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

December 9, 2009

Mr. Adam C. Heflin
Senior Vice President and
Chief Nuclear Officer
Union Electric Company
P.O. Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT, UNIT 1 - ISSUANCE OF AMENDMENT RE: TECHNICAL SPECIFICATION CHANGES ASSOCIATED WITH OPERATING AND SHUTDOWN DC SOURCES (TAC NO. ME0292)

Dear Mr. Heflin:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 194 to Facility Operating License No. NPF-30 for the Callaway Plant, Unit 1. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated December 29, 2008 (ULNRC-05560), as supplemented by letter dated June 18, 2009 (ULNRC-05635).

The amendment revises TS 3.8.4, "DC [Direct Current] Sources - Operating," and TS 3.8.5, "DC Sources - Shutdown." Specifically, the amendment revises the battery connection resistance verification limits in Surveillance Requirement (SR) 3.8.4.2 and SR 3.8.4.5, by lowering the acceptance criteria for cell-to-cell (i.e., inter-cell) and terminal battery connection resistance from 150 micro-ohms to 69 micro-ohms.

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

Sincerely,

Mohan C. Thadani, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosures:
1. Amendment No. 194 to NPF-30
2. Safety Evaluation

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

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 194
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 December 29, 2008, as supplemented by letter dated June 18, 2009, 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;

   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 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. 194 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 amendment is effective as of its date of issuance, and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: December 9, 2009

ATTACHMENT TO LICENSE AMENDMENT NO. 194

FACILITY OPERATING LICENSE NO. NPF-30

DOCKET NO. 50-483

Replace the following pages of the Facility Operating License No. NPF-30 and 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.

Facility Operating License

REMOVE	INSERT
-3-	-3-

Technical Specifications

REMOVE	INSERT
3.8-24	3.8-24

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

Deleted per Amendment No. 169.

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* 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
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance is ≤ 69E-6 ohm for cell to cell connections and ≤ 69E-6 ohm for terminal connections.	92 days
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	18 months
SR 3.8.4.4	Remove visible terminal corrosion, verify battery cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	18 months
SR 3.8.4.5	Verify battery connection resistance is ≤ 69E-6 ohm for cell to cell connections, and ≤ 69E-6 ohm for terminal connections.	18 months
SR 3.8.4.6	Verify each battery charger supplies ≥ 300 amps at ≥ 130.2 V for ≥ 1 hour.	18 months

(continued)

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 194 TO

FACILITY OPERATING LICENSE NO. NPF-30

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By letter dated December 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML090090371), as supplemented by letter dated June 18, 2009 (ADAMS Accession No. ML091690275), Union Electric Company (the licensee) requested an amendment to the Callaway Plant, Unit 1 Facility Operating License No. NPF-30, Appendix A, Technical Specifications (TS). The proposed changes would revise TS 3.8.4, "DC [Direct Current] Sources - Operating," and TS 3.8.5, "DC Sources - Shutdown." Specifically, the battery acceptance criteria in Surveillance Requirements (SRs) 3.8.4.2 and 3.8.4.5 would be modified by lowering the acceptance criteria used to verify that cell-to-cell (i.e., inter-cell) and terminal battery connection resistances are within acceptable limits.

The supplemental letter dated June 18, 2009, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on April 21, 2009 (74 FR 18257).

2.0 REGULATORY EVALUATION

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include TSs as part of the license. The TSs ensure the operational capability of structures, systems, and components that are required to protect the health and safety of the public. The U.S. Nuclear Regulatory Commission's (NRC's) regulatory requirements related to the content of the TSs are contained in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36, "Technical specifications," which requires that the TSs include items in the following specific categories: (1) safety limits, limiting safety systems settings, and limiting control settings; (2) limiting conditions for operations; (3) SRs; (4) design features; and (5) administrative controls. The regulations in 10 CFR 50.36(c)(1)(i)(A), state that "[s]afety limits for nuclear reactors are limits upon important process variables that are found to be necessary

to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity." The regulations in 10 CFR 50.36(c)(3) specify that SRs are "requirements related 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."

General Design Criterion (GDC) 17, "Electric power systems," of 10 CFR, Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

GDC 18, "Inspection and testing of electric power systems," requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

3.0 TECHNICAL EVALUATION

The Callaway Plant DC electrical power system provides the alternating current (AC) emergency power system with control power. It also provides both motive and control power to selected safety-related equipment and preferred AC vital bus power (via inverters).

As required by 10 CFR 50.36(c), Callaway Plant's revised TS 3.8.4, "DC Sources - Operating," and TS 3.8.5, "DC Sources - Shutdown," continue to provide SRs that meet the requirements of 10 CFR 50.36(c)(3).

In its letter dated December 29, 2008, the licensee stated,

> The DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety-related equipment and preferred AC vital bus power (via inverters). As required by 10 CFR 50, Appendix A, GDC 17, the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (March 1971) and [Institute of Electrical and Electronics Engineers] IEEE-308-1978.
>
> The 125 VDC [volt DC] electrical power system consists of two independent and redundant Class 1E DC electrical power subsystems (train 'A' and train 'B'). Each DC electrical subsystem consists of two 125 DC batteries (NK11 and NK13 for train 'A', NK12 and NK14 for train 'B'), two battery chargers, one swing battery charger, and all the associated control equipment and interconnecting cabling.

> During normal operation, the 125 VDC load is powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC load is automatically powered from the station batteries.
>
> The train A and train B DC electrical power subsystems provide the control power for associated Class 1E AC power load groups, 4.16 kV switchgear, and 480 V load centers. The DC electrical power subsystems also provide DC electrical power to the inverters, which in turn power the AC vital buses.
>
> Each battery has adequate storage capacity to carry the required load continuously for at least a 200 minute duty cycle, with margin, for LOCA [loss-of-coolant accident] with coincident loss of offsite power loads and a 240 minute duty cycle, with margin, for station blackout (SBO) loads. While the DC buses in each subsystem share a swing battery charger, there is no sharing between redundant Class IE subsystems, such as batteries, battery chargers, or distribution panels. The batteries for Train A and Train B DC electrical power subsystems are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. Battery size is based on 125% of required capacity and, after selection of an available commercial battery, results in a battery capacity in excess of 150% of required capacity. The voltage limit is 2.17 V per cell, which corresponds to a total minimum voltage output of 130.2 V per battery as recommended by the battery manufacturer for a minimum float voltage. The criteria for sizing large lead storage batteries are defined in IEEE-485-1983.

TS SR 3.8.4.2 currently requires the verification of no visible corrosion at the battery terminals and connectors OR verification of battery connection resistance ≤ 150 micro-ohms (i.e., ≤ 150 E-6 ohms) on a 92-day specified Frequency.

TS SR 3.8.4.5 currently requires the verification of battery connection resistance ≤ 150 micro-ohms on an 18-month specified Frequency.

The battery resistance wording in each of these surveillances currently reads:

> Verify battery connection resistance is ≤ 150 E-6 ohm for cell to cell connections and ≤ 150 E-6 ohm for terminal connections.

During recent operating experience reviews, the licensee evaluated the adequacy of the TS connection resistance limits for its safety-related battery subsystems. As a part of that evaluation, the licensee performed voltage drop calculations for each of the four battery subsystems at Callaway Plant, Unit 1, under both normal operating and accident load profiles.

In the voltage drop calculations, the licensee modeled each battery subsystem as a series of resistances. The licensee identified the worst case allowable inter-cell connector resistance from the voltage drop calculations for NK11 and NK14 batteries, combined with the battery resistance and manufacturer's battery discharge curves, as 86 micro-ohms. The licensee

further reduced the worst case combined resistance of 86 micro-ohms to TS limit of 69 micro-ohms (20 percent reduction in TS limit) to account for an additional margin.

While the licensee's analysis of the battery systems NK12 and NK13 showed that the current TS surveillance limit of 150 micro-ohms was adequate for battery systems NK12 and NK13, it conservatively chose to revise the TS surveillance limit for all of its safety-related battery subsystems (i.e., NK11, NK12, NK13, and NK14) to require that battery connection resistance does not exceed TS limit of 69 micro-ohms for cell-to-cell connections and 69 micro-ohms for terminal connections.

Based on its evaluation, the licensee proposed revising the battery resistance wording in TS SRs 3.8.4.2 and 3.8.4.5 to read as follows:

> Verify battery connection resistance is ≤ 69 E-6 ohm for cell to cell connections and ≤ 69 E-6 ohm for terminal connections.

In its June 18, 2009, response to a Nuclear Regulatory Commission (NRC) staff request for additional information, the licensee provided the calculation that was used to determine the 69 micro-ohm connection resistance value. The staff reviewed this calculation and determined that it shows that batteries NK11, NK12, NK13, and NK14 will perform their intended design functions when cell-to-cell and terminal connection resistance measurements are less than or equal to 69 micro-ohms. Based on this information, the staff finds the proposed changes acceptable.

As required by GDC 18, the revised TSs for electric power systems that are important to safety will continue to permit appropriate periodic inspection and testing.

Based on the above evaluation, the NRC staff concludes that the proposed changes to the Callaway Plant TSs will continue to meet the applicable regulatory requirements and provide reasonable assurance of the continued availability of the required electrical power to shut down the reactor and to maintain the reactor in a safe condition after an anticipated operational occurrence or a postulated design-basis accident. Furthermore, the NRC staff concludes that the proposed TS changes are consistent with 10 CFR 50.36 and meet the intent of GDCs 17 and 18 of Appendix A of 10 CFR 50. Therefore, the staff concludes the proposed changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Missouri State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves 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 and there has been no public comment on such finding (74 FR 18257). 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) 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.

Principal Contributors: M. McConnell
G. Tutac

Date: December 9, 2009

December 9, 2009

Mr. Adam C. Heflin
Senior Vice President and
Chief Nuclear Officer
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P.O. Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT, UNIT 1 - ISSUANCE OF AMENDMENT RE: TECHNICAL SPECIFICATION CHANGES ASSOCIATED WITH OPERATING AND SHUTDOWN DC SOURCES (TAC NO. ME0292)

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

Sincerely,

/RA/

Mohan C. Thadani, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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Enclosures:
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2. Safety Evaluation
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OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	DE/EEEB/BC	OGC – NLO w/comments	NRR/LPL4/BC	NRR/LPL4/PM
NAME	MThadani	JBurkhardt	GWilson	LBSubin	MMarkley	MThadani
DATE	11/28/09	11/20/09	10/13/09	11/27/09	12/9/09	12/9/09

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