Fadi M. Diya
Vice President
Nuclear Operations
Ameren Missouri
Callaway Plant
T 573.676.6411
F 573.676.4056

February 15, 2013

ULNRC-05958

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

10 CFR 50.73(a)(2)(i)(B)

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2013-001-00
VIOLATION OF TECHNICAL SPECIFICATION 3.0.3
DUE TO A CLASS 1E ELECTRICAL EQUIPMENT A/C
UNIT INOPERABILITY

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(i)(B) to report a violation of Technical Specification 3.0.3 due to 'B' Class 1E Electrical Equipment A/C Unit Inoperability.

This letter does not contain new commitments.

Sincerely,

Fadi M. Diya
Vice President Nuclear Operations

Enclosure: LER 2013-001-00

cc: Mr. Elmo E. Collins
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Fred Lyon
Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O-8B1
Washington, DC 20555-2738

Index and send hardcopy to QA File A160.0761

Hardcopy:

Certrec Corporation
4150 International Plaza Suite 820
Fort Worth, TX 76109
(Certrec receives ALL attachments as long as they are non-safeguards and may be publicly disclosed.)

Electronic distribution for the following can be made via LER ULNRC Distribution:

A. C. Heflin
F. M. Diya
C. O. Reasoner III
L. H. Graessle
D. W. Neterer
S. A. Maglio
R. Holmes-Bobo
Corporate Oversight
NSRB Secretary
T. B. Elwood
Performance Improvement Coordinator
Resident Inspectors (NRC)
B. D. Brooks (WCNOC)
Mr. Mike Westman (WCNOC)
Mr. Tim Hope (Luminant Power)
Mr. Ron Barnes (APS)
Mr. Tom Baldwin (PG&E)
Mr. Mike Murray (STPNOC)
Mr. Mark Morgan (SCE)
Mr. John O'Neill (Pillsbury Winthrop Shaw Pittman LLP)
Missouri Public Service Commission
Records Center (INPO)

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Callaway Plant Unit 1	05000483	1 OF 6

4. TITLE

Violation of Technical Specification 3.0.3 Due To A Class 1E Electrical Equipment A/C Unit Inoperability

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	17	2012	2013	- 001 -	00	02	15	2013	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
T.B. Elwood, Supervising Engineer, Regulatory Affairs and Licensing	314-225-1905

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
E	VI	ACU	F034	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On 14:35 on 12/17/2012, the A Class 1E electrical equipment air conditioning unit (SGK05A) was declared inoperable due to identification of Freon leakage from the unit's low oil pressure and compressor discharge sensing lines. Following repair to address the leakage, the unit was declared operable at 11:08 on 12/18/2012.

The SGK05A unit provides a support function for the A train of Class 1E electrical equipment. The Class 1E electrical equipment is addressed in the plant's Technical Specifications. Since the leakage for SGK05A had apparently existed prior to the time of discovery, it was concluded that SGK05A and the supported Class 1E electrical equipment had been inoperable for a period of time longer than the allowed by the plant Technical Specifications.

The leakage was the result of two sensing lines rubbing together. The Root Cause was determined to be an inadequate scope of previously conducted equipment reliability evaluations on the HVAC system. The leaks were repaired. In addition, preventive maintenance and monitoring of vibration-susceptible Class 1E electrical equipment air-conditioners will be increased.

1. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):

At Callaway, the Class 1E electrical equipment air-conditioning (C1EEEAC) system [EIIS system: VI] is part of the control building heating, ventilation, and air-conditioning system [EIIS system: VI]. The C1EEEAC system is safety-related and provides a suitable atmosphere for the two trains of Class 1E electrical switchgear [EIIS systems: EB, ED, and EJ, component SWGR] during all modes of plant operation and during movement of irradiated fuel assemblies, including loss of preferred power and post-accident operation.

Each of two C1EEEAC units (internal designation SGK05A and SGK05B) [EIIS system: VI, component: ACU] provides safety-related cooling to its respective train of Class 1E electrical equipment located in the Control Building. Each unit is mounted on a skid and consists of a prefilter, heat exchanger, compressor, condenser [EIIS system: VI, component: COND], four parallel expansion valves, an evaporator unit, associated ductwork, Essential Service Water supply and return lines and valves, capacity control valve, solenoid valves and temperature control instrumentation. Using the thermodynamic principles of the refrigeration cycle, R-22 refrigerant is circulated through the system in order to transfer heat from Control Building air to the Essential Service Water/Service Water (ESW/SW) systems [EIIS system: BI].

During normal operation, the C1EEEAC system is operated in a continuous recirculation mode to maintain the Engineered Safety Feature (ESF) switchgear rooms, battery [EIIS system: EJ, component: BTRY] rooms, and DC switchgear [EIIS system: EJ] rooms at or below a temperature of 90 degrees Fahrenheit (F). The amount of cooling provided by the self-contained refrigeration system is self-regulating. Indication of a loss of preferred AC power, a LOCA, or a Control Room Ventilation Isolation Signal will automatically initiate the Class 1E electrical equipment air-conditioning units if they are not in operation.

While Technical Specifications address the Class 1E electrical systems, they do not directly address the C1EEEAC system. During power operation Technical Specification (TS) 3.8.4 addresses the DC electrical power systems, TS 3.8.7 addresses inverters [EIIS system: EE, component: INVT], and TS 3.8.9 addresses AC, DC, and AC vital bus electrical power distribution subsystems [EIIS system: EF, component: BU]. During shutdown conditions the corresponding Technical Specifications are TS 3.8.5, TS 3.8.8, and TS 3.8.10 respectively. The two C1EEEAC trains (units) constitute a support system for the two Class 1E electrical equipment trains. As noted, there is no specific Technical Specification for the C1EEEAC system.

Background

The C1EEEAC system was designed such that the A C1EEEAC train provides cooling to the A train of the Class 1E electrical equipment in the Control Building, and the B C1EEEAC train provides cooling to the B train of Class 1E electrical equipment in the Control Building. However, each C1EEEAC train has also been shown to have sufficient capacity to cool both Class 1E electrical equipment trains if the doors between the electrical equipment rooms are opened (in

conjunction with several other compensatory measures). A practice has thus been established at Callaway such that in the event of inoperability of one C1EEEAC unit, operability of the Class 1E electrical equipment (both trains) can be supported by the remaining operable C1EEEAC unit once the noted compensatory actions (including opening the electrical equipment room doors) have been completed.

In accordance with the above-described practice, when a C1EEEAC unit/train is declared inoperable during power operation, the applicable Conditions and Required Actions of TS 3.8.4, TS 3.8.7, and TS 3.8.9 are entered due to declaring the supported train of Class 1E electrical equipment inoperable. Since there are two inverters in each train of Class 1E electrical equipment, but the Conditions and Required Actions under TS 3.8.7 only address inoperability of a single inverter, declaring one train of supported Class 1E electrical equipment inoperable also requires entry into TS LCO 3.0.3. After entering LCO 3.0.3 and the Conditions and Required Actions of TS 3.8.4, TS 3.8.7, and TS 3.8.9 upon declaring a C1EEEAC train/unit inoperable, these Conditions and Required Actions (and LCO 3.0.3) may be exited once supported equipment operability is restored by completion of the noted compensatory actions. Even with the compensatory actions completed, however, the inoperable C1EEEAC unit/train must be restored within seven days per Callaway's requirements.

2. INITIAL PLANT CONDITIONS:

The plant was in MODE 1 at 100 percent power at the time when a Freon leak was first discovered in the B Class 1E AC Unit on December 17, 2012.

3. EVENT DESCRIPTION:

On 12/17/2012, during performance of a quarterly leak check on SGK05B, a small amount of refrigerant was identified to be leaking from the compressor suction and discharge pressure-sensing lines by use of a halide detector. The leakage was the result of the two 1/8-inch copper sensing lines rubbing together. The identified leakage and inability to quantify leakage rates caused SGK05B to be declared inoperable at 10:45. LCO 3.0.3 and the Applicable Conditions and Required Actions of TS 3.8.4, TS 3.8.7, and TS 3.8.9 were entered with the intent of completing the necessary compensatory actions for restoring Operability of the affected Class 1E electrical equipment. Steps were taken to perform plant procedure, "Control Room and Class 1E Air Conditioning Unit Charging," which is used to check the unit for adequate refrigerant charge. Prior to the completion of the refrigerant charge check on SGK05B, an inspection was performed on SGK05A. This inspection identified visible leakage on the unit's low oil pressure and compressor discharge sensing lines. As a result of the inability to quantify the identified leakage, SGK05A was declared inoperable at 14:35. This placed the plant in LCO 3.0.3 (without the ability to implement compensatory measures for the supported Class 1E electrical equipment, assuming both C1EEEAC units inoperable). Steps were immediately taken to also perform a refrigerant charge check on the SGK05A unit.

Upon completion of the refrigerant charge check on SGK05B, it was identified that no refrigerant addition was necessary. It was thus confirmed that SGK05B had in fact remained Operable throughout this time. At 16:00 on 12/17/2012 SGK05B was declared operable. LCO 3.0.3 was exited at 16:12 (as the necessary compensatory actions had been completed to ensure cooling to both Class 1E electrical equipment trains via the operable C1EEEAC unit, SGK05B). The charge check for SGK05A, however, identified that 9 lbs. 3 oz. of refrigerant needed to be added to the system. Based on the reduced Freon charge, it was apparent that the leak rate would challenge the unit's capability to meet its required mission time.

In order to isolate the leaking sensing lines, a Temporary Modification was installed. This modification disconnected the two 1/8-inch sensing lines and capped their termination ports on the compressor body. (The functions of the sensing lines are not essential to the safety function performed by the C1EEEAC unit, except for being an extension of the Freon pressure boundary). Following implementation of this modification, SGK05A was restored to an operable status at 11:08 on 12/18/2012. SGK05A was inoperable for approximately twenty hours and 30 minutes.

4. ASSESSMENT OF SAFETY CONSEQUENCES:

The Class 1E Air Conditioning units, SGK05A and B, are not explicitly modeled in the Callaway Probabilistic Risk Assessment (PRA) model. Analysis supporting the PRA model demonstrates that safety systems supported by the SGK05 units are capable of meeting a 24-hour PRA mission following loss of a single SGK05 unit. As such, the Class 1E electrical equipment air-conditioning units are below the truncation significance level for inclusion in the PRA model.

Further, as previously noted, with one SGK05 unit inoperable the remaining operable unit can be utilized to support both trains of Class 1E electrical equipment with the appropriate compensatory actions completed. Although both units had been declared inoperable, it was soon confirmed that the leak condition identified for SGK05B was not sufficient for actually rendering the unit inoperable. Thus, SGK05B remained operable, and as such it was capable of providing cooling to both trains of supported Class 1E electrical equipment.

5. REPORTING REQUIREMENTS:

This LER is submitted pursuant to 10 CFR 50.73(a)(2)(i)(B) to report a condition or operation prohibited by the plant's Technical Specifications.

A condition or operation prohibited by the plant Technical Specifications was determined to have occurred due to the leakage condition identified for SGK05A. As explained previously, when a C1EEEAC unit/train is declared inoperable, LCO 3.0.3 is required to be entered due to the impact on the supported Class 1E inverters. Upon declaring a C1EEEAC unit inoperable (i.e., when it is

known to be inoperable), compensatory actions can be taken to restore operability of the inverters (and the other supported Class 1E equipment) via the remaining operable C1EEEAC unit, thus allowing LCO 3.0.3 to be exited. If the compensatory actions are not (or cannot be) taken, LCO 3.0.3 remains in effect such that per the requirements of that TS, action must be taken within 1 hour to place the plant in Mode 3 within 7 hours, in Mode 4 within 13 hours, and in Mode 5 within 37 hours. Thus, with a C1EEEAC unit inoperable and no compensatory actions taken, the plant must be in Mode 3 within 7 hours (and so on) to comply with the plant's Technical Specifications (i.e., LCO 3.0.3).

When the tubing leak was identified for SGK05A on 12/17/2012, it was declared inoperable on the basis that the leak condition would not have enabled the unit to fulfill its 30-day post-accident mission time from that point in time. Although it is not certain when the leak began, it was concluded that the leakage had existed for a period of time prior to the discovery of the leak such that the period of SGK05A inoperability exceeded the time allowed by the Technical Specifications (i.e., longer than the 7-hour period of plant operation allowed by LCO 3.0.3 with no compensatory measures in place).

6. CAUSE OF THE EVENT:

The Direct Cause of the leak condition identified for each of the SGK05 units was determined to be the seismically qualified design of the skid-mounted unit which exposes some sub-components to excessive vibration during unit operation. The leakage was the result of two sensing lines rubbing together. The Root Cause was determined to be an inadequate scope of previously conducted equipment reliability evaluations on the Control Building HVAC System. These evaluations should have identified the long-term trends in equipment failure that led to the event in this LER.

7. CORRECTIVE ACTIONS:

As noted in the Event Description section of this LER, a temporary modification was installed to disconnect two 1/8-inch sensing lines and cap their termination ports on the compressor body.

The direct cause is addressed by an increase in preventative maintenance and monitoring of vibration susceptible sub-components and piping on the Class 1E electrical equipment air-conditioning units.

In order to identify other latent, long-term trending issues, Engineering will document a review of the history of the safety-related Control Building HVAC system Air Conditioning units. As part of the review, an analysis of historical data, including subcomponent failure data, will be performed. Engineering will then revise or implement new Preventative Maintenance Tasks to address any failure mechanisms that are identified.

8. PREVIOUS SIMILAR EVENTS:

On March 31, 2011, Callaway submitted LER 2010-010-00 about a violation of Technical Specification 3.0.3 due to inoperability of the B Class 1E electrical equipment air conditioning unit. The air conditioning unit was out-of-service for a timeframe longer than permitted by the Technical Specifications; however, it was for a cause other than a Freon leak.

An internal operating experience search for vibration-induced leakage from copper tubing during the last three years was completed using Callaway's corrective action program and the Equipment Out of Service Logs (EOSLs). This review identified multiple examples of Freon leakage from similar air conditioning units.

On 12/17/2012: Corrective Action Program document, *SGK05B Freon Leaks on sensing line,* was written on the same day as the SGK05A leak was identified. This documents nearly identical leakage due to vibration induced wear on sensing lines.

On 9/18/2011: Corrective Action Program document, *Hazardous Environment developed in A CRAC Room,* documents Freon leakage on hot gas piping due to mechanical fatigue leading to a though wall crack.

On 5/15/2011: Corrective Action Program document, *Small Freon Leak on SGK05A,* documents small refrigerant leak due to an incomplete solenoid joint.

On 3/8/2011: Corrective Action Program document, *Oil Leak on SGK04A,* documents oil leaking from an oil pressure sensing line. The leak occurred where a sensing line was bent at a sharp angle. This was determined to be the result of work in area contributing to the failure.

On 2/27/2011: Corrective Action Program document, *SGK05A 'A' Train Class 1E A/C Unit declared inoperable*, identifies leakage discovered coming from the high side of the piping about a foot from the compressors high side isolation valve. The failure was attributed to wear from the edge of the installed fabric insulation on the compressor discharge piping which was vibrated by the compressor.

From the internal examples, only the 3/8/2011 *Oil Leak on SGK04A* event, deals with leakage on small diameter copper sensing lines. Corrective actions from this event only repaired the leak. This event was determined to be a maintenance preventable functional failure with the basic cause being that work in the area contributed to failure.