



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION IV  
1600 EAST LAMAR BOULEVARD  
ARLINGTON, TEXAS 76011-4511

April 15, 2020

Mr. Fadi Diya  
Senior Vice President and Chief Nuclear Officer  
Ameren Missouri  
8315 County Road 459  
Steedman, MO 65077

SUBJECT: CALLAWAY PLANT – DESIGN BASIS ASSURANCE INSPECTION (TEAMS)  
INSPECTION REPORT 05000483/2020011

Dear Mr. Diya:

On March 31, 2020, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Callaway Plant. On March 31, 2020, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

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 IV; the Director, Office of Enforcement; and the NRC Resident Inspector at Callaway Plant.

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 Callaway Plant.

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,

Vincent G. Gaddy, Chief  
Engineering Branch 1  
Division of Reactor Safety

Docket No. 05000483  
License No. NPF-30

Enclosure:  
As stated

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CALLAWAY PLANT – DESIGN BASIS ASSURANCE INSPECTION (TEAMS) INSPECTION  
REPORT 05000483/2020011 – April 15, 2020

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NRC-002

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

Docket Number: 05000483

License Number: NPF-30

Report Number: 05000483/2020011

Enterprise Identifier: I-2020-011-0012

Licensee: Ameren Missouri

Facility: Callaway Plant

Location: Steedman, MO

Inspection Dates: March 2, 2020 to March 20, 2020

Inspectors: J. Braisted, Reactor Inspector  
G. Callaway, Senior Reactor Technology Instructor  
S. Gardner, Contractor  
G. George, Senior Reactor Inspector, Team Lead  
S. Makor, Reactor Inspector  
M. Yeminy, Contractor

Approved By: Vincent G. Gaddy, Chief  
Engineering Branch 1  
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 Callaway Plant, 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 evaluate Class 1E 4160 VAC (NB) System Train A for (a)(1) Status in Maintenance Rule			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000483/2020011-01 Open/Closed	[H.8] - Procedure Adherence	71111.21M
The inspectors identified a Green non-cited violation of 10 CFR 50.65 (a)(1), for failure to evaluate a maintenance preventable functional failure of Class 1E 4160 Vac system for 10 CFR 50.65 (a)(1) status following the failure of breaker NB0101.			

Failure to Use Appropriate Design Pressure Inputs for Diesel Generator Room and Essential Service Water Pumphouse HVAC System			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000483/2020011-02 Open/Closed	None (NPP)	71111.21M
The inspectors identified a Green non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the failure of the licensee to specify design inputs for design pressures of the emergency diesel generator and essential service water pumphouse ventilation ducts that are required to withstand the negative pressure caused by the fan when its suction path is blocked by a tornado damper.			

### Additional Tracking Items

None.

## 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), regional inspectors were directed to begin teleworking. The inspection documented below was determined that the objectives and requirements stated in the IP could be completed remotely.

## 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) (6 Samples 1 Partial)

From March 2, 2020, to March 20, 2020, the team inspected the following components and listed applicable attributes.

- (1) 480 V Bus NG02
  - Component walkdown and visual inspection was performed to assess the material condition and configuration
  - Maintenance and testing procedures and performance history was reviewed to assure consistency with vendor and industry recommendations
  - Design bases documents, updated safety analysis report, technical specifications and bases to assure licensing bases match component capabilities
  - Component maintenance history and corrective action program reports to verify the monitoring of potential degradation
  - Calculations for electrical distribution, system load flow, voltage drop, short-circuit, and electrical protection to verify that bus capacity and voltages remained within minimum acceptable limits
- (2) 4.16 KV Bus NB02
  - Component maintenance history and corrective action program reports to verify the monitoring for potential degradation
  - Short circuit calculation to determine adequacy of design
  - Procedures for circuit breaker inspection and testing to compare maintenance practices against industry and vendor guidance

- Calculations for DC control voltage to meet acceptance criteria for new Square D breakers
  - Breaker tracking for maintenance history by serial number
- (3) 480 V Motor Control Center, NG03C
- Component walkdown and vendor document review to verify installed configuration, specifications and acceptance criteria and design bases functions
  - Procedures for circuit breaker inspection and testing to compare maintenance practices against industry standards and vendor guidance
  - Maintenance and testing procedures and performance history was reviewed to assure consistency with vendor and industry recommendations
  - Design bases documents, updated safety analysis report, technical specifications and bases to assure licensing bases match component capabilities
- (4) Motor Driven Auxiliary Feedwater Pump A, PAL01A
- Pump inservice testing plan which established the test intervals and parameters to be measured to meet ASME Code requirements
  - Results of comprehensive and quarterly motor driven auxiliary feedwater pump testing
  - Calculations for auxiliary feedwater pump available net positive suction head and suction pressure setpoints for suction source swapover
  - Flow models of the auxiliary feedwater system during normal operating conditions or postulated scenarios
  - Design bases document and piping and instrumentation diagram for the auxiliary feedwater system.
  - Vendor manuals for the motor driven auxiliary feedwater pump
  - Corrective action documents to verify the monitoring of potential degradation
- (5) Diesel Generator Supply Fan, CGM01A
- Component walkdown and vendor document review to verify installed configuration, specifications and acceptance criteria, and design bases functions
  - Fan and duct design drawing, vendor specifications, pressure curves, flow calculations and structural integrity calculations
  - Emergency room heating and ventilation calculations
  - Protection against external events (seismic and tornado)
  - Setpoints and instrument uncertainty of recirculation damper system operating instrumentation and controls
  - Normal and emergency operating procedures
  - Maintenance effectiveness
- (6) Load Shed and Sequencing Train B, NF039B
- Validate qualification and seismic requirements
  - Control logic for capacitor bank permissives
  - Procedures for response time testing to determine consistency between design bases, calculations, and testing acceptance criteria
  - Effect of charging times of new Square D breakers on sequencing interval

(7) Evaluation of Operator Procedures and Actions Related to Components

1. Control room operator actions resulting from a simulated steam generator tube rupture (SGTR) with a stuck open atmospheric steam dump (ASD). Verify the following actions are performed within the required completion times in accordance with the FSAR:
  - a. Close block valve to failed open ASD 20 minutes after the ASD opens
  - b. Isolate the failed train to the control room HVAC filtration system in 30 minutes from event initiation
  - c. Initiate a reactor coolant system (RCS) cooldown in 40 minutes from event initiation
  - d. Complete the RCS cooldown in 56 minutes from event initiation
  - e. Complete the RCS depressurization in 60 minutes from event initiation
  - f. Terminate safety injection (SI) in 5 minutes after the depressurization is completed
  - g. Equalize RCS and ruptured steam generator pressures in 15 minutes after SI termination
2. Control room operator actions resulting from a simulated feedwater line break to the steam generators between the feedwater isolation valve and the check valve. Verify the resulting internal flooding is isolated in 30 minutes from event initiation.
3. Control room operator actions resulting from a simulated loss of secondary heat sink. Verify that the crew re-establishes main feedwater flow prior to the need to initiate bleed and feed cooling of the reactor coolant system.
4. Auxiliary operator actions to locally line up the hardened condensate storage tank (HCST) to the non-safety auxiliary feedwater pump within 20 minutes of task assignment.

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

From March 2, 2020, to March 20, 2020, the team inspected the following large-early-release-frequency component.

- (1) Residual Heat Removal Pumps to Reactor Coolant System Cold Leg Loops Check Valves, EP8818 A, B, C, D
  - Valve inservice testing plan which established the test intervals and parameters to be measured to meet ASME Code requirements
  - Results of inservice testing of full stroke open capability and seat leakage rate (valve closure)
  - Results of instrument calibrations for seat leakage rate testing.
  - Design bases document and piping and instrumentation diagram for the emergency core cooling system
  - Vendor manuals for the residual heat removal pumps to reactor coolant system cold leg loops check valves
  - Corrective action documents to verify the monitoring of potential degradation



#### Modification Review - Permanent Mods (IP Section 02.03) (4 Samples)

From March 2, 2020, to March 20, 2020, the team inspected the following permanent modifications.

- (1) MP 13-0002, "Replace EDG Supply Fans CGM01 A and B"
- (2) MP 16-0027, "Approval of Remanufactured ESFAS and LSELS Circuit Boards"
- (3) MP 17-0006, "ESW Water Hammer Mitigation Modification"
- (4) MP 18-0019, "NG02BER2-Replace SR 480 VAC MCC Buckets"

#### Review of Operating Experience Issues (IP Section 02.06) (3 Samples)

From March 2, 2020, to March 20, 2020, the team inspected the following operating experience issues.

- (1) Callaway OpE 201801880, "OE Received from Comanche Peak Station Electric Station Related to Component Cooling Water System Cross Tie Valves"
- (2) Callaway OpE 20190019, "Ametek Solid State Controls Part 21"
- (3) NRC Operating Experience Smart Sample (OpESS) 2019/01, "Commercial Grade Dedication, Procurement, and Design Control"

### **INSPECTION RESULTS**

Failure to evaluate Class 1E 4160 VAC (NB) System Train A for (a)(1) Status in Maintenance Rule			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000483/2020011-01 Open/Closed	[H.8] - Procedure Adherence	71111.21M
The inspectors identified a Green non-cited violation of 10 CFR 50.65 (a)(1), for failure to evaluate a maintenance preventable functional failure of Class 1E 4160 Vac system for 10 CFR 50.65 (a)(1) status following the failure of breaker NB0101.			
<p><b>Description:</b> The functions of the breakers of the Class 1E 4160 Vac system, in addition to providing circuit protection, are to shed load by demand from the control room or engineered safety features actuation system and load shedder and emergency load sequencer (LSELS).</p> <p>The Ameren maintenance rule program procedures outline the requirements and responsibilities for compliance with Paragraphs (a)(1), (a)(2), and (a)(3) of 10 CFR 50.65, <i>Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants</i>. These maintenance rule procedures consist of EDP-ZZ-001128, Revision 28, "Maintenance Rule Program"; EDP-ZZ-001128 Appendix 2, Revision 36, "Summary of SSC Performance Criteria"; EDP-ZZ-001128 Appendix 4, Revision 22, "Maintenance Rule System Functions"; and APA-ZZ-0500, Appendix 5, Revision 30, "Maintenance Rule." These procedures identify the applicable structures, systems, and components to which 10 CFR 50.65 applies, their performance criteria, the thresholds for meeting their performance criteria, and requirements in the event the criteria are not met.</p>			

On March 21, 2019, a control room hand switch malfunction created an electrical short around the trip coil circuit of Class 1E 4160 Vac breaker NB0101, which resulted in the unavailability of the load shed function for the residual heat removal pump motor. On August 26, 2019, the maintenance rule expert panel determined that the failure of breaker NB0101 was a maintenance preventable functional failure. It was considered to be a maintenance preventable functional failure of the residual heat removal system, load shedder, and emergency load shed sequencer system, the 13.8 kV system, and the Class 1E 4160 Vac system. In accordance with EDP-ZZ-01128 Appendix 4, Revision 22, "Maintenance Rule System Functions", the maintenance rule expert panel determined that maintenance rule criteria, NB-03, *Provides protective features for Class 1E busses, which includes the isolation of certain Non-Safety Related loads from the Safety Related bus in the event of an SIS*, was not met. According to EDP-ZZ-001128, Appendix 2, Revision 36, the 4160 Vac system A train performance criteria NB-03 has a threshold of "0" maintenance preventable functional failures per rolling 18 months.

Procedure EDP-ZZ-001128, Revision 28, "Maintenance Rule Program", step 4.5.3(b) requires, when a structure, system, or component's performance criterion has not been met or repetitive maintenance preventable function failures are identified, initiate a condition report in accordance with APA-ZZ-00500, "Corrective Action Program."

Procedure APA-ZZ-00500, Appendix 5, Revision 30, step 4.1.2, requires that a 10 CFR 50.65 (a)(1) evaluation be completed within 60 days of the initiation of this condition report. Contrary to this, on August 26, 2019, no condition report was initiated following the expert panel determination of the maintenance preventable functional failure on the Class 1E 4160 Vac system A train. Consequently, no 10 CFR 50.65 (a)(1) evaluation was initiated or completed within 60 days.

Corrective Actions: On March 19, 2020, a 10 CFR 50.65 (a)(1) evaluation was completed under CR 202001216. It was determined that the Class 1E 4160 Vac system was to be moved to 10 CFR 50.65 (a)(1) status and performance goals and monitoring criteria were identified.

Corrective Action References: Condition Report 202001216-001

Performance Assessment:

Performance Deficiency: The failure to initiate a condition report and complete a 10 CFR 50.65(a)(1) evaluation in accordance with EDP-ZZ-001128, "Maintenance Rule Program," was 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, similar to Example 8.g of Manual Chapter 0612 Appendix E, "Examples of Minor Issues," the inspectors determined that the significance was more than minor because the Mitigating Systems Cornerstone objectives were adversely affected because, when the Maintenance Rule functional failure was considered, performance indicates that the SSC was not being effectively controlled through appropriate preventive maintenance and that the SSC was not moved to 10 CFR 50.65(a)(1).

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating

Systems Screening Questions,” the inspectors determined the finding to be of very low safety significance (Green) because the finding affected the qualification of a mitigating SSC and did not affect its operability or PRA functionality.

Cross-Cutting Aspect: H.8 - Procedure Adherence: Individuals follow processes, procedures, and work instructions. This finding had a human performance cross-cutting aspect, associated with procedure adherence, because individuals failed to follow maintenance rule processes and procedures.

Enforcement:

Violation: Title 10 CFR Part 50.65 (a)(1) requires each holder of an operating license for a nuclear power plant shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions. These goals shall be established commensurate with safety and, where practical, take into account industry wide operating experience. When the performance or condition of a structure, system, or component does not meet established goals, appropriate corrective action shall be taken.

Contrary to the above, from August 26, 2019, to March 19, 2020, the licensee failed to monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions. When the performance did not meet established goals, appropriate action was not taken. Specifically, the licensee failed to evaluate the Class 1E 4160 Vac system for 10 CFR 50.65 (a)(1) status, when the performance criteria of "0" maintenance preventable functional failures per rolling 18-month period was not met. Additionally, the licensee did not take any corrective action to ensure the Class 1E 4160 Vac bus would be capable of meeting their intended functions.

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

Failure to Use Appropriate Design Pressure Inputs for Diesel Generator Room and Essential Service Water Pumphouse HVAC System			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000483/2020011-02 Open/Closed	None (NPP)	71111.21M
The inspectors identified a Green non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the failure of the licensee to specify design inputs for design pressures of the emergency diesel generator and essential service water pumphouse ventilation ducts that are designed to withstand the negative pressure caused by the fan when its suction path is blocked by a tornado damper.			
<u>Description:</u> Each emergency diesel generator room is equipped with an inlet duct, connecting the outside air source for room ventilation and combustion air. The system design incorporates a recirculation damper designed to protect the room temperature from overcooling in case the outside air temperature is very low. The recirculation damper			

modulates its opening and closing based on emergency diesel generator room temperature; thus, providing part of the 120,000 CFM flow rate from inside the room, such that the volumetric flow rate from the cold environment is greatly reduced. When the room temperature reaches 101 °F, the inlet duct supply fan operates to provide additional air flow for cooling the emergency diesel generator room. However, when the emergency diesel generator room temperature reaches 103 °F, the recirculation damper closes to maximize the air flow rate from outdoors in order to maximize cooling.

The system is also equipped with a tornado damper designed to shut at the onset of a reverse flow, because of low ambient air pressure caused by a tornado. The tornado damper reopens when the tornado event passes. The tornado damper is designed to seal the air inlet opening, thereby shutting air flow to the supply fan. The closing of the tornado damper is not accompanied with logic to stop operation of the fan. When the tornado damper closes, the fan will continue to operate at full angular speed attempting to provide 120,000 CFM to the room. Therefore, in a design basis tornado event that causes a corresponding loss of offsite power with emergency diesel generators running, there is a potential condition where little to no air will flow to the fan, while operating, when the tornado damper is fully closed coincident with a mostly closed recirculation damper because of elevated room temperature while the diesel generators are running.

The fan's design curve shows that the fan can create a negative pressure of -6.8 inches of water in the duct while operating with no air flow. The inlet duct design documents show that the duct was built to withstand a negative pressure of only -3.75 inches of water. Therefore, during the postulated design basis conditions, the negative pressure created by the fan can exceed the documented duct design pressure, causing the duct to potentially implode. When the tornado damper then opens, the reduced area duct would potentially limit the suction flowrate below the design flowrate necessary to maintain the emergency diesel generator room at operable temperatures. This condition affected both emergency diesel generator rooms.

Following the discovery of emergency diesel generator room issue, the licensee determined that the essential service water pumphouse ventilation system is subjected to the same condition, where the inlet fan suction can draw pressure of -6.4 inches of water, while the ventilation duct is designed to withstand a documented maximum pressure of -3.75 inches of water. Therefore, under postulated design conditions, the duct would potentially implode and limit the flowrate below the required flowrate which provides cooling air to maintain the essential service water pumphouse at operable temperatures.

After discovery of the issues, the licensee performed a prompt operability determination because there was no information or analysis available to ensure that the ventilation ducts would maintain structural integrity to support emergency diesel generator operability. The licensee contracted an engineering firm to analyze the strength of the ventilation ducts and their ability to resist collapse at internal pressures greater than its design value of -3.75 inches of water. The analysis evaluated an internal pressure on the inlet duct of -7 inches of water using the ANSYS Version 19.2 Finite Element Analysis software. The analysis illustrated that minor yielding would occur in localized regions near the bottom of the duct at a ninety-degree bend near the inlet to the fan; however, the yielding was very small at 0.00025 in/in. This is below the 0.19 in/in strain necessary to cause a failure. Therefore, the emergency diesel generators and essential service water system remain operable.

The Callaway Operating Quality Assurance Manual states that Ameren Missouri complies with the recommendations of NRC Regulatory Guide 1.64, Revision 2. NRC Regulatory Guide 1.64 endorses ANSI 45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants," as acceptable method to comply with the quality assurance requirements of Title 10 CFR Part 50. ANSI 45.2.11-1974, Section 3.1, "Design Requirements," states, "The design input shall be specified on a timely basis and to the level of detail necessary to permit the design activity to be carried out in a correct manner and to provide a consistent basis for making design decisions, accomplishing design verification measures, and evaluating design changes." The inspectors determined that Callaway failed to specify design inputs for design pressures of the emergency diesel generator and essential service water pumphouse ventilation ducts to provide a consistent basis for making design decisions, accomplishing design verification measures, and evaluating design changes.

**Corrective Actions:** After discovery of the issues, the licensee performed a prompt operability determination because there was no information or analysis available to ensure that the ventilation ducts would maintain structural integrity to support emergency diesel generator operability.

**Corrective Action References:** Condition Reports 202001566 and 202001602

**Performance Assessment:**

**Performance Deficiency:** The inspectors determined that the failure to specify design inputs for design pressures of the emergency diesel generator and essential service water pumphouse ventilation ducts, in accordance with ANSI N45.2.11-1974, was a performance deficiency.

**Screening:** The inspectors determined the performance deficiency was more than minor because it was associated with the design control 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, similar to example 3.e in Manual Chapter 0612, Appendix E, "Example of Minor Issues," in order to justify the as-found condition, the licensee had to revise calculations in order to establish operability and functionality of the ventilation ducts as-found conditions.

**Significance:** The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 2, "Mitigating Systems Screening Questions," the inspectors determined the finding to be of very low safety significance (Green) because the finding affected the qualification of a mitigating SSC and did not affect its operability or PRA functionality.

**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:** Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, "Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions."

Contrary to the above, since December 19, 1984, to March 20, 2020, the licensee failed to assure that applicable regulatory requirements and the design basis for emergency diesel generator and essential service water pumphouse ventilation systems were correctly translated into specifications. Specifically, the licensee failed to specify design inputs for design pressures of the emergency diesel generator and essential service water pumphouse ventilation ducts in accordance with ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants."

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 March 20, 2020, the inspectors presented the design bases assurance inspection (teams) inspection results to Mr. F. Diya, Senior Vice President and Chief Nuclear Officer, and other members of the licensee staff.
- On March 31, 2020, the inspectors presented the design bases assurance inspection (teams) inspection results to Mr. B. Cox, Site Vice President, and other members of the licensee staff.

## DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21M	Calculations	13000678.940	Diesel Generator Ventilation Supply Fan Flow Determined by Velocity Pressure	0
71111.21M	Calculations	7001280	Pipe Stress Analysis of ESW Supply Piping	0
71111.21M	Calculations	81402-J-001	HCST Supply Valve ALHV0220 Opening Setpoint	0
71111.21M	Calculations	AL-22	Aux Feedwater Pumps Suction Pressure Setpoints	3
71111.21M	Calculations	AL-24	Determine the Effect of Dissolved Nitrogen on the NPSHa for AL Pumps. Determine the Effect on Available NPSH for the Aux Feedwater Pumps.	0
71111.21M	Calculations	AL-29	Auxiliary Feedwater System Performance During Feedline Break	3
71111.21M	Calculations	AL-30	Auxiliary Feedwater System Performance During a Loss of Normal Feedwater Flow and Loss of Non-Emergency A/C Power	6
71111.21M	Calculations	AL-56	Loop Tolerance Calculation for ALP-0037, 38, & 39	0
71111.21M	Calculations	ARC-1590	EDG Suction Plenum Analysis	1
71111.21M	Calculations	ARC-595	Aux. Feedwater Flow Model	0
71111.21M	Calculations	B-10	Voltage Drop in MCC Control Circuits	3
71111.21M	Calculations	Callaway Human Reliability Analysis Attachment F	HRA Calculator output for Post-Initiator HFES	4
71111.21M	Calculations	E-B-09	DC Control Circuits Voltage Drops	1
71111.21M	Calculations	E-B-10	MCC Control Circuit Voltage Drop Calculation for MP 18-0003	3
71111.21M	Calculations	FAI/18-0349,	Callaway ESW Water Hammer Mitigation Modification Support Analysis	1
71111.21M	Calculations	GM-03	EDG Room Temperature Without HVAC	3
71111.21M	Calculations	H-9	Systems NG/PG Protective Relay Settings	3
71111.21M	Calculations	M-EG-24	CCW Nuclear Aux. Component Train Switchover Single Failure Analysis	0
71111.21M	Calculations	M-FL-13	Auxiliary Building Flooding: Calculate the Maximum Flood Level in Auxiliary Building Rooms 1304, 1305, 1324, 1325,	1

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			1326, 1327, 1328, 1329, 1330, and 1331 due to a Pipe Break or Crack	
71111.21M	Calculations	M-GM-320	Emergency Diesel Generator Building HVAC	1
71111.21M	Calculations	NAI-1560-001	HELB in the Callaway Auxiliary Building with Additional Openings	3
71111.21M	Calculations	NG-22	NG Load Center Overcurrent Setpoint Calculation1	1
71111.21M	Calculations	NG-23	MCC Set Point Calculation for MP 18-0003	0
71111.21M	Calculations	NK-10	NK System DC Voltage Drop	2
71111.21M	Calculations	ZZ-145	Short Circuit Calculation	2
71111.21M	Calculations	ZZ-561	Open Phase Fault Study for Callaway Energy Center	0
71111.21M	Calculations	ZZ-62	Plant Load Flow Calculation	10
71111.21M	Corrective Action Documents	Condition Report	201606143, 201703700, 201703962, 201703981, 201703992, 201705506, 201705509, 201705513, 201705514, 201801880, 201805948, 201800047, 201605682, 201703961, 201707011, 201707076, 201806177, 201900377, 201903601, 201701331, 201801897, 201803497, 201803907, 201906494, 200700040, 201901697, 201706449, 200711067, 201702850, 201703342, 201703699, 201802482	
71111.21M	Corrective Action Documents Resulting from Inspection	Condition Reports	202001172, 202001211, 202001216, 202001220, 202001256, 202001563, 202001566, 202001602	
71111.21M	Drawings	E-017-00004	AKD-6 Powermaster Indoor Unit Substation	19
71111.21M	Drawings	E-018-00010	Motor Control Center Layout	30
71111.21M	Drawings	E-018-00011	Motor Control Center Layout	29
71111.21M	Drawings	E-1041A-00714	Replacement MCC Cubicles	0
71111.21M	Drawings	E-1041A-00753	Replacement MCC Cubicles	0
71111.21M	Drawings	E-1044-0014	XNB02 LTC Wiring Schematic	4
71111.21M	Drawings	E-1044-0019	XNB02 DC Wiring Schematic	1
71111.21M	Drawings	E-1044-0029	XNB01 DC Wiring Schematic	1
71111.21M	Drawings	E-1052-0001	Control Diagram for 5GSB3, 15GSB3 and 15GSB4 Medium Voltage 1200A, 2000A, 3000A Circuit Breakers	0



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71111.21M	Drawings	E-21001	Main Single Line Diagram	26
71111.21M	Drawings	E-21NB02	Lower Medium Voltage System Class 1E 4.16KV Single Line Meter and Relay Diagram	17
71111.21M	Drawings	E-21NG01	Low Voltage System Class 1E 480V. Single Line Meter & Relay Diagram	28
71111.21M	Drawings	E-21NG02	Low Voltage System Class 1E 480V Single Line Meter & Relay Diagram	35
71111.21M	Drawings	E-22NF01	Load Shedding And emergency Load Sequencing Logic	8
71111.21M	Drawings	E-23EG01C	Schematic Component Cooling Water Pump B	7
71111.21M	Drawings	E-23EG01C	Schematic Component Cooling Water Pump B	9
71111.21M	Drawings	E-23EG07	Schematic Diagram Component Cooling Water Supply to RHR Heat Exchanger	16
71111.21M	Drawings	E-23EG07	Schematic Diagram Component Cooling Water Supply to RHR Heat Exchanger	15
71111.21M	Drawings	E-23EG07	Schematic Diagram Component Cooling Water Supply to RHR Heat Exchanger	14
71111.21M	Drawings	E-23EJ01	Schematic Residual Heat Removal Pumps	8
71111.21M	Drawings	E-23EJ04A	Schematic Diagram RHR Pump 1 to Charging Pump Valve	11
71111.21M	Drawings	E-23NB16	ESF Transformers Auxiliary Power and Control Schematic	11
71111.21M	Drawings	E-23NB18A	NB04 Capacitor Step 1 Control Schematic	3
71111.21M	Drawings	E-23NE13(Q)	Schematic Diesel Generator KKJ01B Exciter/Voltage Control	014
71111.21M	Drawings	E-23NG01	Low Voltage System Class 1E 480 V Three Line Meter and Relay Diagram	5
71111.21M	Drawings	J-22GM01B(Q)	Diesel Generator Building HVAC Exhaust Dampers	0
71111.21M	Drawings	M-2014-00003	Size 6 Class 1690 CF8M Swing Check Clear Waterway	1
71111.21M	Drawings	M-22AL01(Q)	Auxiliary Feedwater System	50
71111.21M	Drawings	M-22AP01	Condensate Storage and Transfer System	31
71111.21M	Drawings	M-22EF02(Q)	Essential Service Water System	78
71111.21M	Drawings	M-22EG01(Q), M-22EG02(Q), M-22EG03(Q)	Component Cooling Water System	11
71111.21M	Drawings	M-22EJ01(Q)	Residual Heat Removal System	62
71111.21M	Drawings	M-22EM01(Q)	High Pressure Coolant Injection System	39

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71111.21M	Drawings	M-22EP01(Q)	Accumulator Safety Injection	18
71111.21M	Drawings	M-22GM01(Q)	P&ID Diesel Generator Building	4
71111.21M	Drawings	M-2H5211(Q)	HVAC Diesel Generator Building Plan and Sections	4
71111.21M	Drawings	M-924-00001	Drawing for Vaneaxial Fan	0
71111.21M	Engineering Changes	MP 07-0070	Replace Safety-Related and Non-Safety Metal-Clad Breakers	000.7
71111.21M	Engineering Changes	MP 13-0002	Replace EDG Supply Fans CGM01A & B	3
71111.21M	Engineering Changes	MP 16-0027	Approval of Remanufactured ESFAS and LSELS Circuit Boards	2
71111.21M	Engineering Changes	MP 17-0006	ESW Water Hammer Mitigation Modification	2
71111.21M	Engineering Changes	MP 18-0003	Replace Safety Related 480VAC MCC BUckets	0
71111.21M	Engineering Changes	MP 18-0019	NG02BER2 - Replace Safety Related 480 VAC MCC Buckets	0
71111.21M	Engineering Changes	MP 19-0113	ESW Water Hammer Mitigation Phase 2	0
71111.21M	Engineering Evaluations	C-04A05S	Floor Response Spectra for Standardized Nuclear Unit Power Plant System	1
71111.21M	Engineering Evaluations	E170.0102	Approval of ABC Fire Extinguishers on Carts	07/02/1997
71111.21M	Engineering Evaluations	RFR 21816	Determine Impact on M-AL-16 for N2 and Low AL Flow	A
71111.21M	Engineering Evaluations	STRIDE 18-03	Integrated Engineered Safety Features Actuation System (ESFAS) Testing	0
71111.21M	Miscellaneous		Inservice Testing Program	33
71111.21M	Miscellaneous	10466-M-627A-0149-02	Test Report For Tornado Dampers	1
71111.21M	Miscellaneous	3857-RPT-003	Required Response Spectra for Seismic Qualification of Replacement I&C Electronics for Callaway Plant	0
71111.21M	Miscellaneous	BLUE 2066	Category C Justification of Class IE Equipment	03/05/1986
71111.21M	Miscellaneous	C-04A05B	Floor Response Spectra for Standardized Nuclear Unit Power Plant System (SNUPPS)	1

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71111.21M	Miscellaneous	E-017-00397	IM Load Center Unit Substations	28
71111.21M	Miscellaneous	E-1052-00031	Instruction Manual for 5GSB3-350-1200/2000 Medium Voltage Circuit Breakers	000
71111.21M	Miscellaneous	E-mail	E-mail DRS to Callaway regarding seismic failures	03/05/2020
71111.21M	Miscellaneous	J-104-00594	Seismic Test Report for Callaway and Wolf Creek Modules	B
71111.21M	Miscellaneous	J-104-00602	Acceptance Test Procedure for Isolation Module 6N234-1	0
71111.21M	Miscellaneous	J-104-0151-03	Quality Conformance Test Procedure #6N234	A
71111.21M	Miscellaneous	J-104-271-07	Environmental Qualification Report for ESFAS and LSELS	F
71111.21M	Miscellaneous	J-104-271-07	Environmental Qualification Report for ESFAS and LSELS	C
71111.21M	Miscellaneous	Letter	Letter from Archon Engineering PC to AmerenUE, EDG Suction Plenum Preliminary Results	03/20/2020
71111.21M	Miscellaneous	M-105A	Design Specification for the Shop Fabricated Tanks (ASME III) for the SNUPPS	10
71111.21M	Miscellaneous	M-1205	Design Specification for ASME Section III Class 3 Stainless Steel Air Accumulators	0
71111.21M	Miscellaneous	M-627A	Specification for Dampers	16
71111.21M	Miscellaneous	M-924	Specification for Safety Related Fans	0
71111.21M	Miscellaneous	M-924-00025	Instruction Manual for 150 HP Fan Motor Data Package	0
71111.21M	Miscellaneous	M-924-00026	Instruction Manual for VOLU Probe and Dwyer Gauge	0
71111.21M	Miscellaneous	Performance Monitoring	Circuit Breakers	03/03/2020
71111.21M	Miscellaneous	SSA-201900029-054	Design Basis Assurance Self Assessment	1
71111.21M	Miscellaneous	System Health Report - NB	Low Med Vlt Sys 1E	02/24/2020
71111.21M	Miscellaneous	System Health Report - NF	LSELS	02/24/2020
71111.21M	Miscellaneous	TRRQ 201700343	Lesson Learned for Incorporation into ESP Training Program	05/03/2018
71111.21M	Miscellaneous	ULDBD-AL-001	Auxiliary Feedwater System	6
71111.21M	Miscellaneous	ULDBD-Class 1E-001	Class 1E Design	0
71111.21M	Miscellaneous	ULDBD-CLASS 1E-001	Class 1E Design	0

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71111.21M	Miscellaneous	ULDBD-ECCS-001	Emergency Core Cooling System	1
71111.21M	Miscellaneous	ULDBD-EG-001	Component Cooling Water	1
71111.21M	Miscellaneous	ULDBD-GM-001	Diesel Generator Building HVAC System	1
71111.21M	Miscellaneous	ULDBD-NB-001	Lower Medium Voltage (Class 1E 4.16 KV)	1
71111.21M	Miscellaneous	ULDBD-NF-001	Load Shedding and Emergency Load Sequencing	2
71111.21M	Miscellaneous	ULDBD-NG-001	Low Voltage (480V) - Class 1E	2
71111.21M	Procedures	1046-M-627A-0081-01	American Warming and Ventilating Test Procedure for Tornado Dampers	03/16/1978
71111.21M	Procedures	14005614.500	Determine Leak By of EAV0185 Per Post Change Test Plan	1
71111.21M	Procedures	APA-ZZ-00322 Appendix B	Work Week Schedule and Execution	56
71111.21M	Procedures	APA-ZZ-00323	Configuration Management Process	12
71111.21M	Procedures	APA-ZZ-00356	Pump and Valve Inservice Test Program	25
71111.21M	Procedures	APA-ZZ-00390	Environmental and Seismic Qualification of Safety-Related Equipment	30
71111.21M	Procedures	APA-ZZ-00395	Significant Operator Response Timing	31
71111.21M	Procedures	APA-ZZ-00500 Appendix 5	Maintenance Rule	30
71111.21M	Procedures	E-0	Reactor Trip or Safety Injection	25
71111.21M	Procedures	E-3	Steam Generator Tube Rupture	24
71111.21M	Procedures	EC Supp Guide	Emergency Coordinator Supplemental Guideline	24
71111.21M	Procedures	EDP-ZZ-01122	Check Valve Predictive Performance Manual	11
71111.21M	Procedures	EDP-ZZ-01128 Appendix 1	SSCS in the Scope of the Maintenance Rule at Callaway	11
71111.21M	Procedures	EDP-ZZ-01128	Maintenance Rule Program	28
71111.21M	Procedures	EDP-ZZ-01128 Appendix 2	Summary of SSC Performance Criteria	36
71111.21M	Procedures	EDP-ZZ-01128 Appendix 4	Maintenance Rule System Functions	22
71111.21M	Procedures	EDP-ZZ-04015	Evaluating and Processing Requests for Resolution	70
71111.21M	Procedures	EDP-ZZ-04600	Engineering Change Control	3

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71111.21M	Procedures	Emergency Operating Procedure Addendum 30	Establishing Main Feedwater Flow	9
71111.21M	Procedures	ETP-ZZ-01331	Crane Nuclear Diagnostic System for Testing Check Valves	4
71111.21M	Procedures	FR-H.1	Response to Loss of Secondary Heat Sink	18
71111.21M	Procedures	IP-ENG-001	Standard Design Process	1
71111.21M	Procedures	J-104-00593	Alternate Parts Equivalency Evaluation for 9N39 and 9N40 Assemblies	0
71111.21M	Procedures	J-104-00602	Acceptance Test Procedure for Isolation Module	0
71111.21M	Procedures	J-104-0151-C03	Quality Conformance Test Procedure for Isolation Module	A
71111.21M	Procedures	M-021-00061	Installation, Operation, Maintenance, Site Storage and Handling Instructions for 4 HMTA-9 Stage Auxiliary Feed Water Pumps	53
71111.21M	Procedures	M-619.2-00136	Instructions Manual for Safety Related Fans	9
71111.21M	Procedures	MDP-ZZ-0STOR	Staging and Storage of Materials, Equipment & Tools	27
71111.21M	Procedures	MPE-ZZ-QS014	General Electric 4.16 KV Switchgear PM	16
71111.21M	Procedures	MPE-ZZ-QS015	Square D Magnum Breaker Preventive Maintenance	11
71111.21M	Procedures	MPM-ZZ-QH001	Inspection and Maintenance of Tornado Damper	5
71111.21M	Procedures	OSP-AL-P001A	Motor Driven Aux. Feedwater Pump a Inservice Test - Group A	68
71111.21M	Procedures	OSP-AL-PV04A	Train A Motor Driven Auxiliary Feedwater Comprehensive Pump and Check Valve Test	22
71111.21M	Procedures	OSP-BB-VL006	RCS Pressure Isolation Valves Inservice Tests-IPTE	47
71111.21M	Procedures	OSP-EJ-PV04A	Train A RHR and RCS Check Valve Inservice Test	18
71111.21M	Procedures	OSP-NE-0001B	Standby Diesel Generator B Periodic Tests	67
71111.21M	Procedures	OSP-SA-0017B	Train B SIS-CSAS Slave Relay Test	44
71111.21M	Procedures	OSP-SA-2413B	Train B Diesel Generator and Sequencer Testing	33
71111.21M	Procedures	OSP-ZZ-00001	Control Room Shift and Daily Log Readings and Channel Checks	92
71111.21M	Procedures	OTA-RK-00016 Addendum 22B	Voltage Control Freeze	0
71111.21M	Procedures	OTN-EF-00001	ESW Air Accumulator Operation	1

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71111.21M	Procedures	OTO-EG-00001	CCW System Malfunction	18
71111.21M	Procedures	OTO-ZZ-00012	Severe Weather	44
71111.21M	Procedures	ZZ-006	Engineering Design Guide	32
71111.21M	Work Orders	Job	17502728, 19001424, 20500603, 18504744, 17513089, 19511872, 17508987, 14005288, 16506328, 19502282, 19502288, 05516338, 11504156, 12504716, 12509849, 12511442	