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May 23, 2012

ULNRC-05858

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

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

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2012-001-00
MODIFICATION IMPLEMENTATION ERROR
ADVERSELY IMPACTED THE CONTAINMENT COOLING SYSTEM

The enclosed licensee event report is submitted in accordance with 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73(a)(2)(v)(D). The enclosed report describes a modification implementation error that could have caused the Callaway Plant containment cooling system to be unavailable during portions of a postulated accident.

This letter does not contain new commitments.

Sincerely,

Fadi M. Diya
Vice President Nuclear Operations

ACS/nls

Enclosure: LER 2012-001-00

cc: Mr. Elmo E. Collins
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U. S. Nuclear Regulatory Commission
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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.)

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

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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
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4. TITLE

Modification Implementation Error Adversely Impacted the Containment Cooling System

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
03	28	2012	2012	- 001 -	00	05	23	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

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
A	BK	FAN	J127	N					

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 March 28, 2012, Callaway Plant personnel discovered a condition in which one train of the containment cooling system operating in 'fast speed' could be tripped by thermal overload protection under certain accident conditions. In this condition, the tripped containment cooling fans could not be automatically restarted by the Load Shedding and Emergency Load Sequencing system.

This condition was previously discovered and reported as Callaway Plant LER 2008-001. After that discovery, Modification MP 08-0013 was implemented to correct this condition. However, on March 16, 2012, MP 08-0013 was inadvertently uninstalled on the 'B' train containment coolers during implementation of a different modification on the same control circuit.

Causes of this event are associated with ineffective communication between the job planner and design engineer, modification implementation work planned beyond the approved scope of the modification, inadequate evaluation of interaction between plant modifications, and inadequate review of the work instructions.

Corrective actions for this event include requiring Field Change Notice initiation when design-related issues are identified, providing training to Callaway Plant staff, and implementing procedure revisions and new checklists to add and strengthen reviews of modifications and work instructions.

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NARRATIVE

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

At Callaway Plant, the containment cooling system provides a means of cooling the containment atmosphere following a postulated loss-of-coolant accident (LOCA) or main steam line break (MSLB) inside containment. This cooling function reduces containment pressure and temperature following a postulated accident, thereby reducing the potential for leakage of airborne and gaseous radioactivity to the environment and maintaining suitable environmental conditions for the equipment inside the containment building.

The containment cooling system consists of two independent trains of containment coolers. Two containment coolers are provided for each train of containment cooling. One containment cooler consists primarily of a cooling coil and fan. The containment cooling fans can be run in either fast speed or slow speed during normal plant operation to maintain containment pressure and temperature within required operating limits. However, upon receipt of an actuation signal following a LOCA or MSLB in containment, the fans are designed to automatically start or restart in slow speed for their accident mitigation function.

Another relevant feature of the containment coolers is that the fan motors are equipped with thermal overload protection to prevent motor damage. Separate overload devices are provided for slow and fast speed operation. Subsequent to a thermal overload protective trip, operator action is required to reset the trip before the cooler can be restarted.

2. INITIAL PLANT CONDITIONS

This condition was identified when the plant was in Mode 1, "Power Operation."

3. EVENT DESCRIPTION

On March 28, 2012, Callaway Plant personnel were installing new relays in the 'A' train containment cooler breaker cubicles per Modification MP 01-1010. During the installation process, personnel discovered that the work instructions for MP 01-1010 directed the removal of a previous wiring change that had been made under Modification MP 08-0013. Removal of the MP 08-0013 wiring changes was not authorized under MP 01-1010.

Following the discovery of this condition, the 'A' train containment cooler circuit was restored to the configuration it was in prior to the start of MP 01-1010 implementation. Later that day, however, Callaway Plant staff discovered that the installation of MP 01-1010 had already removed the MP 08-0013 wiring change from the 'B' train containment cooling circuits on March 16, 2012.

When installed, modification MP 08-0013 corrected a condition in which containment cooling fans in 'fast speed' operation could be tripped by thermal overload protection under certain accident conditions prior to being shed. In this scenario, the tripped cooling fans would not be automatically restarted by the Load Shedding and Emergency Load Sequencing (LSELS) system. Thus, without MP 08-0013 installed and the containment cooling fans in fast speed operation, the containment cooling system may not have been capable of performing its specified safety function under some postulated accident scenarios.

When plant staff discovered that MP 08-0013 had been inadvertently removed from the 'B' containment cooler circuit, the 'B' containment cooling fans were switched from 'fast speed' to 'slow speed' operation to prevent the condition from potentially adversely affecting the 'B' containment coolers until the wiring changes of MP 08-0013 could be reinstalled.

4. ASSESSMENT OF SAFETY CONSEQUENCES

The containment coolers are credited in the safety analysis to remove sufficient energy to maintain peak containment pressure and temperature below design limits. To be considered operable, a single train must be capable of removing 141.4 MBTU per hour under post-accident conditions. During a design basis accident, only one train of coolers is assumed to operate.

Due to the inadvertent removal of the MP 08-0013 wiring changes, the 'B' train containment coolers may not have been able to perform their specified safety function. Without the heat removal capacity of the tripped coolers, post-accident peak containment temperatures and pressures would be impacted.

To evaluate this impact, a sensitivity analysis was performed on the LOCA and MSLB cases that are applicable to this condition. The results of this analysis demonstrated that, even without the availability of the containment coolers, the calculated post-accident temperatures and pressures would not have exceeded the limits in the analysis of record. Therefore, this condition did not significantly degrade plant safety.

This condition is considered to have low safety significance.

5. REPORTING REQUIREMENTS

As a result of the removal of modification MP 08-0013 described in this LER, operability of the 'B' train containment coolers cannot be supported from 0938 on March 16, 2012 through 1511 on March 28, 2012. This corresponds to a period of 12 days, 5 hours, 33 minutes.

The Callaway Plant Technical Specification (TS) applicable to this event is TS 3.6.6, *Containment Spray and Cooling Systems.* TS 3.6.6 Required Action C.1 requires an inoperable containment cooling train to be restored to service within 7 days. If this Completion Time is not met, TS 3.6.6 Required Action D.1 requires Mode 3 entry within 6 hours. Because the period of 'B' train containment cooling inoperability exceeded the Mode 3 entry requirement of TS 3.6.6, this condition is considered reportable per 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specification 3.6.6.

Additionally, during the time that the 'B' train containment coolers were affected by this condition, the 'A' train containment coolers were twice removed from service. 'A' train maintenance and the 'B' train degraded condition described herein overlapped during the following periods:

0505 on 2012.03.27 - 0256 on 2012.03.28;
0756 on 2012.03.28 - 1511 on 2012.03.28.

This results in a combined period of 1 day, 5 hours, and 6 minutes of concurrent inoperability of both trains of containment cooling.

The containment cooling system meets the definition of a system required to mitigate the consequences of an accident as specified by 10 CFR 50.73(a)(2)(v) criterion D. Containment cooling system function was lost during the two periods specified above. Thus, this condition is considered reportable per 10 CFR 50.73(a)(2)(v)(D) as a condition that could have prevented fulfillment of a safety function required to mitigate the consequences of an accident.

6. CAUSE OF THE EVENT

The direct cause for the event was a misunderstanding of the intended scope of MP 01-1010. This misunderstanding of scope occurred because common areas of the same drawings were affected by more than one design modification and also because the designs of MP 08-0013 and MP 01-1010 did not adequately interface with each other.

The causes of this event identified in the root cause evaluation are as follows:

- Ineffective communication between the job planner and design engineer led to misunderstanding of the scope of MP 01-1010 and the associated design modification package drawings.
- The job planner believed he understood the scope of the design modification and planned beyond the scope of the approved modification.
- The design modification process requirements for evaluating the interaction with other plant changes were inadequate.
- The construction supervisor's review of the work instructions was inadequate.

7. CORRECTIVE ACTIONS

As stated in Section 3, following discovery of the wiring discrepancy, immediate corrective action was taken to back out of the implementation of MP 01-1010 on the 'A' train containment coolers, thus restoring the containment coolers to service with MP 08-0013 in place. Additionally, the 'B' train containment coolers were placed in slow speed, thereby preventing this condition from adversely affecting the automatic slow-speed restart function of the containment coolers.

On April 12, 2012, the control circuitry of the 'B' train containment coolers was restored to its correct configuration, incorporating MP 08-0013 and MP 01-1010 as intended.

Corrective actions taken to address the causes listed in Section 6 include, but are not limited to, the following:

- Plant procedures will be revised to require initiation of a Field Change Notice (FCN) when a design-related issue is identified during the modification planning process (rather than relying on the less-rigorous routing process). As a result, the FCN will facilitate full disposition of any discovered issues and will also provide an independent engineering review as required by the FCN process.
- Plant procedures and planning guidance will be revised to require a signed qualified review of all Level 1 and Level 2 use work instructions. Thus, work instructions for modifications such as MP 01-1010 will receive additional peer review.
- Plant procedures will be revised to lower the threshold that triggers review of work instructions. Thus, review will be required for work instructions of lesser complexity or criticality, such as the work instructions for MP 01-1010.
- A comprehensive checklist will be created for the review of work instructions. This checklist will define review criteria, including the boundaries of the design modification. The use of this checklist will ensure that the critical aspects of the work instructions are reviewed.
- Engineering design guidance will be modified to require a documented review of other plant changes relevant to the modification being designed. This requirement will add accountability for engineers to ensure that their modifications are compatible with other ongoing plant changes.

8. PREVIOUS SIMILAR EVENTS

With respect to the containment cooling system, Callaway Plant submitted LER 2008-001 to report this condition when it was initially discovered in 2008. From LER 2008-001:

> Previous occurrences of the containment coolers tripping during fast-speed operation were documented during the Startup Test Program at Callaway in 1983. Actions taken to address the tripping included replacement of the thermal overloads with higher ratings and changes to the control circuitry for the coolers. A trip of one of the coolers occurred in 1986, and as corrective action for that event, new overloads with trip times in the longer portion of their allowable range were installed. Shortly after that, in 1987, a precaution was added to the operating procedure regarding fast-speed operation of the coolers during conditions of high containment pressure and low cooling water temperature, noting that operation under such conditions may cause the coolers to operate near the thermal overload setpoint(s). No further occurrences were documented until the trip of the "A" cooler on March 26, 2008.

With respect to the modification process, the root cause evaluation for this event did not identify previous internal events that resulted from the same root cause, failure, or sequence of events as the event described herein.

9. OTHER INFORMATION

The Energy Industry Identification System (EIIS) identifiers for the components and systems mentioned in this report are as follows:

System: BK, Containment Fan Cooling System
Components: FAN, Fan; 49, Thermal Relay