UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

June 22, 2022

Mr. David Rhoades
Senior Vice President
Constellation Energy Generation, LLC
President and Chief Nuclear Officer (CNO)
Constellation Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION–DESIGN BASIS ASSURANCE INSPECTION (TEAMS)
INSPECTION REPORT 05000456/2022010 AND 05000457/2022010

Dear Mr. Rhoades:

On May 10, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Braidwood Station and discussed the results of this inspection with Mr. B. Keller, Maintenance Director (Acting for Plant Manager) and other members of your staff. The results of this inspection are documented in the enclosed report.

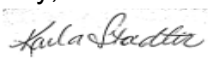
Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement; and the NRC Resident Inspector at Braidwood 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 III; and the NRC Resident Inspector at Braidwood 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 Stoedter, Karla
on 06/22/22

Karla K. Stoedter, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 05000456 and 05000457
License Nos. NPF-72 and NPF-77

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

Letter to David Rhoades from Karla K. Stoedter dated June 22, 2022.

SUBJECT: BRAIDWOOD STATION–DESIGN BASIS ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT 05000456/2022010 AND 05000457/2022010

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000456 and 05000457
License Numbers:	NPF-72 and NPF-77
Report Numbers:	05000456/2022010 and 05000457/2022010
Enterprise Identifier:	I-2022-010-0033
Licensee:	Constellation Energy Generation, LLC
Facility:	Braidwood Station
Location:	Braceville, IL
Inspection Dates:	April 18, 2022 to May 10, 2022
Inspectors:	A. Dahbur, Senior Reactor Inspector M. Gangewere, Reactor Inspector I. Hafeez, Reactor Inspector J. Havertape, Senior Reactor Analyst M. Jones, Reactor Inspector E. Sanchez Santiago, Senior Reactor Inspector R. Trelka, Reactor Inspector C. Baron, Mechanical Contractor
Approved By:	Karla K. Stoedter, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a design basis assurance inspection (teams) inspection at Braidwood 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

Emergency Diesel Generator Voltage and Frequency Acceptance Criteria Incorrectly Translated to Surveillance Test Procedures			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456,05000457/2022010-01 Open/Closed	[H.6] - Design Margins	71111.21M
The inspectors identified a finding of very low safety significance (Green) and an associated Non-Cited Violation (NCV) of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, Criterion III, "Design Control," for the failure to ensure regulatory requirements and the design basis of the Emergency Diesel Generators (EDGs) were correctly translated into surveillance procedures. Specifically, the licensee failed to translate the correct acceptance criteria for EDG voltage and frequency into their surveillance test procedures.			

Failure to Test Manual Valve Closure Function in Accordance with American Society of Mechanical Engineers Code			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456,05000457/2022010-02 Open/Closed	None (NPP)	71111.21M
The inspectors identified a finding of very low safety significance (Green) and a Non-Cited Violation (NCV) of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(f), "Inservice Testing Requirements," American Society of Mechanical Engineers Operation and Maintenance of Nuclear Power Plants Code (ASME OM code), Subsection ISTC-3540, "Manual Valves," for the licensee's failure to perform periodic manual valve exercise testing of Auxiliary Feedwater (AF) Flow Control Valves AF005 A-H to ensure the operational readiness of the valves.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000456,05000457/ 2021010-01	Potential Protective Device Coordination Issues Associated with Battery Charger Short-Circuit Output	71111.21M	Open

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 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), inspectors were directed to begin telework. In addition, regional baseline inspections were evaluated to determine if all or a 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 some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.21M - Design Bases Assurance Inspection (Teams)

The inspectors evaluated the following components and listed applicable attributes, permanent modifications, and operating experience:

Design Review - Risk-Significant/Low Design Margin Components (IP Section 02.02) (4 Samples)

For each component sample, the inspectors reviewed the licensing bases including: (1) the Updated Safety Analysis Report (USAR); (2) the Technical Specification (TS); and (3) the Technical Requirements Manual (TRM). The inspectors reviewed a sample of operating procedures (including normal, abnormal and emergency procedures), overall system/component health (including condition reports and operability evaluations, if any) and associated maintenance effectiveness (e.g., Maintenance Rule, procedures). The inspectors performed visual inspections of the accessible components to identify potential hazards and/or signs of degradation. Additional component specific design attributes reviewed by the inspectors are listed below.

(1) 1AP12E - 4160V/480V Transformer 132X

1. Modifications
2. Protective devices and trip setpoints
3. Breaker testing and maintenance
4. Control circuit scheme
5. Minimum required operating voltage
6. Loading calculations

(2) 1AF005B - Auxiliary Feedwater Motor Driven Pump 1B Flow Control Valve

1. Modifications
2. Translation of vendor specifications
3. Environmental specifications

4. Mechanical design and considerations
    a. Air supply sizing
        i. Minimum supply time
        ii. Minimum supply pressure
    b. Air supply pressure control setpoint
    c. Air supply pressure control relief capacity
    d. Required closing force
    e. Pneumatic pressure requirements
    f. Closure/opening time
5. Test/inspection procedures, acceptance criteria, and recent results
    a. Inservice testing
    b. Thermal overload testing
    c. Technical Specification required surveillance
    d. Actuation test

(3) 2DG0KA - 2A Diesel Generator

1. Modifications
2. Protection against external events
    a. Flooding
    b. Seismic
    c. High energy line break
    d. Fire
3. Mechanical design calculations and considerations
    a. Room heat up calculations and environmental considerations
    b. Fuel oil volume consumption
    c. Fuel oil available volume/level
    d. Combustion air supply design
    e. Starting air design, including station blackout recovery
    f. Engine trip setpoints
    g. Room heat up calculations
    h. Room cooling
4. Test/inspection procedures, acceptance criteria, and recent results
    a. Engine
    b. Technical Specification surveillances
    c. Lube oil cooler
    d. Jacket water cooler
    e. Fuel oil volume
    f. Fuel oil quality
    g. Starting air
5. Electrical design calculations and considerations
    a. Load voltage drop
    b. Loss of voltage relaying
    c. Short circuit calculations
    d. Maximum and minimum voltage and frequency profile
    e. Direct Current (DC) field flashing circuit design
    f. Relay coordination
    g. Output breaker control logic
    h. Protective relay setpoint
    i. Generator grounding scheme
    j. Capability to start under degraded voltage conditions

(4) 1AP06EP - 4KV Feeder Breaker 1425X
    1. Modifications
    2. Protective devices and trip setpoints
    3. Breaker testing and maintenance
    4. Control circuit scheme
    5. Minimum required operating voltage
    6. Loading calculations

Design Review - Large Early Release Frequency (LERFs) (IP Section 02.02) (1 Sample)

(1) 2MS001A - Main Steam Isolation Valve
    1. Translation of vendor specifications
    2. Environmental qualification
    3. Mechanical design calculations and considerations
        a. Weak link analysis
        b. Required thrust (torque)
        c. Maximum allowed leakage
        d. Maximum differential pressure
        e. Air supply sizing
            i. Minimum supply time
            ii. Minimum supply pressure
        f. Air supply pressure control setpoint
        g. Air supply pressure control relief capacity
        h. Required closing force
        i. Pneumatic pressure requirements
        j. Closure/opening time
    4. Test/inspection procedures, acceptance criteria, and recent results
        a. Leakage
        b. Inservice testing
        c. Technical Specification surveillances
        d. Leak rate testing
        e. Actuation test

Modification Review - Permanent Mods (IP Section 02.03) (6 Samples)

(1) EC 405122 - Radiation Monitor -11 Replacement
(2) EC 631828 - Unit 2 System Auxiliary Transformer Surge Arrester Replacement
(3) EC 617421 - 345KV Overhead Bus Vulnerability Unit 2
(4) EC 632665 - Diesel Generator Kilovac Relay Replacement with Struthers-Dunn Model
(5) EC 406359 - Unit 2 Reactor Floor Drain Sump Level Instrumentation Modification
(6) EC 630430 - Disconnect Unit 2 Pressurizer Heaters 17, 18, 40, 69, and 70 and Open Breakers 2RY03EA-B5A/B5B for Heaters 13, 14 and 37

Review of Operating Experience Issues (IP Section 02.06) (2 Samples)

(1) Information Notice 2019-01, "Inadequate Evaluation of Temporary Alterations"
(2) Regulatory Issue Summary 2006-23, “Post-Tornado Operability of Ventilating and Air-Conditioning Systems Housed in Emergency Diesel Generator Rooms"

INSPECTION RESULTS

Emergency Diesel Generator Voltage and Frequency Acceptance Criteria Incorrectly Translated to Surveillance Test Procedures			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456,05000457/2022010-01 Open/Closed	[H.6] - Design Margins	71111.21M

The inspectors identified a finding of very low safety significance (Green) and an associated Non-Cited Violation (NCV) of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, Criterion III, “Design Control,” for the failure to ensure regulatory requirements and the design basis of the Emergency Diesel Generators (EDGs) were correctly translated into surveillance procedures. Specifically, the licensee failed to translate the correct acceptance criteria for EDG voltage and frequency into their surveillance test procedures.

Description:

The inspectors reviewed EDG Surveillance Test Procedure 2BwOSR 3.8.1.13-2, Revision 19, “2B Diesel Generator Bypass of Automatic Trips Surveillance,” and determined the acceptance criteria were not consistent with Design Basis Calculation BRW-16-0001-E, Revision 0, “Evaluation of the Effects of Emergency Diesel Generator Voltage and Frequency Variations on Safety-Related Equipment Powered by the EDGs.” The inspectors found the same inconsistencies upon reviewing the EDG surveillance procedures for the other three EDGs. The design calculation was implemented through Engineering Change (EC) 627247, Section 4.1.27, and established the appropriate acceptance criteria after accounting for setting and control uncertainties of the voltage and frequency measurement devices. This calculation also evaluated and verified the EDGs would operate within the Technical Specification (TS) prescribed frequency and voltage ranges, including measurement uncertainties. The calculated acceptance criteria was used in other calculations to verify EDG loading, EDG fuel oil consumption, emergency core cooling system (ECCS) pump performance, ECCS pump in-service test acceptance criteria, motor operated valve performance, and heating, ventilation, and air conditioning (HVAC) fan and blower performance.

Per Section 4.1.27 of EC 627247, the acceptance criteria in the EDG surveillance procedures which verified adequate voltage and frequency should have been 4000 to 4320 VAC and 59.6 to 60.4 Hz to ensure instrument uncertainty would not result in exceeding the TS allowable values. Instead, the acceptance criteria provided in 2BwOSR 3.8.1.13-2, Revision 19 (and the other applicable EDG surveillance test procedures) were identical to the voltage and frequency values provided in TS Surveillance Requirements 3.8.1.2 and 3.8.1.7 (3950 to 4370 VAC and 59.5 to 60.5 Hz, respectively). These TS values did not account for inherent inaccuracy of the voltmeters and frequency meters used in the surveillances. The inspectors reviewed recently completed surveillance test results and did not identify any instances where

the EDGs operated outside the acceptance criteria provided in Calculation BRW-16-0001-E, Revision 0.

Corrective Actions: The licensee reviewed recent diesel generator surveillance test results and verified the steady state voltages and frequencies, with the engine started in emergency mode, were within the acceptance criteria specified in Calculation BRW-16-0001-E, Revision 0. The licensee also planned to update the affected surveillance procedures.

Corrective Action References: AR 04494950, NRC DBAI: Discrepancies between EC 627247 and Ops Procedures

Performance Assessment:

Performance Deficiency: The licensee's failure to correctly translate the EDG frequency and voltage acceptance criteria provided by Design Calculation BRW-16-0001-E, Revision 0, into their EDG surveillance test procedures as required by 10 CFR 50, Appendix B, Criterion III, "Design Control," was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, the failure to correctly translate the calculated design basis acceptance criteria into the EDG surveillance test procedures could result in an EDG incorrectly being declared operable rather than inoperable.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The inspectors screened the issue against the mitigating systems cornerstone screening questions and determined the finding was of very low safety significance (Green) because the design issue did not result in a loss of EDG operability or functionality.

Cross-Cutting Aspect: H.6 - Design Margins: The organization operates and maintains equipment within design margins. Margins are carefully guarded and changed only through a systematic and rigorous process. Special attention is placed on maintaining fission product barriers, defense-in-depth, and safety related equipment. Specifically, the licensee did not carefully guard safety related equipment design margins through a rigorous process during implementation of EC 627247. The licensee's lack of rigor allowed incorrect translation of design margins into EDG surveillance test procedure acceptance criteria.

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions.

Design Basis Calculation BRW-16-0001-E, Revision 0, associated with EC 627247, Section 4.1.27, stated the acceptance criteria for Surveillance Procedure 2BwOSR 3.8.1.13-2 was required to be between 4000 to 4320 VAC and 59.6 to 60.4 Hz in order to account for uncertainty of any voltmeter or frequency meter used in the surveillances.

Contrary to the above, as of April 18, 2022, the licensee failed to assure the applicable regulatory requirements and the design basis of structures, systems, and components were correctly translated into specifications, drawings, procedures and instructions. Specifically,

the acceptance criteria in Surveillance Procedure 2BwOSR 3.8.1.13-2 were 3950 to 4370 VAC and 59.5 to 60.5 Hz instead of 4000 to 4320 VAC and 59.6 to 60.4 Hz as stated in Design Basis Calculation BRW-16-0001-E, Revision 0.

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

Failure to Test Manual Valve Closure Function in Accordance with American Society of Mechanical Engineers Code

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000456,05000457/2022010-02 Open/Closed	None (NPP)	71111.21M

The inspectors identified a finding of very low safety significance (Green) and a Non-Cited Violation (NCV) of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(f), "Inservice Testing Requirements," American Society of Mechanical Engineers Operation and Maintenance of Nuclear Power Plants Code (ASME OM code), Subsection ISTC-3540, "Manual Valves," for the licensee's failure to perform periodic manual valve exercise testing of Auxiliary Feedwater (AF) Flow Control Valves AF005 A-H to ensure the operational readiness of the valves.

Description:

The ASME OM code, Subsection ISTC-3450, “Manual Valves,” states, in part, that manual valves shall be full-stroke exercised at least once every 2 years, except where adverse conditions may require the valve to be tested more frequently to ensure operational readiness and the valve shall exhibit the required change of obturator position. Additionally, for Category B active valves under Table ISTC-3500-1, "Inservice Test Requirements," Note 2 states, "When more than one distinguishing category characteristic is applicable, all requirements of each of the individual categories are applicable, although duplication or repetition of common testing requirements is not necessary." Active valves are defined as valves that are required to change position to accomplish a specific function in shutting down a reactor to the safe shutdown condition, maintaining the safe shutdown condition, or mitigating the consequences of an accident.

The inspectors reviewed the inservice testing basis document which stated the AF Flow Control Valves (AF005A-H) are Category B valves with an active safety function in both open and closed direction. For the ‘close’ safety function, the basis document states, in part, "the valve must close to prevent steam generator (SG) overfill of its respective SG during a SGTR [steam generator tube rupture] accident." Additionally, the basis document states, "installation of a safety related instrument air supply allows taking credit for the automatic flow control and isolation capability of the 1/2AF005A-H valves for a period of 30 minutes." Because the valve is designed to fail open on a loss of instrument air, EOP [emergency operating procedure] 1BwEP-3, “Steam Generator Tube Rupture,” Revision 303, requires manual hand wheel closure and gagging of the valve to ensure isolation. Specifically, Step 4 states, “Check Ruptured SG Level,” and Step b states, "Close the ruptured steam generator(s) isolation valves and throttle valves, 1AF013A-H and 1AF005A-H (0%demand) [respectively]." The Step b. RESPONSE NOT OBTAINED column states, "IF the AF013 fails to close on the ruptured SG, THEN dispatch an operator to locally close the associated 1AF005 (364' P10 using local handwheel)."

The inspectors noted that because the AF005 valves would have to be repositioned manually to their accident position in the event of a ruptured SG or a SGTR event, the valves were required to be tested in accordance with Subsection ISTC-3450 of the ASME OM code. Based on their review of the inservice test plan and test procedures for the AF005 valves, the inspectors determined the licensee failed to ensure the manual valve function credited in the EOPs and the design bases analysis was periodically tested using the handwheel in accordance with ASME OM code.

Corrective Actions: The licensee determined the manual valve closure [using the handwheel] should be periodically tested per the ASME code and therefore included in the Inservice Testing (IST) program.

Corrective Action References: AR 04497848, NRC DBAI: AF005 Manual Handwheel Usage and Testing

Performance Assessment:

Performance Deficiency: The licensee's failure to perform required inservice testing for the AF Flow Control Valves (AF005A-H) in accordance with the ASME OM code was a performance deficiency. The failure to test the valves in accordance with the ASME OM code was due to the licensee failing to include the manual valve function in the IST program.

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 failure to perform the periodic manual full-stroke exercise of the valves did not ensure the operational readiness as required by 2012 ASME OM Code, Subsection ISTC 3540, "Manual Valves."

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding screened as very low safety significance (Green) because the inspectors answered all Inspection Manual Chapter 0609, Appendix A, Exhibit 2, mitigating systems screening questions "no."

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. The last update of the inservice test program was greater than 3 years ago.

Enforcement:

Violation: Title 10 CFR 50.55a(f)(4)(ii) requires, in part, "Inservice tests to verify operational readiness of pumps and valves, whose function is required for safety… must comply with the requirements of the latest edition and addenda of the American Society of Mechanical Engineers OM Code incorporated by reference in… this section 12 months before the start of the 120-month interval."

The 2012 ASME OM Code, Subsection ISTC-3510, "Exercising Test Frequency," states, in part, "Active Category A, Category B, and Category C valves shall be exercised nominally every 3 months except as provided by paragraphs ISTC-3520, ISTC-3540, ISTC-3550, ISTC-3570, ISTC-5221, and ISTC-5222."

The 2012 ASME OM Code, Subsection ISTC-3540, "Manual Valves," states "Manual valves

shall be full-stroke exercised at least once every two years, except where adverse conditions may require the valve to be tested more frequently to ensure operational readiness. Any increased testing frequency shall be specified by the Owner. The valve shall exhibit the required change of obturator position."

Contrary to the above, as of April 18, 2022, the licensee's in-service tests to verify operational readiness of pumps and valves, whose function is required for safety did not comply with the requirements of the latest edition and addenda of the ASME OM code incorporated by reference 12 months before the start of the 120-month interval that started on July 29, 2018. Specifically, the licensee failed to include manual valve full-stroke exercise and testing of AF Flow Control Valves AF005 A-H in the inservice testing program in accordance with 2012 ASME OM Code, Subsection ISTC-3540.

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

Unresolved Item (Open)	Potential Protective Device Coordination Issues Associated with Battery Charger Short-Circuit Output URI 05000456,05000457/2021010-01	71111.21M

Description:

The inspectors opened this unresolved item (URI) in NRC Inspection Report 05000456/2021010 and 05000457/2021010 (ML21200A161). During this inspection, the inspectors reviewed the licensee's evaluation in response to the URI. The inspectors identified additional questions regarding the coordination of the safety related battery charger breakers and the 300A fuses for the non-safety related bus. The purpose of these questions was to confirm whether the safety related charger breaker would trip in the event of a short circuit on the non-safety related bus/loads. Additional reviews are necessary to resolve this issue. The inspectors are also having discussions to determine whether requiring the coordination of the breakers and relays constitutes a current regulatory requirement or whether there is a need to enter the backfit process. The inspectors do not have a current safety concern because the licensee incorporated compensatory measures into their procedures to ensure operators reset the respective battery charger breaker prior to the calculated battery depletion time.

Corrective Action References: IR 4419717, "Braidwood Applicability of Byron on NRC IN 2017-06"

EXIT MEETINGS AND DEBRIEFS

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

- On May 10, 2022, the inspectors presented the design basis assurance inspection (teams) inspection results to Mr. B. Keller, Maintenance Director (Acting for Plant Manager) and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21M	Calculations	ATD-0196	Useable Volume in Diesel Oil Storage Tanks and Day Tanks - Braidwood Only Revision	5
		BRW-000317-E	Voltage Drop Calculation for 480 Volt Switchgear Breaker Control	1
		BRW-10-0161-M/BYR10-127	Byron/Braidwood Steam Generator Tube Rupture Margin to Overfill Single Failure Assessment	4
		BRW-10-0161-M/Byr10-127	Byron/Braidwood Steam Generator Tube Rupture Margin to Overfill Single Failure Assessment	4
		BRW-10-0171-M	Air Accumulator Sizing for Operation of AF005 Valves to Support Steam Generator Tube Rupture Accident Analysis	01/10/2011
		BRW-12-0084-M	Auxiliary Building Environment Following a High Energy Line Break in the Turbine Building	2A
		BRW-16-0001-E	Evaluation of the Effects of Emergency Diesel Generator (EDG) Voltage and Frequency Variations on Safety Related Equipment Powered by EDGs	0
		BRW-19-AU-4	480 Volt Unit Substation Breaker Relay Setting Key Calculation	27
		BRW-96-156-M	Calculation for Increased Pressure Rating of Braidwood Units 1 & 2 Main Steam Isolation Valve Accumulator Tanks 1/2 MS001A,B,C, and per ER No. 9500645	4
		L-VD-551	Fan Differential Pressure Setpoints for Instrument Drift Acceptability	2
		PSA-B-97-18	Byron/Braidwood AFW Flow for AF005A-H Modification	5
		VA-403	Temp-Hrs Profile for HVAC Safety Related Panels	2
	Corrective Action Documents	1409940	1AF005B-D Did Not Show Full Closed Via Limit Switches	09/07/2012
		1416822	MTO Mod Test - Flow Control Valves Did Not Reach Full Closed	05/14/2014
		1454281	SGTR Margin to Overfill (1AF050A) Air Accumulators	03/15/2012
		1514843	Revision Needed for New SGTR MTO Single Failure Analysis	05/16/2013
		327861	A2R11 LL - Improvement to Operation of AF005 Valves	04/22/2005
		4123933	OSP-X 1AF005B Did Not Go Full Closed During Full Flow	04/06/2018

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Test	
		4144955	Partially Blocked Tube Ends in Eddy Current Testing	06/06/2018
		4145185	Historical FME Identified in 2DG01KA-X1-X2	06/07/2018
		4145676	Intentionally Abbreviated Maintenance on 2DG01KA-X1	06/09/2018
		4181231	OSP-A 2MS001A Showing Dual	10/08/2018
		4211596	DBAI NRC ID'd: Dust Collecting on EDG Room Exhaust Screens	01/16/2019
		4370636	Unexpected Alarm 2-22-CB DG Control Power Failure	09/19/2020
		4419780	2A MSIV #1 Accumulator Pressure Low Annunciator Received	04/28/2021
		4429613	2A MSIV #1 Acc. Low Press Alarm with Sufficient Pressure	06/16/2021
		4456393	10-OSP-A DG Suspected Relay Failure4EX3	10/28/2021
		758258	NRC Identified Potential Learnings from Historic RIS Reviews	03/28/2008
	Corrective Action Documents Resulting from Inspection	4494950	NRC DBAI: Discrepancies Between EC 627247 and Ops Procedures	04/21/2022
		4497602	DBAI: JW HX Discussions with NRC	05/02/2022
		4497748	DBAI: Lack of Design Basis Analysis for Tornado Impacts	05/02/2022
		4497868	Guidance Not Properly Implied for Transformer Inspection	05/03/2022
	Drawings	20-E-4020B	Relaying & Metering Diagram Diesel Generator 1A-1dg01KA Generator Control & Engine Governor Control System Part 2	W
		20E-1-4001A	Station One Line Diagram	T
		20E-1-4006B	Key Diagram - 4160 ESF Switchgear Bus 142	L
		20E-1-4019B	Relaying and Metering Diagram - 480 ESF Switchgear Bus 132X	M
		20E-1-4030 AP 36	Schematic Diagram - 4.16 KV ESF Switchgear Bus Feed to 480 Auxiliary Transformer 132X	H
		20E-1-4030DG31	Schematic Diagram Diesel Generator 1A Starting Sequence Control 1DG01KA Part 1	AP
		20E-1-4092AC-7J	Internal Wiring Diagram Diesel Generator 1A Control Panel 1PL07J Part 19	D
		20E-2-4030DG44	Schematic Diagram Diesel Generator 2A Control Cab Switches Development 2DG01KA	P

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		M-130 Sht 1A	Diagram of Diesel Oil and Fuel Oil Supply - Unit 2	BO
		M-130 Sht 2	Diagram of Diesel Oil and Fuel Oil Supply - Unit 2	BH
		M-152 Sht 10	Manufacturers Supplemental Diagram - Diesel Generator Fuel Oil Schematic	I
		M-152 Sht 14	Manufacturers Supplemental Diagram - Diesel Generator Jacket Water Schematic–Units 1 & 2	V
		M-152 Sht 15	Manufacturers Supplemental Diagram - Diesel Generator Control Diagram Shutdown System–Units 1 & 2	L
		M-152 Sht 18	Diagram of Starting Air	V
		M-152 Sht 9	Manufacturers Supplemental Diagram - Diesel Generator Lube Oil Schematic–Units 1 & 2	V
		M-37	Diagram of Auxiliary Feedwater	BK
		M-54 Sht 4B	Diagram of Service Air - Diesel Generator Stating Air - Unit 2	L
		M-55	Diagram of Instrument Air Auxiliary Building Units 1 & 2	J
		M-97	Diagram of Diesel Generator Rooms 1A & 1B Ventilation System	E
		M-98	Diagram of Diesel Generator Rooms 2A & 2B Ventilation System	Y
	Engineering Changes	380049	SGTR Margin to Overfill (SGTR MTO) Air Accumulator for 1AF005's Aux Feed System [1AF005A-H]	05/31/2012
		390487	Turbine Building High Energy Line Break Design and Licensing Basis	0
		405122	RM-11 Replacement	2
		406359	Unit 2 RF Sump Level Instrumentation Modification	2
		630430	Disconnect Unit 2 Pressurizer Heaters #17, #18, #40, #69, #70 & Open Breakers 2RY03EA-B5A/B5B For Heaters #13, #14, #37	0
		632665	Diesel Generator (DG) KILOVAC Relay Replaced with STRUTHERS-DUNN Model	000
	Engineering Evaluations	390234	Evaluation of Compensatory Actions Due to Inoperable 2L-PC003	0
		391245	2L-PC003 Level Channel to Remain Inoperable Until A2R17	1
		398220	2L-PC003 Level Channel to Remain Inoperable Until A2R18	1
		403960	2L-PC003 Level Channel to Remain Inoperable Until A2R19	0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		407133	GL 89-13 Heat Exchanger Program Visual Inspection Acceptance Criteria (VIAC) Evaluation	0
		435938	2DG01KA-X2 Tube Plugging Required Due to Handling Damage	2
		624528	Lost Parts Evaluation–2A Diesel Generator Lower and Upper Jacket Water Quad Ring	0
		PP-AF-14	IST Pump Evaluation Form	05/24/2021
	Miscellaneous		Braidwood Station IST Program, 4th Interval Supplemental Position Indication Verification Basis Document	
		BRW-2-2018-0268	Simple Issue Risk Assessment - 2A EDG Upper JW Cooler Head	0
		HVAC-SPEC-1	HVAC Ductwork Specification	0
		IST-BRW-PLAN	Inservice Testing Program Fourth Ten Year Interval July 29, 2018- July 28, 2028	03/24/2021
		PMA-19-116455	2A DG Outside Air Damper Hydramotor PMS–Adjust to Bridge Work Window	05/11/2019
		PMA-20-122935	Due Date Adjust 2A DG Temperature Switches to Align with Window	04/08/2020
		PMA-21-128959	Adjust Due Date on 2A DG JW Cooler Shell UT Exams to Align with JW Cooler C&I PM	08/06/2021
		PMC-18-008885	DG JW Cooler Inspection Frequency Change	03/22/2018
		PMC-22-134551	1B DG Lube Oil Cooler Cleaning–PM Change from 8Y to 10YX	04/05/2022
		RCR 04430441-11	Braidwood Unit 1 Reactor Trip on Generator Load Rejection	08/02/2021
	Procedures	1BwCA-0.1	Loss of All AC Power Recovery Without SI Required - Unit 1	302
		1BwEP-0	Reactor Trip or Safety Injection	304
		1BwEP-2	Faulted Steam Generator Isolation	300
		1BwEP-3	Steam Generator Tube Rupture	304
		1BwEP-3	Steam Generator Tube Rupture - Unit 1	303
		1BwGP 100-1A1	CONTROLLER SETPOINTS 1PM02J, 1PM04J, 1PM05J, 1PM06J , 1PL04J, 1PL05J	14
		1BwOA ELEC-3	Loss of 4kV ESF Bus	104
		1BwOA PRI-5	Control Room Inaccessibility	110

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		1BwOSR 5.5.8.AF-4A	Unit One Comprehensive Inservice Testing (IST) Requirements for 1A Auxiliary Feedwater Pump	17
		2BwEP-0	Reactor Trip or Safety Injection - Unit 2	305
		2BwOA ELEC-3	Loss of 4KV ESF Bus - Unit 2	104
		2BwOA PRI-8	Essential Service Water Malfunction - Unit 2	108
		2BwOSR 3.8.1.13-2	2B Diesel Generator Bypass of Automatic Trips Surveillance	19
		BwAP 1100-023	Seismic Housekeeping Requirements for Temporary Storage of Materials in Category 1 Areas	5
		BwHS 4002-075	4160 to 480 Volt Unit Substation Transformer Inspection and Testing	16
		BwMP 3100-022	Diesel Generator 2 Year Inspection	40
		BwMP 3100-082	Diesel Generator 6 Year Inspection	34
		BwOP AF-14	Local Operation of the AF005 Valves	5
		BwOP FP-100	Fire Response Guidelines	25
		BwOP FP-100T40	Attachment 40 Fire Zones 5.2-1 & 5.2-2, 5.1-1 & 5.1-2, Unit 1/ Unit 2 ESF Switchgear Rooms 1D-77, 1D-78, 2D-77, 2D-78	9
		ER-AA-340	GL 89-13 Program Implementing Procedure	11
		ER-AA-340-1002	Service Water Heat Exchanger Inspection Guide	11
		LS-AA-104	Exelon 50.59 Review Process	12
		LS-AA-104-1000	50.59 Resource Manual	14
		MA-BR-722-210	Calibration of Time Delay Relays	15
		OP-BR-102-106	Operator Response Time Program at Braidwood Station	12
	Work Orders	1394162-01	2DG01KA-X1 Inspect, Clean, and Eddy Current Test	03/09/12
		1648835-01	2018 ER-AA-340-1002 Heat Exch As-Found Insp 2DG01KA-X1 - 2DG Jacket Water Upper Cooler	06/10/2018
		1648836-01	2018 ER-AA-340-1002 Heat Exch As-Found Insp 2DG01KA-X2 - 2DG Jacket Water Lower Cooler	06/09/2018
		1735379	OSP-A 2MS001A Dual Indication with Valve Full Closed	05/05/2014
		1958651	IST-PIT-005/013A/B/C/D-1A Auxiliary Feedwater Pump Containment Isolation Valves	04/02/2018
		4629812-01	2A Diesel Generator 24 Hr Endurance Run 18 Month	11/08/2018

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		4650332	OP As Found MSIV Full Stroke Test	10/01/2018
		4754739-01	1AP13E Unit Substation 132X Cleaning and Inspection	10/18/2019
		4755599	00046891-02, EQ, EQ Overhaul, E: 2MS001A, HOVA, A11	11/10/2021
		4774618	IST-PIT-005/013A/B/C/D-1A Auxiliary Feedwater Pump Containment Isolation Valves	10/01/2019
		4795683	IST - Unit 1 AF Pumps Comprehensive Full Flow Test a& EQPT. Resp	10/02/2019
		4814294-01	Doble Testing - 1AP13E	10/13/2019
		4839758	OSP-A 2MS001A Showing Dual	11/16/2018
		4868376-01	2A Diesel Gen Loss of ESF Bus Voltage with No SI Signal	11/01/2021
		4960268-01	2VD24YA2 - Damper Inspection	06/01/2020
		4960269-01	2VD24YA1 - Damper Inspection	06/01/2020
		4970095	IST-PIT-005/013A/B/C/D-1A Auxiliary Feedwater Pump Containment Isolation Valves	03/22/2021
		4971455	IST - Unit 1 AF Pumps Comprehensive Full Flow Test and Equipment Response	04/01/2021
		5044101	TSPR, IST-PIT-2MS001ABCD-CNMT ISOL VALVES, W 2BWOSR 5.5.8.MS-2	11/15/2021
		5044113	IST-2MS001A-D-MSIV Full Stroke: Update A02MS-001A-D-V10-02S	10/08/2021
		5193704	IST-STT-1AF005A-D--TRN A AF Valve Stroke Test	12/15/2021
		5217163	IST-STT-2AF005AA-D--TRN A AF Valve Test 2AF005A-D	02/28/2022
		5217177	IST-STT-1AF005A-D--TRN A AF Valve Stroke Test	02/28/2022
		5220409-01	LR-IST-2A DG Operability Monthly	02/06/2022