD-FP-ALL-1520, "Transient Combustible Control," at the independent spent fuel storage installation (ISFSI).			

Description: On February 7, 2024, while performing a fire protection walkdown of the ISFSI area, the inspectors observed two cranes and combustible material stored within the ISFSI yard area in close proximity to loaded horizontal storage modules (HSMs). A small 100-ton crane fitted with rubber tires was parked unattended approximately 10 feet from loaded HSMs in preparation for an upcoming loading campaign. A large 300-ton crane fitted with metal crawler tracks was parked unattended approximately 120 feet away from loaded HSMs. Wooden boards, cribbing, and other support material was staged near the large crane in preparation for new ISFSI construction activities. The inspectors questioned the licensee on whether the storage of these vehicles and material was in compliance with procedures that control transient combustible materials in the area.

Licensee procedure AD-FP-ALL-1520, Rev 1, "Transient Combustible Control," establishes control of transient combustibles in the ISFSI. This procedure applies to personnel performing ISFSI-related activities per the transient combustible control requirements described in Attachment 9, "Independent Spent Fuel Storage Installations (ISFSIs) Transient Combustible Controls." AD-FP-ALL-1520, Attachment 9, Section 5.0, "ONS ISFSI Storage Controls," states that storage of combustible materials is prohibited at the loaded ISFSI modules and within the immediate vicinity, including the concrete pad area. Combustible material must be attended at all times within these areas. It also states to ensure vehicles are prevented from permanently parking (i.e., left unattended) within 100 feet of loaded ISFSI storage casks. Additionally, it states that total liquid flammable materials and transient combustibles within the ISFSI storage yard areas shall not exceed the equivalent of 300 gallons of diesel fuel.

Upon notification of the inspectors' concerns, the licensee removed the 100-ton crane from the ISFSI area. The inspectors confirmed the small crane had only been in the ISFSI yard area since February 7, 2024, and was being used for preparation of a HSM for an upcoming loading campaign scheduled for that week. The licensee conducted a walkdown of the ISFSI area on February 8, 2024, and the remaining transient combustible material was removed. The large 300-ton crane was being used for construction of a new phase of the ISFSI and it was permanently parked greater than 100 feet from loaded HSMs. A licensee fire protection engineer reviewed the combustible loading of the materials that were identified, which included wood, hydraulic fluid in the small crane, rubber tires on the small crane, and diesel fuel in the small crane. The combined heat content of the identified material equated to approximately 527 gallons of diesel fuel. Following review of the administrative controls for storage of transient combustibles contained in AD-FP-ALL-1520, the inspectors determined that the licensee had stored combustible materials in excess of and contrary to the amount allowed in Attachment 9, Section 5.0, "ONS ISFSI Storage Controls."

Corrective Actions: The small 100-ton crane was removed from the ISFSI yard. The licensee removed the remaining transient combustible material. The licensee also completed an analysis of the material identified stored in the immediate vicinity of loaded HSMs.

Corrective Action References: NCR 2504166

Performance Assessment: None. The Reactor Oversight Process (ROP) was not used for this issue because inspections of ISFSI activities that do not involve the operating plant are not addressed by the reactor safety cornerstones in the ROP's Significance Determination Process.

Enforcement: The ROP's significance determination process does not address 10 CFR Part 72 issues in its assessment of licensee performance. Therefore, it is necessary to address this violation using traditional enforcement.

Severity: Consistent with guidance in the NRC Enforcement Manual, Part I, section 1.2.6.D, if a violation does not fit an example in the Enforcement Policy violation examples, it should be assigned a severity level: (1) commensurate with its safety significance; and (2) informed by similar violation addressed in the violation examples. This issue was more than minor because if left uncorrected, it could become a more significant safety concern since the prolonged presence of combustible material in excess of the amounts allowed in the immediate vicinity of the stored fuel increased the vulnerability of the casks to a fire and therefore, increased the likelihood of fuel damage and/or release during a fire event. Because all stored fuel was located in dry shielded canisters (DSCs) within HSMs during the event, and because of the short duration of time that the combustible materials were stored in the immediate vicinity of the HSMs, the violation was not considered as a substantial threat for potential exposure to or release of radiation and was determined to be of very low safety significance, similar to the example in Section 6.2.d.2 of the NRC Enforcement Policy.

Violation: 10 CFR 72.212, "Conditions of general license issued under 10 CFR 72.210," Section (b)(13) states, in part, that the licensee shall, "Conduct activities related to storage of spent fuel under this general license only in accordance with written procedures." This requirement is implemented in part by procedure AD-FP-ALL-1520, "Transient Combustible Control," where Attachment 9, Section 5.0, requires controls for transient combustibles at the Oconee Nuclear Station ISFSI. Specifically, Section 5.0 prohibits the storage of unattended combustible materials at the loaded ISFSI modules, prohibits vehicles from permanently parking within 100 feet of loaded storage casks, and limits the total liquid flammable materials and transient combustibles within the ISFSI storage yard to less than the equivalent of 300 gallons of diesel fuel.

Contrary to the above, from February 7 to February 8, 2024, transient combustible materials were stored unattended within the immediate vicinity of loaded ISFSI modules, a vehicle was permanently parked within 100 feet of loaded storage casks, and total liquid flammable materials and transient combustibles stored within the ISFSI yard exceeded 300 gallons of diesel fuel. Specifically, combustible materials were stored unattended within the immediate vicinity of loaded ISFSI modules, a 100-ton portable crane was permanently parked within approximately 10 feet of loaded ISFSI storage casks, and the total liquid flammable materials and transient combustibles within the ISFSI storage yard had an equivalent heat content of approximately 527 gallons of diesel fuel.

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

Failure to Maintain Procedure for Axial Power Shaping Rod and Control Rod Drive Coupling			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000269,05000270,05000287/ 2024001-02 Open/Closed	None (NPP)	71153
<p>A self-revealed finding and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified when the licensee failed to ensure procedure MP/0/A/1140/009, "[Control Rod Drive] CRD – [Axial Power Shaping Rods] APSR – Coupling," included appropriate acceptance criteria to ensure APSRs were coupled to the CRDs. This finding resulted in a violation of technical specification (TS) 3.1.6, Axial Power Shaping Rod (APSR) Alignment Limits, and TS 3.0.3 and TS 3.0.4, Limiting Condition of Operation (LCO) Applicability.</p> <p><u>Description:</u> Axial power shaping rods (APSRs) are designed to contribute to the reactivity balance of the reactor while critical. APSRs are evenly distributed throughout the core to provide negative reactivity throughout to counterbalance surplus positive reactivity of the fuel. In order to avoid flux tilting or power peaking in portions of the reactor core caused by asymmetric reactivity distribution, the APSRs typically move in or out of the core as one rod group (in Group 8). TS 3.1.6, Axial Power Shaping Rod (APSR) Alignment Limits, requires, in part, that each APSR is operable and aligned within 6.5% of its group average height. This LCO is applicable in Modes 1 and 2 when the APSRs are not fully withdrawn. Condition A states that when one APSR is inoperable, not aligned within its limits, or both, then perform surveillance requirement (SR) 3.2.2.1 within 2 hours and 2 hours after each APSR movement. Condition B requires the unit to be in Mode 3 if Required Action and associated Completion Time of Condition A is not met. Failure to do so could cause quadrant power tilt and result in exceeding the limits on axial power imbalance. During the course of refueling outages, it is necessary to uncouple control rods, including APSRs, from the control rod drive (CRD). Prior to the startup of the refueled reactor, APSRs are recoupled to their respective CRD as directed by licensee procedure MP/0/A/1140/009, "CRD – APSR – Coupling." TS 3.0.3, LCO Applicability, requires, in part, when an LCO is not met and the associated actions are not met, an associated action is not provided, or if directed by the associated actions, the unit shall be placed in a Mode or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in Mode 3 within 12 hours, Mode 4 within 18 hours, and Mode 5 within 37 hours. TS 3.0.4, LCO Applicability, requires, in part, when an LCO is not met, entry into a Mode or other specified condition in the Applicability shall only be made when the associated Actions to be entered permit continued operation in the Mode or other specified condition in the Applicability for an unlimited period of time.</p> <p>Upon startup from the Unit 2 fall 2021 refueling outage, testing revealed that two of the APSRs were not coupled as directed. Specifically, on December 7, 2021, at 0921, Unit 2 entered mode 2 and, therefore, LCO 3.1.6 was applicable, though the condition of the two APSRs being uncoupled was not known at this time. At 1131, Unit 2 entered mode 1, and on December 8, 2021, power was held at 73 percent for testing during the startup. This included power imbalance detector correlation (PIDC) testing to calibrate the reactor axial power imbalance as measured by the out-of-core nuclear instruments to the incore detectors. At 1654, Reactor Engineering reported that PIDC test acceptance criteria were not met, ultimately as a result of the two misaligned uncoupled APSRs, though this was not yet known at the time. On December 8, 2021, at approximately 1800, following troubleshooting of the</p>			

PIDC testing failure, the recommendation was made to fully insert all APSRs. Insertion of all APSRs was completed at 1943 on December 9, 2021. Subsequent licensee investigation of nuclear instrument data concluded that APSRs F-12 and L-12 were fully inserted throughout the startup and had not moved with the rest of the Group 8 rods, as they were uncoupled from their respective CRD. At the time of discovery of this condition, all APSRs were fully inserted, and LCO 3.1.6 was no longer applicable. The licensee submitted Licensee Event Report 2021-004-00 to the NRC following discovery of this condition, for a condition prohibited by technical specifications, exceeding the allowed action time of placing the reactor in mode 3 within 12 hours as required by LCO 3.0.3, as they had greater than one rod misaligned, which exceeded the conditions required in LCO 3.1.6. Additionally, when Unit 2 entered Mode 2 and Mode 1 on December 7, 2021, Unit 2 entered a different mode or applicability condition in which the mode change did not comply with TS LCO 3.0.4.

The licensee completed an operability evaluation to support operation with all APSRs fully inserted through the two-year fuel cycle and determined there would be no adverse impact. As such, following the Unit 2 2021 refueling outage, all APSRs were left fully inserted in the Unit 2 core, and the cause of the uncoupled APSRs was left to be determined following the subsequent Unit 2 refueling outage in the fall of 2023. Following the 2023 refueling outage, the licensee determined that there was no mechanical or electrical failure at fault for the APSRs being uncoupled and it was the result of inadequate procedural guidance. Specifically, licensee procedure MP/0/A/1140/009, did not require operators to record air pressure or reference tang position to validate the coupling hubs were in the coupled position. Additionally, the licensee's cause evaluation, as documented in NCR 2408618, noted that three previous instances of similar events (from 2013-2015) of APSR uncoupling had occurred in the nuclear industry as a result of inadequate procedural guidance to verify coupling. This operating experience was not captured in Oconee's reactor maintenance briefs or procedures prior to this event in 2021. The licensee updated AD-PI-ALL-0400, "Operating Experience Program," to ensure relevant significant consequential events would be considered and evaluated appropriately. This revision was made following the evaluation of the operating experience event in 2015 but prior to the uncoupling event at Oconee in 2021.

Corrective Actions: The licensee revised MP/0/A/1140/009, "CRD – APSR – Coupling," (April 26, 2022, revision 45) to include guidance to verify adequate coupling has occurred.

Corrective Action References: PRR 02415204, NCR 02408618

Performance Assessment:

Performance Deficiency: The inspectors determined that the licensee's failure to include appropriate acceptance criteria to verify coupling of APSRs in licensee procedure MP/0/A/1140/009, "CRD – APSR – Coupling," was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Configuration Control attribute of the Barrier Integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, it created a reactivity control issue that placed the plant in a condition unbounded by previous safety analyses. This previously unanalyzed condition posed a potential challenge to the barrier design criteria that meant a reasonable assurance could not be provided.

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 3 – "Barrier Integrity Screening Questions," inspectors determined the finding was of very low safety significance (Green) because all questions were answered no. Specifically, upon further review, it was determined that the reactivity mismanagement in this event did not challenge fuel cladding integrity.

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: 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires in part, that procedures shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished." Contrary to the above, from at least August 9, 1997, to April 26, 2022, the licensee failed to include appropriate acceptance criteria in procedure MP/0/A/1140/009, "CRD – APSR – Coupling," to ensure the coupling activity was satisfactorily accomplished.

As a result, on December 7, 2021, TS 3.1.6 requirements for APSR alignment and maximum number of misaligned APSRs in Modes 1 and 2 were exceeded when two APSRs did not withdraw on startup. Additionally, TS LCO 3.0.3 actions were not completed within the required time based on the time from Unit 2 entering Mode 2 with APSRs misaligned at 0921 on December 7, 2021, until the time APSRs were fully inserted at 1943 on December 9, 2021. Furthermore, when Unit 2 entered Mode 2 and Mode 1 on December 7, 2021, Unit 2 entered a different mode or applicability condition in which the mode change did not comply with TS LCO 3.0.4.

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 May 1, 2024, the inspectors presented the integrated inspection results to Steven Snider and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Corrective Action Documents		2497614, 2491962	
	Miscellaneous	OHT-102A-1.1	Flow Diagram of Low Pressure Injection System (Borated Water Supply & LPI Pump Suction) Heat Trace	1
		OHT-130A-1.1	Flow Diagram of Essential Siphon Vacuum (ESV) System, Heat Trace	0
		OSS-0254.00-00-1019	(Mech) Design Basis Spec for the Auxiliary Building HVAC System	035
		OSS-0254.00-00-1028	(Mech) Design Basis Spec for the Low Pressure Injection and Core Flood System (LPI)	070
		OSS-0254.00-00-1049	(Mech) Design Basis Spec for the Essential Siphon Vacuum System	015
	Procedures	AD-OP-ALL-0120	Severe Weather Preparations and Considerations	0
		AD-OP-ONS-0120	Severe Weather Preparations	001
		OP/0/A/1104/041	Auxiliary Building Ventilation	046
		OP/0/A/1106/041	Turbine Building Ventilation	012
		OP/0/B/1104/050	Weather Related Activities	007
		OP/1/A/1104/051	ESV System	028
		PT/0/A/0110/017	Cold Weather Protection	017
		PT/1/A/0600/001	Periodic Instrument Surveillance	348
	Work Orders		20628154	
71111.04	Corrective Action Documents		2493286, 2481037, 2410321, 2498560, 2510523, 2510534, 2510550	
	Drawings	OFD-102A-1.1	Flow Diagram of Low Pressure Injection System (Borated Water Supply & LPI Pump Suction)	72
		OFD-103A-02-01	Flow Diagram Of Reactor Building Spray System (BS)	026
		OFD-124A-1.1	Flow Diagram of Low Pressure Service Water System Turbine Building LPSW Pumps	056
	Miscellaneous		Clearance OPS-1-23-LP-1LP-21 DIAG-0967	
			Clearance PRT-1-23-1A LPI OOS-0203	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Procedures	OP/1/A/1102/008	On-Line Valve Lineup for MOV Maintenance	042
		OP/1/A/1104/010	Low Pressure Service Water	159
		OP/2/A/1104/005	Reactor Building Spray System	039
		PT/1-2/A/0251/030	LPSW Pump Packing Seal Water Regulator Pressure Setup	014
		PT/1/A/0152/012	Low Pressure Injection System Valve Stroke Test	045
	Work Orders		20550600, 20633989, 20555119	
71111.05	Calculations	OSC-10816	ONS TCCA "A" and "B" Area Basis for AD-EG-ALL-1520	005
		OSC-9293	NFPA 805 Transition Radioactive Release G-1 Table	004
		OSC-9314	NFPA 805 Transition Risk-Informed Performance-Based Fire Risk Evaluation	006
	Corrective Action Documents		2275773, 2049530, 2276444, 2504166, 2501120, 2481802	
	Engineering Changes		EC 422486	
		DUKE-QAPD-001	Duke Energy Corporation Topical Report Quality Assurance Program Description Operating Fleet	50
	Fire Plans	CSD-ONS-PFP-1AB-0809	Pre-Fire Plan for U1 Auxiliary Building Elevation 809	000
		CSD-ONS-PFP-2AB-0796	Pre-Fire Plan for U2 Auxiliary Building Elevation 796	002
		CSD-ONS-PFP-3AB-0809	Pref-Fire Plan for U3 Auxiliary Building[sic] Elevation 809	000
		CSD-ONS-PFP-PA-0003	Pre-Fire Plan for Protected Area Southwest	000
	Miscellaneous	AD-OP-ALL-0207	Fire Brigade Administrative Controls	6
		O-0310-K-008	Fire Protect Aux Bldg Unit 2 EL 796+6	026
		OFD-124C-2.2	Flow Diagram of High Pressure Service Water System Turbine Building	43
	Procedures	AD-FP-ALL-1520	Transient Combustible Control	1
		AD-LS-ALL-0009	10 CFR 72.48 Review Process	4
		AD-NF-ALL-0602	Spent Fuel Management and ISFSI	6
		CSD-ONS-PFP-1TB-0796	Pre-Fire Plan for U1 Turbine Building Elevation 796	000

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Work Orders		20218819	
71111.06	Corrective Action Documents		00451693, 00437391, PIP 06-1076, 02504330	
	Procedures	MP/0/B/2002/002	Protected Service Water (PSW) Underground Cable Duct Bank – Drainage System - Inspection	002
	Work Orders		20579745	
71111.11Q	Corrective Action Documents		2479354, 2487761	
	Procedures	AD-OP-ALL-1000	Conduct of Operations	023
71111.12	Corrective Action Documents		2473173, 2476626	
	Miscellaneous		Equipment Reliability Suite (ERS) System information for LPSW	
71111.13	Drawings	OFD-124C-3.2	Flow Diagram of High Pressure Service Water System Turbine Building	40
		OFD-124C-3.7	Flow Diagram of High Pressure Service Water System Sprinkler Valve Sub-Components	1
	Miscellaneous		Unit 3 Operator Logs for January 24, 2024	
			Phoenix ONS Risk Profile for the week of January 29th, 2024 for all three Units	
			Phoenix ONS Unit 3 Risk Profile for the week of March 11th, 2024	
			Unit 3 Operator Logs for March 15th, 2024	
			Phoenix ONS Unit 3 Risk Profile for January 24, 2024	
	Procedures	AD-NF-ALL-0501	Electronic Risk Assessment Tool (ERAT)	5
		AD-WC-ALL-0240	On-Line Risk Management Process	4
		AD-WC-ALL-0240	On-Line Risk Management Process	3
		IP/1/A/0315/014 A	TXS RPS Interposing Relay Test And Control Rod Drive Breaker Trip Timing Test	017
		OP/0/A/1104/011	High Pressure Service Water	110
		PT/3/A.0600/012	Turbine Driven Emergency Feedwater Pump Test	096
PT/3/A/0152/002		Building Spray System Valve Stroke Test	034	
PT/3/A/0204/007	Reactor Building Spray Pump Test	099		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date	
	Work Orders		20580562, 20644146, 20559917, 20558612		
71111.15	Calculations	OSC-4300	(ELEC) Protective Relay Settings	041	
	Corrective Action Documents		02492929, 02473883, 02477813, 02453927, 02503151, 02501851, 0419291		
				2408618, 2408835, 2504330, 2508418, 2393137, 2510402	
	Drawings	O FD-102A-02-01		FLOW DIAGRAM OF LOW PRESSURE INJECTION SYSTEM (BORATED WATER SUPPLY AND LPI PUMP SUCTION)	056F
		O FD-102A-02-01 O		FLOW DIAGRAM OF LOW PRESSURE INJECTION SYSTEM (BORATED WATER SUPPLY AND LPI PUMP SUCTION)	
		O FD-102A-02-02		FLOW DIAGRAM OF LOW PRESSURE INJECTION SYSTEM (LPI PUMP DISCHARGE)	054A
		O-0800		One Line Diagram – Relays & Meters – 230kV Switchyard – PCBs #1 Thru #12	034
		O-0801		One Line Diagram 230kV Switchyard 480/240/120/VAC	048
		O-0802		One Line Diagram 230kV Switchyard 125 VDC	035
		O-398-A-001		PSW Ductbank And Manhole Location Plan & General Notes	001A
		O-398-A1-106G		Protected Service Water Project - PSW Commercial Feeder Relocation - Pullbox F-2 Concrete & Reinforcing - Plan, Sections, & Details	000
		O-398-A1-203		PSW Ductbank Ductbank Manhole No. 3 Sections & Details	000
		OOE-76		External Grid Trouble Protective System One Line	11
		OFD-101A-1.4		Flow Diagram of High Pressure Injection System (Charging Section)	51
		OFD-121D-2.1		Flow Diagram of Emergency Feedwater System	039
		Miscellaneous	NDE-NE-ALL-0002		Request for Miscellaneous Inspection/NDE
	OSS-0254.00-00-1000			(MECH) Design Basis Specification for the Emergency Feedwater System	059
	OSS-0254.00-00-1001			(Mech) High Pressure Injection and Purification & Deborating Demineralizer Systems	065
	OSS-0254.00-00-			(Mech) Design Basis Specification for Reactor Coolant	055

Inspection Procedure	Type	Designation	Description or Title	Revision or Date	
		133	System		
		OSS-0254.00-00-2004	(ELECT) 230kV Switchyard System	027	
		OSS-0254.00-00-2009	(ELECT) Design Basis Spec for Ocone 230kV Switchyard 125 VDC Power System	010	
	Procedures	AD-EG-ALL-1375	Instrument and Electrical Device Calibration Out of Tolerance (OOT)	1	
		AD-EG-ALL-1615	Cable Aging Management Program Implementation	005	
		AD-OP-ALL-0105	Operability Determinations	7	
		AP/1/A/1700/014	Loss of Normal HPI Makeup and/or RCP Seal Injection	023	
		IP/0/A/2000/00	Power And Control Cable Inspection And Testing	016	
		IP/0/A/3000/011	230kV Switchyard Battery SY-1 Quarterly Surveillance	4	
		IP/0/A/4980/027B	CV-22 Relay Test	011	
		OP/1/A/1107/010	Operation of Batteries and Battery Chargers	65	
		OP/2/A/1104/004	Low Pressure Injection System	174-177	
		OP/2/A/1104/004 B	LPI SYSTEM FILL AND STARTUP	037	
		PT/0/A/1720/002	Periodic Pressure Testing of ASME Section XI Components	000	
		PT/2/A/0203/006 A	Low Pressure Injection Pump Test - Recirculation	089	
		PT/2/A/0203/012	HPI/LPI/RBS Piping Vent	016	
		Work Orders		20594448, 20584211, 20643793, 20262241	
			20311170, 20311173, 20296203, 20296221, 20263581, 20263583, 20579745, 20263771, 20545433, 20560755, 20265055, 20266033		
	71111.18	Corrective Action Documents		02453927, 02503151, 02501851	
		Engineering Changes	419291		
Procedures		IP/0/A/0101/001	Low Risk Maintenance Configuration Control	019	
	IP/0/A/0401/001 B	KHU-1 and 2 TXS Governor Control System Cabinet Maintenance and Calibration	010		
71111.24	Calculations	OSC-2515	Verification of Emergency Feedwater System Flow Utilizing MFW System Bypass	025	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Corrective Action Documents		2454667, 2455357, 2456329, 2461056, 2500872, 2500765, 2505803, 2467330, 2496568, 2495192, 2428148, 2505998, 2507352, 2496162, 2198433, 2304822, 2418167, 02497631	
	Drawings	O-0709-02	Connection Diagram, 13,860 Volts/4160 Volts Spare Stand-By Transformer No. CT4	2
		OFD-121A-1.7	Flow Diagram of Condensate System (Upper Surge Tank Dome & Condensate Storage Tank)	047
		OFD-121A-1.8	Flow Diagram of Condensate System (Condensate Make-up & Emergency FDW Pump Suction)	027
		OFD-121D-1.1	Flow Diagram of Emergency Feedwater System	039
		OFD-122A-1.4	Flow Diagram of Main Steam System (Emergency FDW Pump Turbine Steam Supply & Exhaust)	025
		OFD-124C-1.2	Flow Diagram of High Pressure Service Water System (Turbine Building)	042
		OFD-133A-1.2	Flow Diagram of Condenser Circulating Water System (Normal Intake & Discharge)	027
		OFD-135B-1.2	Flow Diagram of Lube Oil System (Emergency Feedwater Pump Turbine)	007
		ONTC-1-121D-0002-001	Oconee Nuclear Station Unit 1 Test Acceptance Criteria for Turbine Driven EFW Pump	4
	Miscellaneous	OSS-0254.00-00-1000	(Mech) Design Basis Specification for the Emergency Feedwater System	059
	Procedures	CSD-EG-ONS-1610.1000	Diverse and Flexible Coping Strategies (FLEX) Program Document- Oconee Nuclear Station	005
		IP/0/A/0401/003	KHU-1 And 2 TXS Governor Control System Wicket Gate Position Input String Test	11
		IP/0/A/2001/003 A	Inspection and Maintenance of 4.16 KV and 6.9 KV ACB	059
		IP/0/A/2001/003 D	Removal and Installation of Metal Clad Air Circuit Breakers	016
		IP/0/A/2001/010	DSII-516 Power Circuit Breaker Inspection and Maintenance	024
		IP/0/A/2007/001	Transformer Inspection and Maintenance	42
		IP/0/B/0350/004	CRD System Checkout Prior to Maintenance/Testing	027
		IP/1/A/0315/014 A	TXS RPS Interposing Relay Test and Control Rod Drive Breaker Trip Timing Test	017

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		OP/0/A/1107/019	Keowee Hydro at Oconee	114
		OP/0/A/1600/010	Operation of the SSF Diesel-Generator	101
		OP/1/A/1105/019	Control Rod Drive System	036
		OP/1/A/1106/006	Emergency FDW System	134
		PT/0/A/0400/011	SSF Diesel Generator Test	015
		PT/0/A/0600/021	Standby Shutdown Facility Diesel-Generator Operation	017
		PT/0/A/0620/009	Keowee Hydro Operation	56
		PT/1/A/0600/012	Turbine Driven Emergency Feedwater Pump Test	108
		PT/1/A/0600/015	Control Rod Movement	031
		PT/2/A/0203/006 A	Low Pressure Injection Pump Test – Recirculation	089
		PT/2/A/0203/006 A	Low Pressure Injection Pump Test – Recirculation	088, 091
		PT/2/A/0203/006 B	Low Pressure Injection Pump Test – Decay Heat	032
		PT/3/A/0204/007	Reactor Building Spray Pump Test	099
		TE-MN-ALL-0202	Transformer and Apparatus Testing	4
		71114.06	Miscellaneous	
	ONS 24-01 Drill Guide			
CSD-EP-ONS-0101-01	EAL Technical Basis Document			5
CSD-EP-ONS-0101-02	Classification of Emergency			3
EP-ALL-EPLAN	Duke Energy Common Emergency Plan			5
EP-ONS-EPLAN-ANNEX	Duke Energy Oconee Emergency Plan Annex			1
71151	Miscellaneous		Unit 1 Operator Logs, November 2023	
			Unit 2 Operator Logs, October – November 2023	
			Unit 3 Operator Logs, June 2023	
			MSPI Derivation Reports for the High Pressure Injection System for Units 1, 2 and 3 for all months of 2023	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			MSPI Margin Reports for the High Pressure Injection System for Units 1, 2 and 3 for all months of 2023	
		AD-PI-ALL-0700	Performance Indicators	6
71153	Corrective Action Documents		2408618, 2409112, 2415204, 1579134, 2040588, 2461378, 2196352, 2383415	
	Miscellaneous	ONEI-0400-587	Figure 1. Oconee 2 Cycle 32 Final Core Load Map	0
	Procedures	AD/PI/ALL/0400	Operating Experience Program	11
		MP/0/A/1140/001 A	CRD – Shim Drive – Leadscrew Couple	013
		MP/0/A/1140/009	CRD - APSR - Coupling	045
		PT/0/A/0750/002	Core Inspections Procedure	31
	Work Orders		20522549, 20522553	