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September 16, 2011

ULNRC-05820

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

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

Ladies and Gentlemen:

**DOCKET NUMBER 50-483  
CALLAWAY PLANT UNIT 1  
UNION ELECTRIC CO.  
FACILITY OPERATING LICENSE NPF-30  
LICENSEE EVENT REPORT 2011-004-00  
POST-FIRE SAFE SHUTDOWN LATENT DESIGN ISSUE WITH ESSENTIAL SERVICE  
WATER FLOW BALANCE**

The enclosed licensee event report is submitted in accordance with 10 CFR 50.73 to report an unanalyzed condition that could potentially affect post-fire safe shutdown equipment at Callaway Plant.

This letter does not contain new commitments.

Sincerely,

**Fadi M Diya**  
Vice President Nuclear Operations

CSP/nls

Enclosure: LER 2011-004-00

cc: Mr. Elmo E. Collins, Jr.  
Regional Administrator  
U.S. Nuclear Regulatory Commission  
Region IV  
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**Index and send hardcopy to QA File A160.0761**

**Hardcopy:**

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4200 South Hulen, Suite 422  
Fort Worth, TX 76109

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**LICENSEE EVENT REPORT (LER)**  
(See reverse for required number of digits/characters for each block)

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.

**1. FACILITY NAME**  
Callaway Plant Unit 1

**2. DOCKET NUMBER**  
05000483

**3. PAGE**  
1 OF 5

**4. TITLE**  
Post-Fire Safe Shutdown Latent Design Issue with Essential Service Water (ESW) Flow Balance

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
07	20	2011	2011	- 004	- 00	09	16	2011	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b>  Mode 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)</b>									
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
<b>10. POWER LEVEL</b>  100%	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER							
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

**12. LICENSEE CONTACT FOR THIS LER**

<b>FACILITY NAME</b> T.B. Elwood, Supervising Engineer, Regulatory Affairs and Licensing	<b>TELEPHONE NUMBER (Include Area Code)</b> 314-225-1905
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

**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 July 20, 2011, during a review of the post-fire safe shutdown analysis for valve EFHV0060, "ESW Return from CCW B Heat Exchanger," a condition was discovered where a fire in the control room could cause valve EFHV0060 to open. Valve EFHV0060 is required to be closed for post-fire safe shutdown when operating the "B" essential service water (ESW) train. The opening of EFHV0060 would cause a flow imbalance in the ESW system and could reduce the ESW flow to other essential components.

The direct cause is a latent design deficiency that did not ensure that valve EFHV0060 was isolated/protected from the potential effects of a Control Room fire. An hourly fire watch was put into place in the control room and will remain in place until this issue is resolved. Procedure OTO-ZZ-00001, "Control Room Inaccessibility," was revised to include interim compensatory actions to de-energize, and verify closed, valve EFHV0060.

Callaway Plant is in the process of transitioning its Fire Protection Program to NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition," pursuant to 10 CFR 50.48(c). The request to transition to 10 CFR 50.48(c) was submitted to the NRC on August 29, 2011 via letter ULNRC-05781. Implementation of the provisions of NFPA 805 is considered the final corrective action for this issue.

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**NARRATIVE**

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

The Service Water (SW) system is a non-safety related system that provides a source of heat rejection for plant auxiliaries requiring cooling during normal plant operation and normal plant shutdown. The system also supplies cooling water to the safety-related Essential Service Water (ESW) system during normal operation. ESW removes heat from plant components that require cooling for safe shutdown of the reactor or following a Design Bases Accident (DBA) such as a Loss Of Coolant Accident or Main Steam Line Break. The ESW system operates in conjunction with the Component Cooling Water system, other reactor auxiliary components, and the ultimate heat sink to perform its required function.

Following a DBA or loss of offsite power, safety-related signals will isolate the ESW system from the SW system by closing the associated motor-operated isolation valves and closing the motor operated ESW return valves from the CCW heat exchangers. Manual bypass valves are provided around the motor operated valves on the ESW return line from the component cooling water heat exchangers. These manual valves are adjusted for proper flow for safety functions and locked into position.

Valve EFHV0060 [EIIS Code: BI-V] is the Train "B" Essential Service Water (ESW) Return Isolation from the Train "B" Component Cooling Water (CCW) Heat Exchanger [EIIS Code: CC-HX]. During normal plant operation, EFHV0060 may be either open or closed depending on service water system alignment. However, EFHV0060 is required to be closed when operating the "B" ESW train in order to ensure the assumed system flow balance is maintained. Valve EFV0090 [EIIS Code: BI-V], which is installed in parallel with EFHV0060, is throttled to ensure the proper "B" train ESW flow balance when "B" train of ESW is in operation.

The "B" train of ESW provides cooling water to various "B" train safety-related components including the "B" Emergency Diesel Generator (EDG) [EIIS Code: EK-DG]. Under the current licensing basis, only "B" train components are credited for safe shutdown of the plant in the event of a Main Control Room fire. With EFHV0060 not in the closed position the flow balance of the "B" train ESW is adversely affected, most importantly, flow to the "B" train emergency diesel generator.

One of the panels containing control circuitry for valve EFHV0060 is located in the main control room.

**2. INITIAL PLANT CONDITIONS:**

At the time the condition was identified, the plant was in MODE 1 at approximately 100 percent power. No structures, systems, or components were inoperable that contributed to this

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event.

**3. EVENT DESCRIPTION:**

On July 20, 2011, Callaway Plant staff identified a fire protection program design deficiency associated with the control circuitry for valve EFHV0060. Specifically, it was identified that, in the event of a Control Room fire, it is possible for the fire to cause a single hot short on cable 4EFG04BC in panel RL019. This hot short could then spuriously open EFHV0060, causing reduced flow of ESW cooling to the "B" Emergency Diesel Generator.

This condition represents a missing barrier in the fire protection program. By design, a fire barrier is required to separate redundant trains of circuits and equipment necessary to achieve and maintain safe shutdown. This includes keeping the "B" train free of fire damage in the event of fire in the main control room fire. In this case, it was determined that the control circuitry for valve EFHV0060, located within a panel in the main control room, lacked such a barrier.

This nonconforming condition was identified while completing supporting analysis for the transition to NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition," pursuant to 10 CFR 50.48(c).

**4. ASSESSMENT OF SAFETY CONSEQUENCES:**

In light of the noted design deficiency, the event or condition of concern is a postulated fire in the control room that could adversely affect the control circuitry for valve EFHV0060. Had such an event occurred, the capability to achieve and maintain safe shutdown from outside of the control room could have been affected.

A severe fire in the control room that causes evacuation and shutdown from outside the control room is extremely unlikely due to fire protection program administrative controls, availability of fire detection and suppression systems, the trained on-site fire brigade, and the minimal potential for the fire growth necessary to induce the circuit failure mode. Additionally, the combustible loading in the control room is low and interior finish materials meet or exceed the surface flammability requirements of applicable standards. Cables entering the control room are IEEE 383 rated.

The fire protection program includes provisions for establishing compensatory measures in the event a fire barrier is degraded or missing. These compensatory measures include establishing a fire watch. The Control Room is continuously manned; therefore, there has been an adequate fire watch for the last 3 years.

Callaway Plant is in the process of transitioning its Fire Protection Program to NFPA 805 in

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accordance with 10 CFR 50.48(c). The license amendment request for this transition was submitted to the NRC on August 29, 2011 via Ameren Missouri letter ULNRC-05781.

The condition identified in this Licensee Event Report was discovered during completion of analysis in support of the transition to 10 CFR 50.48(c). This condition has been evaluated with the NFPA 805 guidelines using a risk-informed performance-based process. A risk evaluation with consideration of defense in depth and safety margin has determined that the change in risk associated with this issue is sufficiently low as to require no further action. No future modifications to the valve circuitry are planned. Compensatory measures for this nonconforming condition will remain in place until the transition to 10 CFR 50.48(c) is complete.

**5. REPORTING REQUIREMENTS:**

Under current reporting requirements, and in light of Callaway's current, deterministic licensing basis for its fire protection program, this condition is reported pursuant to 10 CFR 50.73(a)(2)(ii)(B) for any event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety.

**6. CAUSE OF THE EVENT:**

The cause of this event is a latent design deficiency in that the original plant design did not adequately address the consequences of fire-induced circuit failures (hot shorts). This condition has existed since plant construction. The consequences of hot shorts were not well understood in the nuclear industry until NRC Information Notice (NRC IN) 92-18 was issued in 1992. Callaway Plant had the opportunity to identify the potential hot short issue with EFHV0060 in the resolution of this NRC IN. Specifically, a plant modification was developed and implemented to address susceptible motor-operated valves. However, the list of valves identified for the modification excluded EFHV0060, because this valve was not included in the original control room evacuation procedure established prior to receipt of the Operating License for Callaway Plant. This unanalyzed condition was discovered during post fire safe shutdown analyses being performed as a part of the transition to 10 CFR 50.48(c).

**7. CORRECTIVE ACTIONS:**

An hourly fire watch was already in place in the control room for other issues. The fire watch will remain in effect until the transition to 10 CFR 50.48(c) is complete.

Procedure OTO-ZZ-00001, "Control Room Inaccessibility," has been revised to include actions

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to de-energize, and verify closed, valve EFHV0060.

The request to transition to 10 CFR 50.48(c) was submitted to the NRC on August 29, 2011. Implementation of the provisions of NFPA 805 is considered the final corrective action for this issue.

**8. PREVIOUS SIMILAR EVENTS:**

LER 2002-006-01 reported a condition where a potential hot short involving valves EJHV8811A, BNHV8812A, EJHV8811B, and BNHV8812B where it would have been possible to drain the Refueling Water Storage Tank (RWST) to the containment sumps if a fire were to occur in a location where the control circuit cables for these valves are run in the same electrical raceway.

LER 2002-010-00 reported a condition in which an extent of condition review revealed the potential for safety-related components and electrical load centers to experience a common cause failure due to the miscoordination if a fire were to occur in the 1974' Auxiliary Building Fire Area A-1. Safety-related MCC's NG01A and NG02A (opposite trains) could experience a fire-induced ground fault condition due to cable damage on downstream loads. This ground-fault condition could cause the loss of either or both NG01A and NG02A which supply post-fire safe shutdown equipment like "A" and "B" Residual Heat Removal (RHR) pump room-coolers. It was concluded this scenario could impact post-fire safe shutdown equipment. In addition, it was identified that cables in Fire Area A-1 for the "A" and "B" Residual Heat Removal (RHR) pump room coolers, which are post-fire safe shutdown equipment, have less than 20 feet of horizontal separation and do not meet the separation commitments documented in FSAR Table 9.5E-1.