AmerenUE
Callaway Plant

PO Box 620
Fulton, MO 65251

December 23, 2008

ULNRC-05579

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

10CFR50.73(a)(2)(iv)(A)

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2008-005-00
REACTOR MANUALLY TRIPPED DUE TO "B" MAIN FEED PUMP
TRIPPING ON LOW LUBE OIL PRESSURE

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(iv)(A) to report an event in which the "B" main feedwater pump turbine was tripped due to low lube oil pressure. As a result of the loss of one main feedwater pump, the reactor was manually tripped.

This letter does not contain new commitments.

Sincerely,

John T. Patterson
Plant Director

EMF

Enclosure

IE22
NRR

cc: Mr. Elmo E. Collins, Jr.
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
612 E . Lamar Blvd., Suite 400
Arlington, TX 76011-4125

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

Mr. Mohan C. Thadani (2 copies)
Licensing Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O-8G14
Washington, DC 20555-2738

Index and send hardcopy to QA File A160.0761

Hardcopy:

Certrec Corporation
4200 South Hulen, Suite 422
Fort Worth, TX 76109
(Certrec receives ALL attachments as long as they are non-safeguards and may be publicly disclosed.)

LEREvents@inpo.org (must send the **WORD** version of the LER to this address)

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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), 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
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4. TITLE
Reactor manually tripped due to "B" Main Feed Pump tripping on low lube oil pressure

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
11	11	2008	2008	- 005 -	00	12	23	2008	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE: 1

10. POWER LEVEL: 097

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, Supervisor, Regulatory Affairs	(573) 676-6479

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
B	SL	PCV	G080	Y					

14. SUPPLEMENTAL REPORT EXPECTED		15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)*	☒ NO				

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

On 11/11/2008, while operating at 97-percent reactor power, with power increasing following Refuel 16, the "B" main feedwater pump (MFP) turbine tripped. Since the loss of one MFP at greater than 80-percent power challenges the plant's ability to maintain steam generator (SG) water levels to support continued plant operations, the reactor was manually tripped per plant operating procedures.

All control rods fully inserted during the event and all safety systems responded as designed. Operation of the Auxiliary Feedwater system restored SG levels. Operation of the main steam supply system provided the heat sink for decay heat removal following shutdown. No primary relief valves or main steam relief valves lifted during the event. No primary to secondary leakage existed. No radioactive material was released. This event was considered an uncomplicated reactor trip.

The cause was that the o-rings in the MFP lube oil strainer were a material susceptible to swelling in petroleum-based lubrication systems. An o-ring originally located in one of the MFP lube oil basket strainers swelled, became dislodged, and traveled into a MFP turbine bearing oil supply pressure regulating valve. The corrective actions to prevent recurrence included identification of a replacement for the o-rings. The correct o-rings were installed in both strainers for the "A" and "B" MFP turbine oil system.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

All times are approximate and Central Standard Time unless otherwise stated.

I. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

10CFR50.73(a)(2)(iv)(A) requires reporting of any event or condition that resulted in a manual or automatic actuation of any of the systems listed in 10CFR50.73(a)(2)(iv)(B). The systems listed below are relevant to this LER:

(1) Reactor protection system (RPS) including: reactor scram or reactor trip; and
(6) PWR auxiliary or emergency feedwater system.

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

The plant was in MODE 1, Power Operation, at 97-percent reactor power at the time the event occurred.

C. STATUS OF STRUCTURES, SYSTEMS OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

No structures, systems, or components were inoperable at the start of the event which contributed to the event.

D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

On November 11, 2008, startup activities from Refuel 16 were underway at the Callaway Plant. The main feed pump (MFP) turbine "B" lube oil cooler outlet strainer [EIIS system: SL, component: STR] was switched over to the opposite side of the duplex strainer arrangement as part of the in-service leak test, which was completed at 1534. At 1846.33, reactor power had been increased to approximately 97-percent when annunciation was received that the "B" MFP turbine [EIIS system: SJ, component: TRB] was experiencing low lube oil pressure. Subsequently at 1846.36, the "B" MFP turbine tripped on low lube oil pressure. Annunciation for low lube oil pressure for a MFP turbine occurs at 5.5 psig; a MFP turbine trips on lube oil pressure below 4 psig.

The function of the MFPs is to supply Secondary Plant feedwater to the steam generators (SG) [EIIS system: AB, component: SG] for conversion to saturated steam during power operations. The loss of one MFP at power levels greater than 80 percent challenges the ability to maintain SG water levels at the required levels to support continued plant operations. As directed by plant operating procedure OTO-AE-00001, "Feedwater System Malfunction," the reactor was manually tripped at 1846.40.

All control rods fully inserted during the event and all safety systems responded as designed. An Auxiliary Feedwater (both motor-driven and turbine-driven) [EIIS system: BA, component: P] actuation and a Main Feedwater Isolation [EIIS system: SJ, component: ISV] actuation occurred as expected. Because these systems responded properly during this event, no additional operator actions or use of other systems/components as a backup function were required, and the plant operators were able to

maintain safe shutdown conditions. Operation of the Auxiliary Feedwater system restored SG levels, and use of the Main Steam Supply System [EIIS system: SB] provided decay heat removal following shutdown. This event was considered an uncomplicated reactor trip.

On November 12, 2008, corrective maintenance was initiated to determine the cause of the low "B" MFP turbine bearing oil pressure. Maintenance technicians found two pieces of an o-ring lodged in the "B" MFP turbine bearing oil supply pressure regulating valve [EIIS system: SL, component: PCV] during disassembly. Engineering determined that the two pieces of o-ring that were recovered formed a complete o-ring that had been dislodged. The regulating valve could not operate properly due to a piece of o-ring that was pinched between the disk and the seat of the valve, resulting in low oil pressure to "B" MFP turbine. Evidence indicates that the o-ring originated from one of the "B" MFP basket strainers. The exact time the o-ring entered the system could not be determined.

The installed o-rings were made of Ethylene Propylene Diene Monomer (EPDM), which is considered to be unsatisfactory for petroleum products; the preferred material is Buna-N (Nitrile). In this situation, the EPDM o-ring had swelled and became dislodged. New o-rings made of Buna-N (Nitrile) were subsequently installed in both "B" MFP Basket Strainers. The plant was restored as indicated above and the forced outage ended on November 12, 2008.

On November 13, 2008, corrective maintenance was initiated to change out the EPDM o-rings in the "A" MFP basket strainers. Maintenance found that the o-ring on the west strainer was intact and not swollen; however, the o-ring on the east strainer was showing characteristics of swelling. These o-rings were installed in January 2005. New o-rings made of Buna-N (Nitrile) were installed in the "A" MFP basket strainers.

E. METHOD OF DISCOVERY OF EACH COMPONENT, SYSTEM FAILURE, OR PROCEDURAL ERROR

Given the annunciation of low lube oil pressure for the "B" MFP turbine at the onset of this event, the condition was self-revealing. Causal factors, as well as a root cause, were discovered through the use of a seven-step root cause analysis. It was determined that the pressure regulating valve was experiencing some blockage. Upon disassembly of the valve, the o-ring was discovered.

II. EVENT DRIVEN INFORMATION

A. SAFETY SYSTEMS THAT RESPONDED

All safety systems functioned as designed. The motor-driven Auxiliary Feedwater actuation, turbine-driven Auxiliary Feedwater actuation, and main feedwater isolation actuation occurred as expected.

B. DURATION OF SAFETY SYSTEM INOPERABILITY

No structures, systems, or components were inoperable during the event which contributed to the event.

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C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT.

As directed by plant operating procedures, a manual reactor trip was initiated in response to the loss of one non-safety grade MFP. A reactor trip is considered an ANS Condition II event which is defined as a condition, that once corrected, will allow the plant to return to operation.

The event actuated safety grade systems that responded as designed and which fulfilled their intended safety functions. Because these systems responded properly during this event, no additional operator actions or use of other systems/components as a backup function were required. The plant operators were able to maintain safe shutdown conditions. Operation of the Auxiliary Feedwater system and main steam supply system adequately removed decay heat following the shutdown. No release of radioactive material was associated with this event.

III. CAUSE(S) OF THE EVENT AND CORRECTIVE ACTION(S)

This event was evaluated using a seven-step root cause analysis process. The reactor trip was caused from a series of events beginning with one causal factor, a one-time receipt of incorrect o-ring material from the original equipment manufacturer (OEM). Engineering analysis at that time confirmed that the o-rings supplied by the OEM were made of EPDM material. An engineering evaluation that was then performed permitted use of the material based on what had been supplied. Use of this incorrect material was identified as the root cause since it has been confirmed that EPDM is incompatible with petroleum-based lubrication systems. The EPDM o-rings installed in the MFP lube oil basket strainers swelled, dislodged, and degraded the performance of a MFP turbine lube oil pressure regulating valve that ultimately led to the manual trip of the plant.

The cause was that the o-rings in the MFP lube oil system were a material susceptible to swelling in petroleum-based lubrication systems. Specifically, an o-ring swelled, got into the MFP lube oil system, and traveled into a MFP turbine bearing oil supply pressure regulating valve. The Corrective Actions to Prevent Recurrence (CATPRs) included identification of a replacement for the o-rings for the strainer baskets. The correct o-rings were installed in both strainers for "A" and "B" MFP turbine oil system.

Action identified from the extent of cause evaluation is to assure that correct material is being purchased for the Callaway Plant. Procurement controls are being modified to ensure that o-rings having the correct critical characteristics (i.e., size, material, and hardness) are obtained.

IV. PREVIOUS SIMILAR EVENTS

Operating Experience (OE) was reviewed and it was determined that there have been no reactor trips due to incompatible materials at Callaway.

There were no forced outages since the completion of Refuel 14 (November 2005) that impacted either MFP.

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V. ADDITIONAL INFORMATION

The system and component codes listed below are from the IEEE Standard 805-1984 and IEEE Standard 803A-1983, respectively.

System: AB, Reactor Coolant System (PWR)
Components: SG, Generator, Steam

System: BA, Auxiliary/Emergency Feedwater System (PWR)
Components: P, Pump

System: SJ, Feedwater System
Components: ISV, Valve, Isolation
TRB, Turbine

System: SL, Feedwater Pump Turbine Lube Oil System
Components: PCV, Valve, Control, Pressure
STR, Strainer