



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

April 27, 2022

Mr. Kent Scott
Site Vice President
Entergy Operations, Inc.
5485 U.S. Highway 61N
St. Francisville, LA 70775

**SUBJECT: RIVER BEND STATION – INTEGRATED INSPECTION
REPORT 05000458/2022001**

Dear Mr. Scott:

On March 31, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at River Bend Station. On April 11, 2022, the NRC inspectors discussed the results of this inspection with Ms. Bonnie Bryant, General Manager, Plant Operations, and other members of your staff. The results of this inspection are documented in the enclosed report.

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

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

K. Scott

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Sincerely,



Signed by Josey, Jeffrey
on 04/27/22

Jeffrey E. Josey, Chief
Projects Branch C
Division of Operating Reactor Safety

Docket No. 05000458

License No. NPF-47

Enclosure:

Inspection Report 05000458/2022001

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

Docket Number: 05000458

License Number: NPF-47

Report Number: 05000458/2022001

Enterprise Identifier: I-2022-001-0017

Licensee: Entergy Operations, Inc.

Facility: River Bend Station

Location: St. Francisville, LA

Inspection Dates: January 1, 2022, to March 31, 2022

Inspectors: R. Kumana, Senior Resident Inspector
N. Okonkwo, Reactor Inspector
C. Wynar, Resident Inspector

Approved By: Jeffrey E. Josey, Chief
Projects Branch C
Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting an integrated inspection at River Bend 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 Implement Adequate Procedures for Control Building Air Conditioning Maintenance			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000458/2022001-01 Open/Closed	[P.2] - Evaluation	71111.15
<p>The inspectors identified a Green finding and associated non-cited violation of Technical Specification 5.4.1.a for failure to maintain written procedures covering activities recommended in Regulatory Guide 1.33, Revision 2, Appendix A. Specifically, the licensee failed to prepare appropriate procedures for maintenance of the C subsystem of the control building chilled water system which led to unnecessary cycling of safety-related breakers for the control building air control units, resulting in unplanned inoperability of Division I of the control building and control room air conditioning systems.</p>			
Failure to Promptly Identify and Correct Conditions Adverse to Quality			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000458/2022001-02 Open/Closed	[P.2] - Evaluation	71152A
<p>The inspectors identified a Green finding and associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI with two examples for failures to promptly correct conditions adverse to quality. Specifically, one safety-related valve, E12-VF036B, was unable to perform its intended function in abnormal and emergency operating procedures and safety-related discharge check valve for Division III of standby service water was unable to fully close under all conditions.</p>			
Failure to Maintain Appropriate Procedures for Turbine Generator Control System Shutdown			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000458/2022001-03 Open/Closed	[P.3] - Resolution	71153
<p>A self-revealed Green finding and associated non-cited violation of Technical Specification 5.4.1.a was identified when the licensee failed to maintain written procedures covering activities recommended in Regulatory Guide 1.33, Revision 2, Appendix A. Specifically, the licensee failed to prepare appropriate procedures for shutdown of the turbine generator and associated electrical control systems, which led to a failure of control system components that caused a turbine trip at power.</p>			

Failure to Implement Maintenance Rule for Condenser Air Removal System			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000458/2022001-04 Open/Closed	None	71153
<p>A self-revealed Green finding and associated non-cited violation of 10 CFR 50.65(a)(2) was identified when the licensee failed to demonstrate effective control of performance of a maintenance rule scoped system through appropriate preventive maintenance. Specifically, the licensee failed to ensure the air ejector suction valve current-to-pressure (I/P) converter could perform its function to fail the valve open, resulting in a manual scram due to unrecoverable main condenser vacuum.</p>			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000458/2021-002-00	Automatic Reactor Scram due to Turbine Control System Communication Fault	71153	Closed
LER	05000458/2021-001-00	Manual Reactor Scram due to Loss of Main Condenser Vacuum	71153	Closed

PLANT STATUS

River Bend Station began the inspection period at rated thermal power. On February 11, 2022, River Bend Station reduced power to approximately 60 percent for a rod pattern adjustment. River Bend Station returned to rated thermal power on February 14, 2022, and remained at or near rated thermal power 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," conducted routine reviews using IP 71152, "Problem Identification and Resolution," observed risk significant activities, and completed onsite 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:
 - Standby service water system and fire suppression system on January 26, 2022

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 impending severe weather due to thunderstorm warning and high winds on March 22, 2022.

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) Division III standby service water on February 23, 2022
- (2) Division I control building air conditioning during chiller C maintenance on March 22, 2022

Complete Walkdown Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated system configurations during a complete walkdown of the low-pressure core spray system on March 11, 2022.

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) Division II emergency diesel generator, fire area DG-4/Z-1, on February 8, 2022
- (2) Standby switchgear 1A room, fire area C-15, on February 8, 2022
- (3) Division I standby service water, fire areas PH-1/Z-1 and PH-1/Z-2, on February 18, 2022
- (4) Control building heating, ventilation, and air conditioning 1A room, fire area CB-4, on March 28, 2022
- (5) High pressure core spray pump room, fire area AB-2/Z-1, on March 29, 2022

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

- (1) Residual heat removal B pump room

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

- (1) The inspectors observed and evaluated licensed operator performance in the Control Room during downpower for rod sequence change and testing on February 11, 2022.

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

- (1) The inspectors observed and evaluated simulator as-found evaluation on March 15, 2022.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (1 Sample)

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

- (1) Condenser air removal failures on March 30, 2022

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (6 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) Elevated risk during standby service water testing on January 4, 2022
- (2) Emergent work due to failure of service water cooling fans on January 20, 2022
- (3) Elevated risk during unit cooler HVR–UC6 work on January 25, 2022
- (4) Elevated risk during diesel generator and standby service water work on February 23, 2022
- (5) Elevated risk during air control unit (ACU) breaker 1 and 2A cycling on March 18, 2022
- (6) Elevated risk during reactor core isolation cooling E51-MOVF045 valve repair on March 18, 2022

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (5 Samples)

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

- (1) Containment unit coolers A and B on January 7, 2022 (CR-RBS-2019-03097)
- (2) Scram discharge volume indication on January 31, 2022 (CR-RBS-2021-07600)
- (3) Division II emergency diesel generator on March 11, 2022 (CR-RBS-2022-01091)
- (4) Control building ACU breakers on March 24, 2022 (CR-RBS-2022-00629 and CR-RBS-2022-00633)
- (5) Reactor core isolation cooling governor valve on March 24, 2022 (CR-RBS-2022-01466)

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) Replace SWP–MOV40C with tricentric butterfly (EC-0000084643)

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (6 Samples)

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

- (1) Work Order (WO) 52922469, reactor protection system channel D half scram, on March 11, 2022

- (2) WO 00574511, main steam positive leakage control system steam tunnel repairs, on March 11, 2022
- (3) WO 52920331, control building chiller C flow instrument, on March 18, 2022
- (4) WO 00575911 and WO 00575922, reactor core isolation cooling valve E51-MOVF045, on March 18, 2022
- (5) WO 00574058, air handling units ACU-1A and ACU-2A circuit breakers, on March 21, 2022
- (6) WO 00529319, control building chiller C, on March 28, 2022

71111.22 - Surveillance Testing

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

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

- (1) STP-207-4550, Revision 11, "Monthly RCS Leakage Detection System Drywell and Pedestal," on January 14, 2022
- (2) STP-202-0202, Revision 4, "ADS Inhibit Switch Channel and Logic System Functional Test," on March 4, 2022

Inservice Testing (IP Section 03.01) (1 Sample)

- (1) STP-255-6302, Revision 8, "Division II PVLCS Quarterly Valve Operability Test," on January 24, 2022

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) (1 Sample)

- (1) January 1, 2021, through December 31, 2021

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02) (1 Sample)

- (1) January 1, 2021, through December 31, 2021

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

- (1) January 1, 2021, through December 31, 2021

71152A - Annual Follow-up Problem Identification and Resolution

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

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

- (1) Increasing backlog of open work orders for adverse conditions (CR-RBS-2020-05272).

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

Event Report (IP Section 03.02) (2 Samples)

The inspectors evaluated the following licensee event reports (LERs):

- (1) LER 05000458/2022-001-00, “Manual Reactor Scram due to Loss of Main Condenser Vacuum” (ADAMS Accession No. ML21141A193)

The inspection conclusions associated with this LER, and an associated non-cited violation are documented in this report under the Inspection Results Section.

- (2) LER 05000458/2022-002-00, “Automatic Reactor Scram due to Turbine Control System Communication Fault” (ADAMS Accession No. ML21152A033)

The inspection conclusions associated with this LER, and an associated non-cited violation are documented in this report under the Inspection Results Section.

Reporting (IP Section 03.05) (1 Sample)

- (1) The inspectors evaluated reportability requirements associated with a failure of an emergency diesel generator circuit breaker.

INSPECTION RESULTS

Failure to Implement Adequate Procedures for Control Building Air Conditioning Maintenance			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000458/2022001-01 Open/Closed	[P.2] - Evaluation	71111.15
<p>The inspectors identified a Green finding and associated non-cited violation of Technical Specification 5.4.1.a for failure to maintain written procedures covering activities recommended in Regulatory Guide 1.33, Revision 2, Appendix A. Specifically, the licensee failed to prepare appropriate procedures for maintenance of the C subsystem of the control building chilled water system which led to unnecessary cycling of safety-related breakers for the control building air control units, resulting in unplanned inoperability of Division I of the control building and control room air conditioning systems.</p>			
<p><u>Description:</u> On February 2, 2022, while conducting a tour of the Division I switchgear room, the inspectors identified repetitive cycling of safety-related breakers for the Division I control building ACUs. The inspectors notified the control room staff who discovered that the plant was in an improper configuration for the maintenance that was going on that day. Specifically, the control building AC system, a technical specification required system, was in an improper lineup for maintenance on the Division I control building chilled water (HVK) system C chiller. The licensee has two trains of control building and control room AC.</p>			

Division I is made up of ACU 1A, 2A, and 3A. Division I can be supplied chill water from either the A or C HVK chillers. Division II is made up of 3 ACUs (ACU 1B, 2B, and 3B) with chill water supplied by the B or D HVK chillers.

On February 2, 2022, Division II was supplying control room and control building AC. Division I was in standby with the C chiller tagged out for maintenance. If there was a loss of Division II, the A chiller would start, the Division I ACU breakers would shut, and the Division I air handling units would start. For the ACU breakers to shut, they need a chill water flow signal from one of the two associated chiller subsystems. However, the absence of a running pump sends a signal to trip the ACU breakers. At the time of the maintenance, both the Division I chill water pumps were not running and the Division I ACU breakers were receiving a signal to keep the breakers tripped. However, during the maintenance on the C chiller, a flow calibration was in progress. This electrically simulated full system flow which sent a signal to the ACU breakers to shut. Since no pumps were running, they were simultaneously receiving a signal to open. This caused the cycling observed in the switchgear room.

The repetitive cycling caused a position switch to fail on the ACU1A breaker, rendering it inoperable.

Corrective Actions: The licensee entered this issue into their corrective action program and replaced the breakers for ACU1A and ACU2A.

Corrective Action References: CR-RBS-2022-00629 and CR-RBS-2022-00633

Performance Assessment:

Performance Deficiency: The failure to prepare appropriate procedures for the C HVK chiller maintenance 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, this led to one train of a two-train system becoming inoperable.

Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, they determined this finding was of very low safety significance (Green) because "Yes" was not answered to any of the screening questions.

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. CR-RBS-2016-05511 documented the same events happening during a flow calibration leading to breaker cycling. This CR was not screened as adverse and failed to fully address the inadequate work orders, resulting in improvements to the procedures in the work orders for the A, B, and D chillers, but not for the C chiller.

Enforcement:

Violation: Technical Specification 5.4.1.a requires, in part, that procedures shall be established, implemented, and maintained covering the activities recommended in

Appendix A of Regulatory Guide 1.33, Revision 2. Section 9 of Regulatory Guide 1.33, Revision 2, requires instructions for maintenance. The licensee established Work Order 52920331 to cover maintenance activities for the Division I control building AC chillers.

Contrary to the above, on February 2, 2022, the licensee failed to establish, implement, and maintain procedures recommended by Appendix A of Regulatory Guide 1.33, Revision 2. Specifically, the licensee did not ensure that the work order for the flow calibration of the C control building chiller was adequate which led to the unnecessary cycling of the ACU 1A and ACU 2A breakers and the inoperability of ACU 1A.

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

Failure to Promptly Identify and Correct Conditions Adverse to Quality

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000458/2022001-02 Open/Closed	[P.2] - Evaluation	71152A

The inspectors identified a Green finding and associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI with two examples for failures to promptly correct conditions adverse to quality. Specifically, one safety-related valve, E12-VF036B, was unable to perform its intended function in abnormal and emergency operating procedures and safety-related discharge check valve for Division III of standby service water was unable to fully close under all conditions.

Description: While conducting a review of CR-RBS-2020-05272, a roll up CR that downgraded CRs that were previously screened as “adverse” to a “non-adverse” status, under IP 71152, the inspectors identified two examples of 10 CFR Part 50, Appendix B violations.

The first example is for valve E12-VF063B, the condensate flush valve for residual heat removal train B. The licensee generated CR-RBS-2019-02892 on April 26, 2019, documenting the valve failing to open due to stem and disc separation. It was screened as a condition adverse to quality (CAQ) and Work Request (WR) 457318 was generated with the valve classified as a noncritical component. On February 1, 2021, the CR was downgraded to a non-adverse condition. The licensee failed to recognize this safety-related, quality group B valve was a critical component per Procedure EN-DC-153. They also failed to document the impact the valve has on executing both abnormal operating procedures and emergency operating procedures. Procedures AOP-51 and EOP-5, Attachment 6, both have specific requirements for this valve to open. The inspectors determined that because this valve has been in a failed state for nearly three years, with an opportunity to repair it during a refueling outage, the licensee had failed to promptly correct the CAQ.

The second example is for valve SWP-V148, the standby service water (SSW) C discharge check valve. On September 9, 2019, the licensee generated CR-RBS-2019-06296 to document the check valve not fully seating after a periodic test of the C SSW pump. The condition was noticed by licensee staff after they observed normal service water system leaking by to the SSW system. The CR was screened as adverse and WR 464663 was generated. The design of this check valve has internal springs to force the check valve closed in all flow conditions in a specific way to minimize seat wear. A backup safety pin

allows system back flow to shut the valve should the springs fail. The suspected issue with the valve is failed or worn springs. This check valve should fully seat in all conditions to prevent leak-by that could divert system flow. As part of the roll up CR, this issue was downgraded to non-adverse on February 2, 2021. The valve was not repaired during the 2021 refueling outage. In August 2021, the licensee discovered that the valve could not be repaired online and would need to be worked in an outage. Then on October 7, 2021, during another test of the C SSW pump, SWP-V148 failed to fully close again. A new CR, CR-RBS-2021-06185, was generated to document this. This CR was also screened as non-adverse.

The inspectors determined that because the valve has had a degraded condition for nearly three years, with an opportunity to repair it during a refueling outage, the licensee had failed to promptly correct the CAQ.

Corrective Actions: The licensee entered this issue into their corrective action program and scheduled both E12-VF063B and SWP-V148 to be repaired during the next plant refueling outage in 2023.

Corrective Action References: CR-RBS-2022-01532

Performance Assessment:

Performance Deficiency: The inspectors determined that failing to timely correct CAQs 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, the licensee failed to ensure that a safety-related valve used in emergency operating procedures would perform its function and failed to ensure that a safety-related check valve would reliably close and seat.

Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating Systems," the inspectors determined that both issues screened as very low safety significance (Green) because neither represented a loss of probability risk assessment function of a train of a technical specification system.

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.

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part that, "measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment and non-conformances are promptly identified and corrected."

Contrary to the above, from April 26, 2019, and September 9, 2019, to present date, the

licensee failed to correct two CAQs. Specifically, the licensee failed to promptly correct a CAQ with valve E12-VF063B resulting in the inability to execute AOP-51 as written and failed to promptly correct a CAQ with valve SWP-V148, which resulted in another failure of SWP-V148 in 2021.

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 Appropriate Procedures for Turbine Generator Control System Shutdown

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000458/2022001-03 Open/Closed	[P.3] - Resolution	71153

A self-revealed Green finding and associated non-cited violation of Technical Specification 5.4.1.a was identified when the licensee failed to maintain written procedures covering activities recommended in Regulatory Guide 1.33, Revision 2, Appendix A. Specifically, the licensee failed to prepare appropriate procedures for shutdown of the turbine generator and associated electrical control systems, which led to a failure of control system components that caused a turbine trip at power.

Description: On April 2, 2021, while River Bend Station was operating at 86 percent reactor power, a turbine trip signal caused a main turbine trip and an automatic reactor scram. The main turbine trip and reactor scram were caused by a random, spurious communication error within the Ovation turbine control system. This event was caused by a remote communications module that erroneously sent a turbine front standard manual pushbutton trip signal by making the normally energized inputs appear de-energized.

The licensee performed troubleshooting to determine why the module failed. The module was labeled as the “Drop 3 controller” and was one of two that performed the same function, with the other labeled as the “Drop 53 controller.” During the previous outage the licensee had configured the “Drop 53 controller” as the active controller, but during refueling outage RF-21 which ended on March 20, 2021, the “Drop 3 controller” was made active. The licensee had observed multiple spurious alarms on the Ovation turbine control system after placing the “Drop 3 controller” as the active controller but had not determined the cause. Further research showed that during a previous operating period following a forced outage in 2018, the alarms had come in while the “Drop 3 controller” was active. The licensee found that, in 2018, CR-RBS-2018-00771 was written documenting an abnormal startup configuration due to inadequate shutdown of the turbine generator control system. The procedure for securing power to VBN-PNL01A1, the bus that powered the Ovation system, was OSP-0019, “Electrical Bus Outages.” The section of the procedure for shutdown of the bus did not contain steps to properly shutdown the Ovation system prior to securing power. When power was restored after the outage, the system was re-powered in an abnormal condition. However, the licensee only made changes to the startup procedure to place the system in the proper configuration and did not evaluate the impact of the improper shutdown on system components or take action to correct the shutdown procedure.

The licensee determined, based on the timeline and vendor information, that the “Drop 3 controller” was likely damaged by the improper shutdown performed in 2018 and was generating spurious alarms when set as the active controller. While the spurious alarms continued for a period of time in such a way that did not immediately impact operation of the

turbine generator, the alarms ultimately occurred in a combination and sequence that triggered a turbine trip.

Corrective Actions: The remote communications module was replaced, and the condition was entered into the licensee's corrective action program.

Corrective Action References: CR-RBS-2021-02862

Performance Assessment:

Performance Deficiency: The failure to prepare appropriate procedures for shutdown of the turbine generator control system 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 inadequate procedure for shutdown of the turbine generator control system resulted in the failure of the system while at power causing the scram.

Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 1, "Initiating Events Screening Questions," the finding was screened as very low safety significance (Green) because although it caused a scram, it did not also result in the loss of mitigating equipment.

Cross-Cutting Aspect: P.3 - Resolution: The organization takes effective corrective actions to address issues in a timely manner commensurate with their safety significance. Specifically, the licensee had identified problems with the shutdown procedure in 2018 but failed to evaluate the condition of the affected components and correct the shutdown procedure.

Enforcement:

Violation: Technical Specification 5.4.1.a, requires, in part, that procedures shall be established, implemented, and maintained covering the activities recommended in Appendix A of Regulatory Guide 1.33, Revision 2. Section 4.m and 4.w of Appendix A to Regulatory Guide 1.33, Revision 2, require that instructions for shutdown should be prepared as appropriate for the turbine generator system and the onsite AC system. The licensee established Procedure OSP-0019, "Electrical Bus Outages," Revision 312, to cover those activities.

Contrary to the above, prior to April 2, 2021, the licensee failed to establish, implement, and maintain procedures recommended by Appendix A of Regulatory Guide 1.33, Revision 2. Specifically, the licensee did not ensure that Procedure OSP-0007 included appropriate steps for shutting down the AC electrical bus that powered the turbine generator control system, causing a failure of the Ovation communications module that ultimately resulted in a turbine trip and reactor scram.

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 Maintenance Rule for Condenser Air Removal System			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000458/2022001-04 Open/Closed	None	71153
<p>A self-revealed Green finding and associated non-cited violation of 10 CFR 50.65(a)(2) was identified when the licensee failed to demonstrate effective control of performance of a maintenance rule scoped system through appropriate preventive maintenance. Specifically, the licensee failed to ensure the air ejector suction valve current-to-pressure (I/P) converter could perform its function to fail the valve open, resulting in a manual scram due to unrecoverable main condenser vacuum.</p> <p><u>Description:</u> On March 25, 2021, at approximately 9:08 a.m., the Main Control Room noted lowering condenser vacuum, lowering generator load, and lowering offgas system flow. The condenser vacuum could not be recovered. The operators identified that Valve ARC-AOV1A, air ejection suction valve, was closed for an unknown reason and inserted a manual reactor scram at 9:18 a.m. The licensee's cause evaluation identified that the controller (ARC-ZIC1A) for ARC-AOV1A had failed, which caused the valve to close. An installed current to pressure (I/P) converter, ARC-I/P1A, is designed to have ARC-AOV1A fail as-is upon loss of electrical input or control air. This I/P converter should have caused ARC-AOV1A to fail as is (open in this case) vice shut when its controller failed; however, the I/P converter also failed, which caused ARC-AOV1A to fail shut and caused an unrecoverable loss of vacuum resulting in a manual scram.</p> <p>The I/P converter was installed in the plant in 2007 to eliminate single point failures in the plant. The preventive maintenance to test this feature every outage that the engineering change required was never implemented. Therefore, this feature was not tested for approximately 14 years. Condenser air removal is a maintenance rule scoped system under 10 CFR 50.65(a)(2). Since no preventive maintenance was being done to test the I/P converter's function to fail ARC-AOV1A as-is (open position), the licensee failed to demonstrate adequate performance through preventive maintenance.</p> <p>Corrective Actions: The licensee replaced the controller and cards that failed, reported the event as LER 50-458/2021-001-00, and entered the event into their corrective action program.</p> <p>Corrective Action References: CR-RBS-2021-02694</p> <p><u>Performance Assessment:</u></p> <p>Performance Deficiency: The failure to monitor the performance or demonstrate effective control of performance of systems covered by the maintenance rule is a performance deficiency.</p> <p>Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance 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 failure of the I/P converter prevented ARC-AOV1A from failing open. Since it failed closed, a manual scram was inserted due to an unrecoverable loss of vacuum.</p>			

Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 1, "Initiating Events Screening Questions," the finding was screened as very low safety significance (Green) because although it caused a scram it did not result in the loss of mitigating equipment.

Cross-Cutting Aspect: None

Enforcement:

Violation: Title 10 CFR 50.65(a)(1) requires, in part, that the holders of an operating license shall monitor the performance or condition of SSCs within the scope of the rule as defined by 10 CFR 50.65(b), against licensee established goals, in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions.

Title 10 CFR 50.65(a)(2) states, in part, that monitoring as specified in 10 CFR 50.65(a)(1) is not required where it has been demonstrated that the performance or condition of an SSC is being effectively controlled through the performance of appropriate preventive maintenance, such that the SSC remains capable of performing its intended function.

Contrary to the above, the licensee failed to monitor the performance of ARC-AOV1A and ARC-I/P1A in excess of 14 years. The performance or condition of this SSC was not being effectively controlled through the performance of appropriate preventive maintenance and, as a result, goal setting and monitoring was required per 10 CFR 50.65(a)(1). The licensee then failed to implement goal setting and monitoring.

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 11, 2022, the inspectors presented the integrated inspection results to Ms. Bonnie Bryant, General Manager, Plant Operations, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.15	Corrective Action Documents	CR-RBS-	2016-05511, 2022-00629, 2022-00633	
	Work Orders	WO	42825651, 52520502, 52791396, 52836793, 52920331	
71152A	Corrective Action Documents	CR-RBS-	2019-02892, 2019-06296, 2021-06185	
	Miscellaneous	C283-0101	C&S Valve Co. Installation & Maintenance Instructions for Dual Plate Check Valves	05/241994
		SEP-RBS-IST-2	RBS Inservice Testing Plan	10
	Procedures	AOP-0051	Loss of Decay Heat Removal	321
		EN-DC-153	Preventive Maintenance Component Classification	021
		EN-LI-102	Corrective Action Program	47
		EN-OP-104	Operability Determination Process	17
		EOP-0005	Emergency Operation and Severe Accident Procedures Enclosures	326
71153	Corrective Action Documents	CR-RBS-	2017-08106, 2018-00771, 2021-02694, 2021-02862	
	Drawings	0231.015-001-572	Index Sheet System Architecture & Layout Network Connections	0
	Miscellaneous	DCN 89719	Removal of Ovation Point TCS PBFSTRIP from Scan	0
		EC-RBS-69990	Digital EHC Upgrade - Testing Modifications	0
	Procedures	EN-DC-153	Preventive Maintenance Component Classification	021
		EN-DC-324	Preventive Maintenance Program	27
		OSP-0019	Electrical Bus Outages	311
		OSP-0019	Electrical Bus Outages	312