



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 28, 2026

Mr. Kent Scott
Senior Vice President and
Chief Nuclear Officer
Ameren Missouri
Callaway Energy Center
8315 County Road 459
Steedman, MO 65077

SUBJECT: CALLAWAY PLANT, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 241
REVISION TO SURVEILLANCE REQUIREMENTS FOR TECHNICAL
SPECIFICATION 3.8.1, "AC SOURCES – OPERATING," TO CHANGE DIESEL
GENERATOR FREQUENCY RANGES (EPID L-2025-LLA-0040)

Dear Mr. Scott

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 241 to Renewed Facility Operating License No. NPF-30 for the Callaway Plant, Unit No. 1. The amendment consists of changes to the technical specifications (TSs) in response to your application dated February 27, 2025, as supplemented by letters dated March 18 and April 14, 2026.

The amendment revises surveillance requirements for TS 3.8.1, "AC [Alternating Current] Sources – Operating," to change the diesel generator steady-state frequency ranges.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

/RA/

Mahesh L. Chawla, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosures:

1. Amendment No. 241 to NPF30
2. Safety Evaluation

cc: Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT NO. 1

DOCKET NO. 50-483

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 241
License No. NPF-30

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Union Electric Company (UE, the licensee), dated February 27, 2025, as supplemented by letters dated March 18, 2026, and April 14, 2026, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-30 is hereby amended to read as follows:

- (2) Technical Specifications and Environmental Protection Plan*

The Technical Specifications contained in Appendix A, as revised through Amendment No. 241 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented on or before May 31, 2027.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael Mahoney, Acting Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-30 and
the Technical Specifications

Date of Issuance: April 28, 2026

ATTACHMENT TO LICENSE AMENDMENT NO. 241

CALLAWAY PLANT, UNIT NO. 1

RENEWED FACILITY OPERATING LICENSE NO. NPF-30

DOCKET NO. 50-483

Replace the following pages of Renewed Facility Operating License No. NPF30 and the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Renewed Facility Operating License

REMOVE

-3-

INSERT

-3-

Technical Specifications

REMOVE

3.8-7

3.8-9

3.8-10

3.8-11

3.8-13

3.8-16

3.8-17

INSERT

3.8-7

3.8-9

3.8-10

3.8-11

3.8-13

3.8-16

3.8-17

- (3) UE, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (4) UE, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source of special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (5) UE, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

UE is authorized to operate the facility at reactor core power levels not in excess of 3565 megawatts thermal (100% power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan*

The Technical Specifications contained in Appendix A, as revised through Amendment No. 241 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Environmental Qualification (Section 3.11, SSER #3)**

Deleted per Amendment No. 169.

* Amendments 133, 134, & 135 were effective as of April 30, 2000 however these amendments were implemented on April 1, 2000.

** The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.2</p> <p>----- NOTES -----</p> <ol style="list-style-type: none"> 1. Performance of SR 3.8.1.7 satisfies this SR. 2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading. 3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.7 must be met. <p>-----</p> <p>Verify each DG starts from standby conditions and achieves steady state voltage ≥ 3740 V and ≤ 4320 V and frequency ≥ 59.7 Hz and ≤ 60.3 Hz.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	<p>----- NOTE ----- All DG starts may be preceded by an engine prelube period. -----</p> <p>Verify each DG starts from standby condition and achieves:</p> <p>a. In ≤ 12 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and</p> <p>b. Steady state voltage ≥ 3740 V and ≤ 4320 V and frequency ≥ 59.7 Hz and ≤ 60.3 Hz.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.8.1.8	Not used.	
SR 3.8.1.9	Not used.	
SR 3.8.1.10	Verify each DG operating at a power factor ≤ 0.9 and ≥ 0.8 does not trip and voltage is maintained ≤ 4784 V and frequency is maintained ≤ 65.4 Hz during and following a load rejection of ≥ 5580 kW and ≤ 6201 kW.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.11 ----- NOTES -----</p> <ol style="list-style-type: none"> 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal:</p> <ol style="list-style-type: none"> a. De-energization of emergency buses; b. Load shedding from emergency buses; c. DG auto-starts from standby condition and: <ol style="list-style-type: none"> 1. energizes permanently connected loads in ≤ 12 seconds, 2. energizes auto-connected shutdown loads through the shutdown load sequencer, 3. maintains steady state voltage ≥ 3740 V and ≤ 4320 V, 4. maintains steady state frequency ≥ 59.7 Hz and ≤ 60.3 Hz, and 5. supplies permanently connected and auto-connected shutdown loads for ≥ 5 minutes. 	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12 ----- NOTES -----</p> <ol style="list-style-type: none"> 1. All DG starts may be preceded by prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. <p>-----</p> <p>Verify on an actual or simulated safety injection signal each DG auto-starts from standby condition and:</p> <ol style="list-style-type: none"> a. In ≤ 12 seconds after auto-start and during tests, achieves voltage ≥ 3740 V and frequency ≥ 58.8 Hz; b. Achieves steady state voltage ≥ 3740 V and ≤ 4320 V and frequency ≥ 59.7 Hz and ≤ 60.3 Hz; c. Operates for ≥ 5 minutes; d. Permanently connected loads remain energized from the offsite power system; and e. Emergency loads are auto-connected and energized through the LOCA load sequencer from the offsite power system. 	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.14 ----- NOTES -----</p> <ol style="list-style-type: none"> 1. Momentary transients outside the load and power factor ranges do not invalidate this test. 2. The DG may be loaded to ≥ 5580 kW and ≤ 6201 kW for the entire test period if auto-connected design loads are less than 6201 kW. <p>-----</p> <p>Verify each DG operating at a power factor ≤ 0.9 and ≥ 0.8 operates for ≥ 24 hours:</p> <ol style="list-style-type: none"> a. For ≥ 2 hours loaded ≥ 6600 kW and ≤ 6821 kW; and b. For the remaining hours of the test loaded ≥ 5580 kW and ≤ 6201 kW. 	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.15 ----- NOTES -----</p> <ol style="list-style-type: none"> 1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours loaded ≥ 5580 kW and ≤ 6201 kW. Momentary transients outside of load range do not invalidate this test. 2. All DG starts may be preceded by an engine prelube period. <p>-----</p> <p>Verify each DG starts and achieves:</p> <ol style="list-style-type: none"> a. In ≤ 12 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and b. Steady state voltage ≥ 3740 V and ≤ 4320 V and frequency ≥ 59.7 Hz and ≤ 60.3 Hz. 	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.19 ----- NOTES -----</p> <ol style="list-style-type: none"> 1. All DG starts may be preceded by an engine prelube period. 2. This Surveillance shall not normally be performed in MODE 1 or 2. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated Safety Injection signal:</p> <ol style="list-style-type: none"> a. De-energization of emergency buses; b. Load shedding from emergency buses; and c. DG auto-starts from standby condition and: <ol style="list-style-type: none"> 1. energizes permanently connected loads in ≤ 12 seconds, 2. energizes auto-connected emergency loads through LOCA load sequencer, 3. achieves steady state voltage ≥ 3740 V and ≤ 4320 V, 4. achieves steady state frequency ≥ 59.7 Hz and ≤ 60.3 Hz, and 5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes. 	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.20</p> <p>----- NOTE ----- All DG starts may be preceded by an engine prelube period. -----</p> <p>Verify when started simultaneously from standby condition, each DG achieves:</p> <p>a. In ≤ 12 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and</p> <p>b. Steady state voltage ≥ 3740 V and ≤ 4320 V and frequency ≥ 59.7 Hz and ≤ 60.3 Hz.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.21</p> <p>----- NOTE ----- The continuity check may be excluded from the actuation logic test. -----</p> <p>Perform ACTUATION LOGIC TEST for each train of the load shedder and emergency load sequencer.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 241 TO

RENEWED FACILITY OPERATING LICENSE NPF-30

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT NO. 1

DOCKET NO. 50-483

1.0 INTRODUCTION

1.1 Background

By letter dated February 27, 2025 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML25058A155), as supplemented by letters dated March 18 and April 14, 2026 (Packages ML26077A162 and ML26104A353), Union Electric Company, doing business as Ameren Missouri (the licensee), submitted a license amendment request (LAR) to the U.S. Nuclear Regulatory Commission (NRC, the Commission) requesting changes to the technical specifications (TSs) for Callaway Plant, Unit No. 1 (Callaway).

The proposed amendment would revise surveillance requirements (SRs) for TS 3.8.1, "AC [Alternating Current] Sources – Operating," to change the diesel generator (DG) steady-state frequency acceptance criteria.

The supplemental letters dated March 18 and April 14, 2026, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on May 14, 2025 (90 FR 20520).

1.2 System Description

In section 2.1, "System Design and Operations," of the enclosure to its LAR, the licensee states, in part, that the Callaway onsite standby power source consists of two DGs (DGs A and B). Each DG is dedicated to one of the two 4.16-kilovolt (kV) engineered safety feature (ESF) buses A and B, respectively. Each DG is rated at 6201 kilowatts (kW) for continuous operation. Additional ratings are 6,635 kW for 2,000 hours; 6,821 kW for 7 days; and 7,441 kW for 30 minutes. The generator 2-hour rating is equal to the 7-day rating.

The DGs can supply the Class 1E loads required to safely shut down the unit following a design-basis accident. A DG starts automatically on a safety injection (SI) signal or on an ESF

bus degraded voltage or undervoltage signal. After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SI signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the loss of offsite power, in response to the undervoltage signal, a sequencer strips non-permanent loads from the ESF bus. When the DG is tied to the ESF bus, the associated loads are then sequentially connected to the ESF bus by an automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

Each DG is designed to attain rated voltage and frequency and to accept load within 12 seconds after receipt of a start signal. The characteristics of the generator exciter and voltage regulator provide satisfactory starting and acceleration of sequenced loads and ensure rapid voltage and frequency recovery when starting large motors. According to the licensee, the voltage and frequency recovery characteristics meet or exceed the requirements of NRC Regulatory Guide (RG) 1.9, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, July 1993 (ML003739929).

1.3 Reason for the Proposed Change

The licensee states, in part, in section 1, "Summary Description," of the enclosure to its LAR that the "request is required to correct a non-conservative TS. The proposed TS SR changes establish DG surveillance testing limits to support the required performance ranges for the affected safety related equipment."

In section 2.3, "Reason for the Proposed Change," of the enclosure to its LAR, the licensee states, in part, that,

The proposed amendment is necessary based on the discovery that some safety related components could not be demonstrated to perform as specified in the design basis over the full range of DG frequencies allowed by the TSs without more detailed analysis. Subsequent Ameren Missouri evaluations utilizing the methodologies approved in [Topical Report (TR)] WCAP-17308-NP-A determined that a more conservative operating range for DG frequency should be specified. The proposed amendment would revise the applicable TS SRs to reflect a more restrictive steady state frequency operating range. The more restrictive steady state frequency operating range [would help ensure] that safety related equipment can perform its specified safety functions consistent with design basis assumptions.

1.4 Description of Proposed Change

The proposed amendment would revise the DG steady-state frequency range for TS 3.8.1 as specified in certain SRs described below. Specifically, the proposed changes would incorporate Technical Specifications Task Force (TSTF) traveler TSTF-163, Revision 2, "Minimum vs. Steady State Voltage and Frequency" (ML040500733), as well as changes to the DG steady-state frequency range consistent with the methodology specified in TR WCAP-17308-NP-A, "Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances" (ML17215A232). The proposed amendment does not change the allowable DG voltage operating range.

In its LAR, the licensee proposed revisions to SRs 3.8.1.2, 3.8.1.7, 3.8.1.11, 3.8.1.12, 3.8.1.15, 3.8.1.19, and 3.8.1.20 to change the DG steady-state frequency as described below (emphasis added: deleted text is shown as ~~strikeout~~, added text is underlined, revised frequency values are highlighted in bold and underlined, and changes reflecting the incorporation of TSTF-163 are shown in italics and underlined):

SR 3.8.1.2

Current SR 3.8.1.2 states:

Verify each DG starts from standby conditions and achieves steady state voltage ≥ 3740 V [Volt] and ≤ 4320 V, and frequency ≥ 58.8 Hz [hertz] and ≤ 61.2 Hz.

Revised SR 3.8.1.2 would state:

Verify each DG starts from standby conditions and achieves steady state voltage ≥ 3740 V and ≤ 4320 V, and frequency ≥ 58.8 **59.7** Hz and ≤ 61.2 **60.3** Hz.

SR 3.8.1.7

Current SR 3.8.1.7 states:

Verify each DG starts from standby condition and achieves in ≤ 12 seconds, voltage ≥ 3740 V and ≤ 4320 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.

Revised SR 3.8.1.7 would state:

Verify each DG starts from standby conditions and achieves in ~~≤ 12 seconds~~:

- a. In ≤ 12 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and*
- b. Steady state voltage ≥ 3740 V and ≤ 4320 V, and frequency ≥ 58.8 **59.7** Hz and ≤ 61.2 **60.3** Hz.*

SR 3.8.1.11

Current SR 3.8.1.11 states, in part:

Verify on an actual or simulated loss of offsite power signal:

...

- c. DG auto-starts from standby condition and:

...

4. maintains steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and

...

Revised SR 3.8.1.11 would state, in part:

Verify on an actual or simulated loss of offsite power signal:

...

c. DG auto-starts from standby condition and:

...

4. maintains steady state frequency ≥ 58.8 **59.7** Hz and ≤ 61.2 **60.3** Hz, and

...

SR 3.8.1.12

Current SR 3.8.1.12 states, in part:

Verify on an actual or simulated safety injection signal each DG auto-starts from standby condition and:

a. In ≤ 12 seconds after auto-start and during tests, achieves voltage ≥ 3740 V and ≤ 4320 V;

b. In ≤ 12 seconds after auto-start and during tests, achieves frequency ≥ 58.8 Hz and ≤ 61.2 Hz;

...

Revised SR 3.8.1.12 would state, in part:

Verify on an actual or simulated safety injection signal each DG auto-starts from standby condition and:

a. In ≤ 12 seconds after auto-start and during tests, achieves voltage ≥ 3740 V and ~~≤ 4320 V~~ frequency ≥ 58.8 Hz;

b. ~~In ≤ 12 seconds after auto-start and during tests, achieves~~ Achieves steady state voltage ≥ 3740 V and ≤ 4320 V and frequency ≥ 58.8 **59.7** Hz and ≤ 61.2 **60.3** Hz;

...

SR 3.8.1.15

Current SR 3.8.1.15 states:

Verify each DG starts and achieves, in ≤ 12 seconds, voltage ≥ 3740 V, and ≤ 4320 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.

Revised SR 3.8.1.15 would state:

Verify each DG starts and achieves; ~~in ≤ 12 seconds,~~

a. In ≤ 12 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and

b. Steady state voltage ≥ 3740 V, and ≤ 4320 V and frequency ≥ 58.8 **59.7** Hz and ≤ 61.2 **60.3** Hz.

SR 3.8.1.19

Current SR 3.8.1.19 states, in part:

Verify on actual or simulated loss of offsite power signal in conjunction with an actual or simulated Safety Injection signal:

...

c. DG auto-starts from standby condition and:

...

4. achieves steady state frequency ≥ 58.8 Hz and ≤ 61.2 Hz, and

...

Revised SR 3.8.1.19 would state, in part:

Verify on an actual or simulated loss of offsite power signal in conjunction with actual or simulated Safety Injection signal:

...

c. DG auto-starts from standby condition and:

...

4. achieves steady state frequency ≥ 58.8 **59.7** Hz and ≤ 61.2 **60.3** Hz, and

...

SR 3.8.1.20

Current SR 3.8.1.20 states:

Verify when started simultaneously from standby condition, each DG achieves, in ≤ 12 seconds, voltage ≥ 3740 V and ≤ 4320 V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.

Revised SR 3.8.1.20 would state:

Verify when started simultaneously from standby condition, each DG achieves: ~~in ≤ 12 seconds,~~

a. In ≤ 12 seconds, voltage ≥ 3740 V and frequency ≥ 58.8 Hz; and

*b. Steady state voltage ≥ 3740 V and ≤ 4320 V and frequency ≥ 58.8 **59.7** Hz and ≤ 61.2 **60.3** Hz.*

2.0 REGULATORY EVALUATION

According to section 3.1, "Conformance with NRC General Design Criteria," of the Callaway Final Safety Analysis Report (FSAR), Revision 16 (ML21195A333), Callaway is designed to comply with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." The NRC staff has identified the following regulatory requirements and guidance applicable to its review of the LAR.

2.1 Regulatory Requirements

The regulations in 10 CFR 50.36, "Technical specifications," require, in part, that the operating license of a nuclear power facility include TSs (10 CFR 50.36(b)). The regulation at 10 CFR 50.36(c)(3) requires that the TSs include SRs, which are requirements "relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

The regulations in 10 CFR 50.55a, "Codes and standards," require, in part, that inservice testing (IST) of pumps and valves be performed in accordance with the ASME Operation and Maintenance (OM) Code, as incorporated by reference in 10 CFR 50.55a(a)(1)(iv). Specifically, 10 CFR 50.55a(f)(4)(ii), "Applicable IST Code: Successive code of record intervals," requires that,

Inservice tests to verify the operational readiness of pumps and valves, whose function is required for safety, conducted during successive code of record intervals must comply with the requirements of the latest edition and addenda of the ASME OM Code incorporated by reference in [10 CFR 50.55a(a)(1)(iv)] no more than 18 months before the start of the code of record interval (or the optional ASME Code Cases listed in the appropriate NRC regulatory guides...), subject to the conditions listed in [10 CFR 50.55a(b)].

The following General Design Criteria (GDCs) of 10 CFR Part 50, Appendix A are applicable for the review of this LAR:

GDC 17, "Electric power systems," states, in part:

An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

The onsite electric power supplies, including the batteries, and the onsite electric distribution system shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

GDC 18, "Inspection and testing of electric power systems," states:

Electric power systems important to safety shall be designed to permit appropriate periodic inspection and testing of important areas and features, such as wiring, insulation, connections, and switchboards, to assess the continuity of the systems and the condition of their components. The systems shall be designed with a capability to test periodically (1) the operability and functional performance of the components of the systems, such as onsite power sources, relays, switches, and buses, and (2) the operability of the systems as a whole and, under conditions as close to design as practical, the full operation sequence that brings the systems into operation, including operation of applicable portions of the protection system, and the transfer of power among the nuclear power unit, the offsite power system, and the onsite power system.

GDC 35, "Emergency core cooling," states:

A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

Suitable redundancy in components and features, and suitable interconnections, leak detection, isolation, and containment capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

GDC 38, "Containment heat removal," states, in part:

A system to remove heat from the reactor containment shall be provided. The system safety function shall be to reduce rapidly, consistent with the functioning of other associated systems, the containment pressure and temperature following any loss-of-coolant accident and maintain them at acceptably low levels.

2.2 Regulatory Guidance

RG 1.9, Revision 3, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants" (ML003739929). In the LAR, the licensee states, in part, that Callaway was initially licensed to RG 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," and RG 1.9, Revision 2. For ongoing testing of the DGs, Callaway conforms to the TSs and with exceptions to the test recommendations of RG 1.9, Revision 3. Revision 3 of RG 1.9 integrates the guidance in Revisions 1 and 2 of RG 1.9 and the guidance of Revision 1 of RG 1.108.

RG 1.239, "Licensee Actions to Address Nonconservative Technical Specifications" (ML20294A510), endorses Nuclear Energy Institute (NEI) 15-03, Revision 3, March 2020 (ML20100G903), as an acceptable method for addressing nonconservative TSs. NEI 15-03

provides guidance for establishing administrative controls and related actions when a nonconservative TS is identified. Consistent with this guidance, the licensee implemented NEI 15-03 administrative controls pending approval of this amendment.

Pressurized Water Reactor Owners Group (PWROG) prepared TR WCAP-17308-NP, Revision 0, "Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances." The NRC staff reviewed TR WCAP-17308-NP Revision 0 and found that the TR is acceptable for referencing in licensing applications to the extent specified and under limitations delineated in the TR and in the NRC final safety evaluation (SE) (ML17074A121). In the final SE, the NRC staff requested PWROG publishing an approved version of TR WCAP-17308-NP, Revision 0, within 3 months of receipt of the final SE. The PWROG subsequently published TR WCAP-17308-NP-A, Revision 0 (ML17215A232). In the LAR, the licensee states, in part, that the proposed changes reflect changes to the steady-state DG operating frequency range consistent with the methodology specified in TR WCAP-17308-NP-A.

NUREG-1482, Revision 3, "Guidelines for Inservice Testing at Nuclear Power Plants: Inservice Testing of Pumps and Valves and Inservice Examination and Testing of Dynamic Restraints (Snubbers) at Nuclear Power Plants," July 2020 (ML20202A473). NUREG-1482 provides the NRC staff guidance for implementing IST of pumps and valves in accordance with 10 CFR 50.55a and the ASME OM Code, including guidance for adjusting acceptance criteria when plant-specific conditions warrant.

Traveler TSTF-163, Revision 2, "Minimum vs. Steady State Voltage and Frequency" (ML040500733). In the LAR, the licensee states, in part, that the proposed changes reflect the incorporation of TSTF traveler TSTF-163, Revision 2.

3.0 TECHNICAL EVALUATION

As stated in section 3.0, "Technical Evaluation," of the enclosure to the LAR, Callaway was licensed to RG 1.108 and RG 1.9, Revision 2, and conforms RG 1.9, Revision 3 (with exceptions). The proposed changes would incorporate TSTF-163, Revision 2, and be consistent with WCAP-17308-NP-A. The NRC staff evaluated the proposed changes using this guidance, as well as information in the LAR, as supplemented, the FSAR, and TS Bases.

The NRC staff identified the need for a regulatory audit to examine Callaway's non-docketed information with the intent to gain understanding, verify information, and identify information that would be required to support the licensee's requested regulatory decision. The NRC staff performed an audit in accordance with an audit plan dated May 7, 2025 (ML25120A119). An audit summary was issued on April 16, 2026 (ML26085A718).

As stated in WCAP-17308-NP-A, the DG steady-state operation at extreme voltage and frequency limits can have an impact on the performance of equipment, including:

- Performance of safety-related systems which include emergency core cooling systems (ECCS),
- DG loading and fuel consumption calculations,
- Motor-operated valve (MOV) performance, and
- Heating, ventilation and air conditioning (HVAC) fan/blower performance

In its LAR, the licensee provided justifications for the proposed changes to the DG steady-state frequency limits in the various SRs, which are listed in section 1.4 of this SE. The NRC staff's evaluation of the licensee's proposed changes to the TS SRs is described below.

3.1 WCAP-17308-NP-A Methodology Evaluation

As stated in section 2.2 of this SE, the NRC approved methodologies in WCAP-17308-NP-A for evaluating and addressing the impact of the DG steady-state frequency and voltage variation on essential motor loads such as ECCS pumps, MOVs, and fans/blowers. The impact of the DG steady-state frequency and voltage variation on motor-driven parameters such as pump flow rate and MOV actuation speed can be compared to the required performance values that these components are verified to meet on a periodic basis. In the case of ECCS pump performance, the effect of DG steady-state frequency and voltage variation can be combined with other uncertainties to revise the pump IST curves to account for those variables.

In its LAR, the licensee states, in part, that "Ameren Missouri analyzed the allowable steady state variations in voltage and frequency proposed for the affected TS SRs ... following the methods provided by WCAP-17308-NP-A, including the utilization of Callaway-specific inputs, to demonstrate the capability of equipment to meet its specified safety function. The SRs being revised are consistent with those addressed by WCAP-17308-NP-A." The licensee further states that "[t]he proposed amendment does not change the allowable DG voltage operating range."

From a mechanical components perspective, the NRC staff reviewed the licensee's application of WCAP-17308-NP-A for ASME Code Class 1, 2, and 3 pumps, MOVs, and safety-related fans/blowers powered by the DGs at Callaway, as described in sections 3.1, 3.4, 3.5, and 3.6 of the enclosure to the LAR. The NRC staff verified that motor performance parameters such as pump flow, pump developed head, MOV stroke time, and fan/blower flow were properly adjusted for the proposed ± 0.3 Hz steady-state frequency tolerance (59.7–60.3 Hz) and the existing DG voltage range of 3740–4320 volts. The staff also confirmed that the licensee committed to revise pump IST surveillance acceptance criteria, consistent with the ASME OM Code (Subsection ISTB) and guidance in NUREG-1482, Revision 3. Based on this review, the NRC staff finds that the WCAP-17308-NP-A methodology, as applied by the licensee, adequately addresses potential mechanical impacts from DG steady-state tolerances and provides reasonable assurance that safety-related pumps, MOVs, and fans will remain capable of performing their safety functions.

3.1.1 Uncertainty Calculation Evaluation

As stated in TR WCAP-17308-NP-A,

A properly operating [DG] governor and voltage regulator will be able to control around a nominal value within the manufacturer's specified tolerances. This capability is validated when a DG is synchronized to the grid, as synchronization requires precise control. If the tolerances on the governor and voltage regulator are treated as uncertainties, similar to instrument setpoints, an uncertainty calculation can be performed, which considers the manufacturer's specified tolerance, instrument uncertainties, and setpoint tolerances. The results of this statistical uncertainty calculation for governor and voltage regulator performance can then be translated into an impact on pump flow and developed head. This impact can then be factored into the IST acceptance criteria for the affected pumps.

Furthermore, section 2.2.3, “Define Uncertainty in Diesel Generator Frequency, U_f ” of WCAP-17308-NP-A states, in part: “If the governor manufacturer’s specified tolerance is not available, a tolerance that is established by the utility may be used. If a tolerance is determined by the utility, that tolerance should be validated during DG testing and the frequency should periodically be confirmed to be within that tolerance....”

The NRC staff reviewed the proposed DG ± 0.3 Hz frequency tolerance change and notes that the licensee established the ± 0.3 Hz frequency tolerance and utilized the surveillance test data from the past four years to periodically validate and confirm the ± 0.3 Hz frequency tolerance during steady-state operation. The NRC staff notes that this method follows section 2.2.3 of WCAP-17308-NP-A and the value is not obtained by applying the uncertainty methodology in Equation 2 in the same section of the WCAP-17308-NP-A. This provides assurance that the revised frequency tolerance of ± 0.3 Hz around the 60 Hz setpoint is valid, maintained, acceptable, and achievable.

The NRC staff requested the basis for the ± 0.3 Hz frequency tolerance in Item No. 1 of the staff’s audit plan dated May 7, 2025, and the licensee provided the basis in its response via the supplement to the LAR dated March 18, 2026; to the additional audit questions (ML25219A301) as the following rationale:

1. A calculation for uncertainty was not needed due to the simple system consisting of a speed sensor which has no error/uncertainty (a tooth gear with a magnetic pickup to provide a DG frequency input), and a DG electronic governor control with a digital reference unit.
2. For the pump and fan calculations looking at DG frequency variations, the frequency uncertainty was ± 0.3 Hz. This provides adequate margins.

Additionally, the staff confirmed during the audit that the DG frequency tolerance ± 0.3 Hz is appropriately applied to the flow measurement, pump developed head, and pump speed uncertainty calculations in Westinghouse Electric Company (Westinghouse) Documents M-018-01009, M-018-01010, and M-018-01011. The flow measurement, pump developed head, and pump speed uncertainty calculations meet the associated uncertainty calculations in WCAP-17308-NP-A.

3.1.1.1 Flow and Pressure Measurement Uncertainty

As described in section 3.1, “Pump Evaluation,” of the enclosure to the LAR, WCAP-17308-NP-A allows each utility to define the method for establishing overall flow uncertainty, which is then combined with DG steady-state tolerances to evaluate pump performance. The licensee applied Callaway-specific inputs to determine flow and pressure instrument loop uncertainties for each applicable safety-related pump.

The NRC staff reviewed the licensee’s evaluation and confirmed that these uncertainties were incorporated into the ECCS pump curves of record to generate proposed curves for IST surveillance acceptance criteria, ensuring compliance with system minimum flow requirements.

3.1.1.2 Pump Developed Head Measurement and Pump Speed Uncertainty

Section 3.1 of the enclosure to the LAR references TR WCAP-17308-NP-A. Section 3.2.2 of this TR defines pump developed head as the difference in static pressure head, velocity head, and

elevation head across the pump. Accordingly, the measurement uncertainty for pump developed head is derived from the combined uncertainties of these parameters. The WCAP also provides guidance for evaluating pump speed uncertainty, based on the relationship between pump speed and variations in motor frequency and voltage.

The NRC staff reviewed the licensee's evaluation and confirmed that pump developed head and pump speed uncertainties were incorporated into the ECCS pump curves of record to generate proposed curves for IST surveillance acceptance criteria, ensuring compliance with system minimum flow requirements.

3.1.1.3 DG Frequency Uncertainty

As described in section 3.1 of this SE, WCAP-17308-NP-A provides the approved methodology for evaluating the impact of DG steady-state tolerances on downstream mechanical loads. The licensee proposed to narrow the DG steady-state frequency tolerance from ± 1.2 Hz to ± 0.3 Hz, establishing a band of 59.7–60.3 Hz. The NRC staff notes that this band was selected and justified by the licensee in Request for Resolution (RFR) 220278, referenced in the TS Bases, and adopted in the proposed TS SRs and Bases.

The NRC staff reviewed the licensee's evaluation of downstream mechanical effects and confirmed that operation within the ± 0.3 Hz steady-state frequency tolerance does not adversely affect pump operability, fan/blower flow performance, or MOV stroke times. These effects are bounded by the proposed IST acceptance criteria and the licensee's equipment evaluations described in the enclosure to the LAR. The staff also reviewed supporting surveillance history demonstrating that the tighter ± 0.3 Hz steady-state band is achievable in operation. Based on this review, the NRC staff finds that the proposed DG steady-state frequency tolerance of 59.7-60.3 Hz at Callaway is acceptable.

3.2 Pump Evaluation

Consistent with WCAP-17308-NP-A, the licensee evaluated the impact of DG steady-state frequency tolerance and flow/pressure measurement uncertainties on safety-related pump performance and stated that the resulting analyses will be used to adjust IST surveillance acceptance criteria. In section 3.1 of the enclosure to its LAR, the licensee evaluated the essential service water (ESW), component cooling water (CCW), motor-driven auxiliary feedwater (MDAFW), residual heat removal (RHR), containment spray (CS), high-head SI (charging), intermediate-head SI pumps (SIP), and fuel-oil transfer pumps.

The analyses adjusted the existing pump curves of record to account for Callaway-specific DG steady-state frequency effects and instrument uncertainties. For systems with variable resistance, throttle-valve settings were checked or reset to ensure minimum DBA flow is met, pump runout is avoided, and flow-balance tolerances are maintained. The licensee committed to update IST pump surveillance acceptance criteria upon approval of the amendment.

In the supplement to the LAR dated March 18, 2026, the licensee confirmed in response to an audit question that Westinghouse Document M-018-01010 calculated the impact on flows for the MDAFW pumps for the DG voltage and frequency tolerances. The report summary included the results compared to past IST testing. This impact to IST testing procedures for the MDAFW pumps was added to the Callaway Engineering Analysis. The licensee reported that the auxiliary feedwater (AFW) flow verification procedures will be modified to ensure that the AFW flow is at least 1 percent above the required minimum and maximum values in the required

AFW line-up. Westinghouse Document M-018-01010 provides the minimum flow rates adjusted for steady-state variations in DG frequency and voltage. This document, M-018-01010 also provides the maximum flow rates adjusted for steady-state variations in DG frequency and voltage.

The NRC staff reviewed the licensee's evaluation and confirmed that the proposed pump curves incorporate the DG steady-state frequency tolerance and measurement uncertainties in an acceptable manner. The NRC staff therefore finds that Callaway's safety-related pumps will remain capable of performing their design functions under the proposed DG steady-state frequency tolerance of 59.7–60.3 Hz, while operating within the existing TS voltage range of 3740–4320 V.

Pump Net Positive Suction Head Analysis

The CS and RHR pumps draw water from the containment sump during the loss-of-coolant accident (LOCA) recirculation phase. The performance of these pumps depends on the DG voltage and frequency when the DG is supplying its associated Class 1E electrical bus. It is necessary to review the safety analysis of the net positive suction head (NPSH) of these pumps because the pump speed is linearly proportional to the supply voltage frequency. The current analyses generally assume that the steady-state DG voltage is 4160 V and the steady-state DG frequency is 60 Hz. However, equipment powered from the DGs is allowed to be subject to voltage and frequency variations up to the limits specified in the TS SRs. The proposed revised DG frequency ranges have been analyzed assuming a steady-state voltage range of 3740 V to 4320 V and a frequency range of 60 Hz \pm 0.3 Hz.

According to the pump affinity laws, the pump performance parameters change as follows:

- Pump flow rate and efficiency are directly proportional to pump speed.
- Pump dynamic head and required NPSH (NPSHR) is directly proportional to the square of the pump speed.
- Pump power is directly proportional to the cube of the pump speed.

In the supplement to the LAR dated March 18, 2026, the license provided the following information on the current and the revised NPSH analysis for the CS and RHR pumps.

CS Pumps

Analysis Assumptions:

- Minimum sump fluid level elevation at the swap over time to recirculation,
- Sump fluid at the maximum temperature of 270 degree Fahrenheit (°F) obtained from LOCA sump temperature response.
- Credit is not taken for containment accident pressure (CAP) above the saturation pressure at sump fluid temperature.
- NPSHR is 16.6 feet (ft) (Reference FSAR table 6.2.2-7).
- Pump flow rate increase linearly with speed.

- Nominal Speed = 1770 revolutions per minute (rpm) at nominal frequency.
- Analysis pump speed = 1786.78 rpm at the maximum frequency of 60.3 Hz.
- Pump developed head and NPSHR increases with the square of the pump speed.

CS Pump NPSH Margin Versus Pump Speed
NPSH Margin Results

Pump speed (rpm)	Pump speed (% nominal)	Flow (gpm)	Temp (°F)	NPSHA (ft) (Note 1)	NPSHR (ft)	CAP Used (ft) (Note 4)	NPSH Margin (ft) (minimum)	Sump Strainer Loss (ft) (Note 5)	NPSH Margin after Strainer Loss (ft)
1770	100	3750 (Note 1)	270	22.1	16.6 (Note 3)	0	5.5	0.651	4.85
1786.78	100.9	3858 (Note 2)	270	22.1	16.81	0	5.3	0.651	4.65

Notes:

1. NPSHA (net positive suction head available) calculated assuming 3950 gallons per minute (gpm) flow for conservatism.
2. NPSHR does not take the 3858 gpm flow value for the calculation rather it uses the increased speed to calculate the NPSHR.
3. NPSHR of 16.6 ft is listed in FSAR figure 6.2.2-7.
4. CAP used above saturation pressure at sump fluid temperature.
5. Strainer head loss at 140 °F, which is a lower temperature for conservatism.

The NRC staff finds that the licensee's NPSH analysis for the CS pumps that draw water from the containment sump during the LOCA recirculation phase acceptable based on the following:

- The analysis used reasonable assumptions and conservative inputs.
- The available NPSH did not credit CAP above the saturation pressure at the sump temperature.
- The suction strainer head loss is included in the pump suction side head loss.
- Due to higher supply frequency, the analysis results at higher pump speed show positive NPSH margin, thus preventing pump cavitation and therefore would deliver the required discharge flow rate.

RHR Pumps

Analysis Assumptions:

- The limiting NPSH margin for RHR NPSHA occurs during the recirculation phase at the time of the ECCS pump suction swap over from refueling water storage tank to the containment recirculation sumps.

- The sump water elevation is at minimum at swap over 1 ft 10 inch.
- Cold leg recirculation (CLR) is the limiting operation for RHR pump NPSH.
- The limiting RHR pump NPSHR configuration occurs when only one RHR pump is operating when it takes suction from the sump and delivers directly to two reactor coolant system (RCS) cold legs and feeds two centrifugal charging pumps (CCPs) and two SIPs both of which are injecting into cold legs.
- In hot leg recirculation both CCPs continue to inject water through the common header, but each SIP is now aligned with its own hot leg injection header. The maximum flow rate supplied by each SIP can exceed the flow rate during cold leg injection operation. Therefore, the hot leg recirculation typically results in the most limiting NPSHR since the RHR pump flow rate is typically higher in this mode than the cold leg recirculation phase.
- An Applied Flow Technology (AFT) Fathom 6.0 ECCS flow model is used to determine the effects on the RHR pump NPSH of the new sump strainer and screen head loss values in the cold leg and hot leg recirculation phase. Fathom is a fluid dynamic simulation software to calculate pressure drop and pipe flow distribution in liquid and low-velocity gas piping and ducting system. This software version has been verified for safety-related use. The analysis using this software complies with 10 CFR Part 50, Appendix B, and ASME NQA-1, 1994, QA [Quality Assurance] Program.

RHR Pumps NPSH Margin at Lower Speed – Results Based on FATHOM Code Runs

RHR Pump CLR (Note 1)	Speed (%)	Flow (gpm) (Note 1)	Temp (°F)	NPSHA (ft)	NPSH R (ft)	CAP Used (ft) (Note 2)	NPSH Margin (ft) (minimum)	Sump Strainer Loss (ft)	NPSH Margin after Strainer Loss (ft)
A	100.5	4800	211.9	25.75	21.31	0	4.44	0.307	4.13
B	102.3	4800	211.9	25.74	21.73	0	4.01	0.307	3.7
<u>Notes</u>									
1. During CLR, the minimum sump water level is 1 ft-10 inch prior to swap over the containment spray pumps.									
2. CAP used above saturation pressure at sump fluid temperature.									

RHR Pumps NPSH Margin at Increased Speed – Results Based on FATHOM Code Runs

RHR Pump CLR (Note 1)	Speed (% Nominal)	Flow (gpm)	Temp (°F)	NPSHA (ft)	NPSHR (ft)	CAP Used (ft) (Note 2)	NPSH Margin (ft) (minimum)	Sump Strainer Loss (ft)	NPSH Margin after Strainer Loss (ft)
A	102.5	4657	211.9	25.99	21.22	0	4.77	0.307	4.46
B	104.3	4720	211.9	25.88	21.90	0	3.98	0.307	3.67

Notes

1. During CLR, the minimum sump fluid level is 1 ft-10 inch prior to swap over the containment spray pumps.
2. CAP used above saturation pressure at sump fluid temperature.

The NRC staff finds that the licensee’s NPSH analysis for the RHR pumps that draw water from the containment sump during the LOCA recirculation phase acceptable based on the following:

- FATHOM computer code used for analysis complies with 10 CFR Part 50, Appendix B, and ASME NQA-1, 1994, QA program and therefore can be used for safety analysis.
- The analysis used reasonable assumptions and conservative inputs
- The available NPSH did not credit CAP above the saturation pressure at the sump temperature.
- The suction strainer head loss is included in the pump suction side head loss.
- Due to higher supply frequency, the analysis results at higher pump speed show positive NPSH margin, thus preventing pump cavitation and therefore would deliver the required discharge flow rate.

3.3 Impact on DG Capability Evaluation

In section 3.0 of the enclosure to its LAR, the licensee stated, in part, that the DG voltage regulator has demonstrated its capability to maintain steady-state voltage within the existing tolerance. Similarly, the DG governor has demonstrated its capability to maintain DG speed within the narrower tolerance as demonstrated during operation. Design analyses and supporting manufacturer design tolerances also support the capability of the DG governor to maintain speed within the SR limits. The licensee’s review of surveillance test data over the past three years provides assurance that the revised voltage and frequency limits will be achievable. The licensee further stated that since the DGs were designed to operate within the current frequency tolerance, limiting the tolerance to a tighter band is considered acceptable for DG operation.

The NRC staff finds that the proposed DG’s steady-state frequency ranges are conservative and within the DG rating. The proposed change would not adversely impact the DG’s capability of providing its intended safety function. Therefore, Callaway would continue to meet the intent of GDC 17 with respect to equipment capability. The NRC staff finds that the proposed steady-state frequency range is acceptable.

3.4 DG Steady-State Voltage and Frequency Tolerances Evaluation

The calculated ECCS flows typically assume that the steady-state DG frequency is 60 Hz and voltage is 4160 V after the DG starting and loading transients. After the DG starting and loading sequences, the DG governor maintains the frequency at 60 Hz within a specified tolerance, which is based on the governor manufacturer/model. The DG voltage is controlled by the voltage regulator at 4160 V within a specified tolerance, which is based on the voltage regulator manufacturer/model.

The methodology in WCAP-17308-NP-A states, in part, that the minimum and maximum values of frequency and voltage contained in plant-specific TS SRs are typically equal to ± 2 percent of the 60 Hz nominal frequency and ± 10 percent of the 4160 V nominal voltage. However, the ± 2 percent frequency tolerance and ± 10 percent voltage tolerance is only applicable to DG starting and loading transients and does not apply to steady-state operation. The WCAP further recommends revising the TS to reduce the allowable DG frequency and voltage tolerances.

In section 3.0, of the enclosure to its LAR, the licensee stated, in part, that the current Callaway's analyses generally assume that the steady-state DG voltage is 4160 V and the steady-state DG frequency is 60 Hz. However, equipment powered from the DGs is allowed to be subject to voltage and frequency variations up to the limits specified in the TS SRs. The current TS 3.8.1 allows a steady-state voltage range of 3740 V to 4320 V and a steady-state frequency range of 58.8 Hz to 61.2 Hz. These allowed steady-state ranges represent tolerances for voltage of +3.85 percent/-10 percent around a nominal 4160 V and for frequency of ± 2 percent around a nominal 60 Hz. The proposed DG frequency ranges have been analyzed assuming a steady-state voltage range of 3740 V to 4320 V and a frequency range of 60 Hz ± 0.3 Hz.

The NRC staff notes that the LAR proposes revising certain SRs in TS 3.8.1 to change the DG steady-state frequency tolerance from ± 2 percent to ± 0.5 percent (± 0.3 Hz) and keeping the DG steady-state voltage tolerance at +3.85 percent/-10 percent.

During the regulatory audit, the NRC staff reviewed the licensee's surveillance data to verify that the DG voltage regulator maintains the steady-state voltage at the proposed steady-state frequency tolerance. The sample data shows no records of transients that were not recovered to 4320 V and 60 Hz within a short period of time (0.5-3 seconds).

As for the impact of the proposed change to the motor overload protection, the licensee states, in part in LAR enclosure section 3.3, "Motor Overload Protection," that "[t]he protective relaying or overload settings for breakers and overload relays could be impacted by operation at higher frequency and low voltage, potentially resulting in spurious breaker openings (i.e., trips). This potential condition has been evaluated." The licensee further provided evaluation on the impact of high-frequency concurrent with low-voltage condition on certain plant equipment (e.g., protective relay, fan and pump motors) that demonstrated that there is no adverse impact on equipment performance.

Based on the above information and the verification during the regulatory audit, the NRC staff finds that the proposed TS SR change to steady-state frequency range would not adversely impact the plant equipment, and therefore acceptable.

3.5 Impact on DG Loading Evaluation

The methodology in WCAP-17308-NP-A, section 3.1 states, in part, that addressing the impact of DG frequency and voltage variations on DG loading requires an evaluation of changes in DG loading associated with variations in frequency and voltage allowed by the DG governor and regulator. An underfrequency would not negatively impact DG loading calculations. By applying the upper bound of frequency (> 60 Hz) allowed by the DG governor to the maximum inductive loads calculated for the DG, an additional power load can be calculated for the potential variation in frequency allowed by the DG governor operating range.

The NRC staff notes that for the upper bound of the DG governor control band, the main concern from a higher than nominal frequency value (> 60 Hz) would be the additional power load required from the DG. An underfrequency would not adversely impact DG loading calculations. By applying the upper bound of frequency (> 60 Hz) allowed by the DG governor to the maximum inductive loads calculated for the DG, an additional power load can be calculated for the potential variation in frequency allowed by the DG governor operating range.

In evaluating the impact of the proposed change on the DG loading, in section 3 of the enclosure to the LAR, the licensee states, in part, that the maximum impact on DG loading is observed when both the voltage and frequency are at the upper TS limits of 4320 V and 60.3 Hz. For this condition, the licensee determined that the steady-state loading on the DG does not exceed the continuous rating of the DG. The reduction in the maximum allowable frequency band from $60 + 1.2$ Hz to $60 + 0.3$ Hz will reduce the operating load on the DGs from 6147 kW to 5952 kW. This demonstrates that the proposed maximum allowable voltage and frequency variations does not exceed the continuous rating of Callaway's DGs of 6201 kW.

During the regulatory audit, the NRC staff reviewed the licensee's load calculation to verify no adverse impacts by potential load changes as resulted from the proposed change. The calculated loads supplied by DGs NE01 and NE02 operating at 60.3 Hz do not exceed the DG rating of 6201 kW.

Based on the above information and the verification during the regulatory audit, the NRC staff finds that the licensee adequately evaluated the impact of the proposed change to the DG loading. The proposed change to steady-state frequency range does not adversely impact the DG loading capability, and therefore acceptable.

3.6 Impact on DG Fuel Consumption Evaluation

The methodology in WCAP-17308-NP-A, section 3.2 states that a calculated change in DG loading due to steady-state frequency variation will also require a commensurate evaluation of the impact on fuel oil consumption and stored fuel requirements as a result of the change in loading.

In evaluating the impact of the proposed change on DG fuel consumption, the licensee states in part, in section 3.2 of the enclosure to its LAR, that,

The Callaway DG fuel oil storage tank 7-day volume is based on the DG continuous rating of 8600 brake horsepower (bhp). The generator output power at this engine rating is 6201 kW. ...calculations show that the loading at the maximum allowable frequency of 60.3 Hz is below the 6201-kW generator rating,

and thus, the existing design bases fuel oil requirements are not adversely impacted.

As stated in section 3.5 of this SE, the NRC staff reviewed the licensee's load calculation to verify the DGs' loads operating at 60.3 Hz do not exceed the DG rating of 6201 kW. The staff finds that based on the calculated loads, the proposed change of the maximum steady-state frequency to 60.3 Hz does not adversely impact the fuel oil requirements.

In evaluating the impact of the proposed change on the DG fuel pumps, the licensee states, in part, in section 3.2 of the enclosure to its LAR that Callaway fuel-oil-transfer pumps are used to provide makeup to the DG fuel oil day tanks. FSAR section 9.5.4.2.2.b indicates the capacity of each transfer pump is approximately twice the consumption rate of the diesel engine at its continuous rating. Since the maximum DG consumption rate is approximately 7.7 gpm, the licensee stated that these pumps have significant margin for degradation and can easily accommodate DG uncertainty. Further, the licensee stated that the effect on NPSH required during over-voltage and over-frequency is also negligible.

Based on the above information and the verification during the regulatory audit, the NRC staff finds that the proposed TS SR change to steady-state frequency range would not adversely impact DG fuel consumption, and therefore acceptable.

3.7 Motor-Operated Valve Performance Evaluation

In section 3.4 of the enclosure to the LAR, the licensee evaluated MOV performance using the methodology in section 4, "Impact on MOV Operation," of WCAP-17308-NP-A. In the supplement to the LAR dated March 18, 2026, the licensee provided additional information regarding the MOV performance evaluation. The NRC staff review and findings are summarized in this section.

The licensees' evaluation determined that motor-speed effects from the proposed ± 0.3 Hz DG steady-state frequency tolerance (59.7–60.3 Hz) were negligible, that actuator thrust and torque margins remained positive under bounding differential pressures, and that degraded-voltage analyses (based on the minimum TS voltage of 3740 V) continued to ensure MOV operability with the voltage limits unchanged. The evaluation also considered inertia effects on thrust delivery and potential increases in differential pressure associated with slightly higher pump flow at the upper frequency bound. The NRC staff reviewed the licensee's MOV evaluation, as described in the enclosure to the LAR, and verified that motor-speed effects on stroke time at ± 0.3 Hz were negligible, actuator thrust and torque capability remained adequate at bounding differential pressures, and positive margin exists when compared to actuator sizing and design-basis requirements. The staff also confirmed that existing degraded-voltage evaluations remain applicable because the DG steady-state voltage limits are unchanged by this amendment.

During its review, the NRC staff noted that RFR 220278 indicates that 24 rising stem MOVs might have potential for more frequent periodic testing. In the supplement to the LAR dated March 18, 2026, the licensee stated that the plant altered the reduced voltage capability of all affected MOV actuators due to a change in the voltage factor. This change has the potential to decrease the available margin in output torque of a rising stem MOV to the point that changes in test frequencies might be required. The licensee justified that the changes in the voltage factor did not warrant changes to test frequencies based on margin evaluations assuming a valve stem coefficient of friction of 0.1, 0.15 and 0.2 for the MOVs. The change in DG frequency does not adversely impact the MOVs supported by the DGs.

Based on the NRC staff's review and the WCAP-17308-NP-A methodology, the NRC staff finds that safety-related MOVs will remain capable of performing their design-basis functions under the proposed DG steady-state frequency tolerance. Therefore, the staff concludes that the MOV performance evaluation is acceptable.

3.8 Fan and Blower Performance Evaluation

In section 3.5 of the enclosure to the LAR, the licensee evaluated the performance of safety-related fans and blowers using the WCAP-17308-NP-A methodology. The analysis applied fan/blower affinity laws to both direct-drive and belt-driven fans. For the proposed DG steady-state frequency tolerance of 59.7–60.3 Hz (± 0.3 Hz), the licensee determined that fan flow changes were approximately 1 percent, which is within procedural tolerances. To explicitly account for this additional variation, plant procedures were revised to reduce flow-balance tolerances from ± 10 percent to ± 9 percent. The licensee concluded that safety-related fans and blowers would remain capable of meeting design-basis flow requirements under the proposed frequency tolerance and existing TS voltage range of 3740–4320 V.

In the supplement to the LAR dated March 18, 2026, the licensee confirmed in response to an audit question that the plant flow balance and maintenance procedures for the impacted direct drive and belt driven fans will have their tolerance limits (acceptance criteria) changed from the original ± 10 percent limit to ± 9 percent to account for the frequency variation. This gives an allowance of 1.0 percent for the DG frequency and voltage operating bands with the exception of both trains of the ESW pump room supply fans, which will be 1.15 percent. The design minimum and maximum flow variation for filtering, cooling, and thermal overload sizing is based on ± 10 percent design limits. Performance checks and flow balance tests providing operation to ± 9 percent will ensure the DG frequency and voltage variation will not cause operation outside of the design limits for the fan operation. For ESW pump room supply fan A and ESW pump room supply fan B, the flow balance will be held within ± 8.85 percent.

The NRC staff reviewed the licensee's evaluation of fans and blowers as described in the enclosure to the LAR. The staff confirmed that the predicted flow variations under the ± 0.3 Hz frequency tolerance were bounded by the revised procedural tolerances and that the licensee incorporated the limitations and conditions from the NRC's SE of WCAP-17308-NP-A. Based on this review, the NRC staff finds that safety-related fans and blowers at Callaway will remain capable of performing their design-basis safety functions under the proposed DG steady-state frequency tolerance and the existing voltage range. Therefore, the staff concludes that the fan and blower performance evaluation is acceptable.

3.9 Impact on Miscellaneous Equipment Powered from DGs Evaluation

3.9.1 Pressurizer Heaters

At the lower steady-state DG voltage limit, the calculated wattage for each group of heaters is well above the TS 3.4.9, "Pressurizer", requirement of 150 kW. Therefore, the licensee concluded, and the staff concurs, that the DG minimum steady-state voltage would not have an adverse effect on the pressurizer heater requirements and that DG frequency variances do not impact heater operation.

3.9.2 Battery Chargers

As stated, in part, in WCAP-17308-NP-A NRC final SE, support systems such as battery charges and uninterruptible power supplies, not included in the WCAP, may also need to be evaluated separately for operation under steady-state conditions with DG voltage and frequency at the extremes of allowable bands.

In evaluating the impact of the proposed change on the battery chargers, the licensee states, in part, in section 3.6.2 of the enclosure to its LAR that,

Based on the design principles of the battery chargers, operation at the upper allowable voltage and across the frequency tolerance will have negligible effect on the operation of the battery charger. Operation of the battery chargers at the low voltage tolerance has already been evaluated. The battery chargers are ... qualified to operate at 460 VAC [V alternating current] \pm 10 percent. Electrical bus loading calculations show the lowest DG voltage operation will provide a minimum voltage of 424 VAC at the charger input terminals which is greater than the required minimum 414 VAC specified operating minimum voltage for the chargers. ... [T]here is no postulated mechanism to cause adverse performance of DC loads due to DG voltage or frequency variances. Thus, the battery chargers will continue to perform their specified safety function with the proposed allowable DG voltage and frequency tolerances.

Based on the above information, the NRC staff finds that the proposed change does not adversely impact on the battery chargers, and therefore acceptable.

3.9.3 Essential Service Water Discharge Strainer Motors

In section 3.6 of the enclosure to the LAR, the licensee addressed miscellaneous safety-related loads, including the ESW discharge strainer motors (strainer motors). The evaluation confirmed that the strainer motors, rated for 460 V \pm 10 percent, would remain operable under the proposed DG frequency tolerance and existing TS voltage limits, with minimum terminal voltages maintained above the vendor's specified minimum of 414 V. The NRC staff reviewed the licensee's evaluation of strainer motors and confirmed that the analysis appropriately demonstrated operability across the proposed DG steady-state frequency tolerance and the existing TS voltage range. Based on this review, the NRC staff finds that the strainer motors remain capable of performing their safety function.

3.9.4 Emergency Exhaust Ventilation Filter Heaters

Callaway TS 3.7.13, "Emergency Exhaust System (EES)," requires two operable trains. The system is designed to filter radioactive gases released into the auxiliary building or fuel handling building under postulated events. The EES system heaters (heaters) used to dry the air that is supplied to the filters are required to have a heating output of 30 kW by TS 3.7.13. The NRC staff confirmed that the DG operating at minimum steady-state voltage, the calculated wattage for each heater is above the minimum required by TS 3.7.13. Therefore, the NRC staff finds the EES system heaters remain capable of performing their specified safety function.

3.9.5 Post-LOCA Hydrogen Analyzers

FSAR section 16.3.3.4, "Accident Monitoring Instrumentation Limiting Condition for Operation," requires two channels of Post-LOCA Hydrogen Analyzers to be operable. The analyzers have sample motors rated at 460 VAC. The sample motors are manufactured to the National Electrical Manufacturers Association (NEMA) MG-1 standards, which require the motor to operate with continuous voltage within ± 10 percent rated voltage. The NRC staff reviewed the licensee's calculations which show the lowest allowable DG voltage operation will provide a continuous voltage within the NEMA standards and concludes that the post-LOCA hydrogen analyzers will continue to perform their safety function for the proposed DG frequency and voltage tolerances.

3.9.6 Miscellaneous AC Loads

In evaluating the impact of the proposed change on the AC loads, the licensee states, in part in section 3.6.6 of the enclosure to the LAR that,

The adequacy of safety-related devices energized from the 120 VAC distribution panels to perform their intended safety related function at degraded voltage is calculated based on voltages lower than the DG minimum steady-state voltage. Bus voltage at the maximum steady-state DG output voltage is bounded by the maximum 120 VAC bus rating. The effect of DG frequency variance is negligible with respect to the 120 VAC loads, as the loads do not include major rotating equipment (i.e., MOVs, large pumps, or large fans) that are subject to adverse performance based on frequency variances.

Based on the above information, the NRC staff finds that the proposed change does not adversely impact on the AC loads and thereby, the proposed change is acceptable.

3.10 NRC Staff Review of Calculations and Analyses

As described in section 3.0 of this SE, the NRC staff conducted a regulatory audit to examine the following proprietary information with the intent to gain understanding, verify information, and identify information that would be required to support the regulatory decision. In its letter dated March 18, 2026, the licensee provided additional information in response to the NRC audit questions to supplement the information provided in the initial LAR.

In its review of the LAR and the supplemental information, the NRC staff found the following information to support the proposed change to the DG operating conditions:

- Calculation ZZ-179, Revision 12, "Plant AC Load List" (July 2024), provides the load calculations for DGs NE01 and NE02 with the assumption that the DGs to be operating at 60.3 Hz. The calculation determined that the DG loadings are within their continuous rating acceptable limit. The calculation also provides safety-related pump load lists, including ESW strainer motors, and shows that the terminal voltages remain ≥ 424 V at the lowest bus voltage of 3740 V (above the 414 V vendor minimum).
- Attachment 4 to Surveillance Procedure OSP-SA-2413A(B), "Recorder Traces" (Job Entries 17511317, 11511579, 19504490, and 20509928), provides sample recorder traces for the DG voltage responses in different forms (e.g., steady-state voltage, steady-state frequency, transient voltage, and transient frequency).

- RFR 220278 provides an evaluation of and the analytical bases to support the maximum allowed tolerance for the DG steady-state operating frequency given in technical specifications. The establishment of maximum and minimum DG steady-state operating voltages and frequencies is necessary to support operability of components supplied by the DGs during design-based events. The evaluation uses the approved methodology as described in TR WCAP-17308-NP-A, Revision 0. Use of this report supports changes to TS 3.8.1 SRs. Westinghouse and the Callaway licensee produced analyses and calculation revisions in accordance with TR WCAP-17308-NP. The analyses provide that a new TS DG frequency tolerance band of 60 Hz +/- 0.3 Hz is supported. The supporting analyses demonstrate that no change is required for the TS defined tolerance for voltage.
- Westinghouse Document M-018-01009, "Implementation of WCAP-17308-NP-A for Callaway Safety Related Direct Drive Fans," evaluated the impact of the new TS DG frequency tolerance band of 60 Hz +/- 0.3 Hz and the existing TS DG voltage tolerance band for the Callaway safety-related direct drive fans. The analysis for the fans utilized TR WCAP-17308-NP-A, section 5, "Impact on Fan/Blower Operation." This report evaluates all of the potentially impacted direct drive fans. The analyses show a +/- 0.88 percent maximum change in air flow for the fan operation due to the DG frequency variation for all direct drive fans, except for the two trains of ESW pump room supply fans. The variation for these fans is a maximum of +/- 1.15 percent change in flow. The maintenance flow-balance testing requirements of the fans will be modified or adjusted to account for the uncertainties based on the voltage and frequency tolerances as well as other existing uncertainties.
- Westinghouse Document M-018-01010, "Implementation of WCAP-17308-NP-A for Callaway Safety Related Pumps," evaluated the impact of the new TS DG frequency tolerance band of 60 Hz +/- 0.3 Hz and the existing TS DG voltage tolerance band on safety-related pumps. The methodology in TR WCAP-17308-NP-A, section 2, "Method for Developing IST Curves," was used to address the impact on safety-related pumps. The change in frequency and voltage of the DGs impact the flow output from the safety-related pumps, such as the ECCS pumps. The new DG frequency acceptance criteria requires modification to the IST requirements and margins for ECCS pumps in the pump IST program, to account for the uncertainties based on the voltage and frequency tolerances, as well as other existing uncertainties. For the component cooling water and ESW pumps, the flow balance requirements will be adjusted to ensure the required flow accounts for the flow reduction attributed to the change in DG frequency and voltage.
- Westinghouse Document M-018-01011 Rev. 000, "Implementation of WCAP-17308-NP-A for Callaway Safety Related Belt Driven Fans," evaluates the impact of the new TS DG frequency tolerance band of 60 Hz +/- 0.3 Hz and the existing TS DG voltage tolerance band for impact on the operation of the safety-related belt driven fans. The analysis for the fans utilized TR WCAP-17308-NP-A, section 5. This report shows a maximum change of +/- 0.99 percent change in flow for the belt-driven fan operation throughout the DG voltage and frequency tolerance bands. The maintenance flow-balance testing requirements for the fans will be modified to account for the uncertainties based on the new voltage and frequency tolerances as well as other existing uncertainties.

- MOV Program File Review, “GL [Generic Letter] 96-05 Implementation for Callaway MOVs” (2024) provides the licensee’s MOV program updates and supporting calculations. The program files included TR WCAP-17308-NP-A based thrust and torque margin evaluations, and documented updates under the plant’s ongoing GL 96-05 MOV program.

3.11 Technical Conclusion

Based on the evaluations above, the NRC staff finds that the licensee has adequately evaluated the impact of the proposed TS SRs changes to the DGs steady-state frequency on the safety-related loads fed by the DGs. The proposed TS changes would not adversely impact the continued safe operation and shutdown capability of loads fed by the DGs, and the licensee would continue to meet the regulatory requirements and conform with guidance discussed in section 2.0 of this SE.

The NRC staff also determined that there is reasonable assurance that the proposed changes to the steady-state frequency of the TS 3.8.1 SRs, as specified in section 1.4 of this SE, will not have an adverse impact on the (1) affected plant safety-related systems performance; (2) DG loadings and fuel consumption; and (3) operation of plant equipment powered by the DGs. The NRC staff finds the proposed TS changes and the supporting analysis provide a reasonable assurance of safe operation and shutdown capability at the revised TS SR values. The proposed changes were evaluated in accordance with the WCAP-17308-NP-A and TSTF-163 guidance described in this SE.

Based on the evaluations above, the NRC staff determines that the proposed change continues to meet the intent of GDC 17 concerning the availability, capacity, and capability of the electrical power systems; GDC 18 concerning appropriate DG periodical testing; GDC 35 concerning the capability of the ECCS; and GDC 38 concerning the capability to remove heat from the reactor containment. The proposed change continues to meet 10 CFR 50.36(c)(3) because the lowest functional capability or performance levels of equipment required for safety is maintained. The proposed change is also consistent with 10 CFR 50.55a because inservice testing of applicable pumps and valves will be performed in accordance with the ASME OM Code as incorporated by reference in 10 CFR 50.55a. Therefore, the NRC staff finds that the proposed changes described in section 1.4 of this SE are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission’s regulations, the Missouri State officials were notified on March 19, 2026, of the proposed issuance of the amendment. The state officials had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, published in the *Federal Register* on May 14, 2025 (90 FR 20520), and there has been no public comment on such finding.

Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: April 28, 2026

SUBJECT: CALLAWAY PLANT, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 241
REVISION TO SURVEILLANCE REQUIREMENTS FOR TECHNICAL
SPECIFICATION 3.8.1, "AC SOURCES – OPERATING," TO CHANGE DIESEL
GENERATOR FREQUENCY RANGES (EPID L-2025-LLA-0040)
DATED APRIL 28, 2026

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