

Callaway Plant
Post Office Box 620
Fulton, Missouri 65251



August 18, 1997

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

ULNRC-3630

Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 97-006-00
LOSS OF ANNUNCIATORS AND UNUSUAL EVENT
DECLARATION DUE TO LIGHTNING STRIKES**

The enclosed licensee event report is submitted voluntarily to address the causes and corrective actions for a 7/19/97 loss of Main Control Board Annunciators for which an Unusual Event was declared.

A handwritten signature in cursive script, appearing to read "R. D. Affolter".

R. D. Affolter
Manager, Callaway Plant

RDA/HDB/JGB/smv

Enclosure

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PDR ADQCK 05000483
S PDR



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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Callaway Plant Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 4 8 3					PAGE (3) 1 OF 0 5		
TITLE (4) Loss of Annunciators and Unusual Event Declaration Due to Lightning Strikes																	
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)							
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAMES					DOCKET NUMBER(S)			
0 7	1 9	9 7	9 7	- 0 0 6	- 0 0	0 8	1 8	9 7						0 5 0 0 0			
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11)														
POWER LEVEL (10) 0 9 5			20.402(b)			20.405(c)			50.73(a)(2)(iv)			73.71(b)					
			20.405(a)(1)(i)			50.36(c)(1)			50.73(a)(2)(v)			73.71(c)					
			20.405(a)(1)(ii)			50.36(c)(2)			50.73(a)(2)(vi)			<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A) Voluntary					
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)								
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)								
20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(x)											
LICENSEE CONTACT FOR THIS LER (12)																	
NAME H. D. Bono, Supervising Engineer, Quality Assurance										TELEPHONE NUMBER AREA CODE: 5 7 3 6 7 6 - 4 4 2 8							
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																	
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS								
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)			MONTH DAY YEAR				
YES (If yes, complete EXPECTED SUBMISSION DATE)										X NO							

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

On 7/19/97, at approximately 1600 CDT, two lightning strikes occurred in the Callaway Plant water treatment facility resulting in degraded field power supply voltages and a loss of several Main Control Board (MCB) annunciators. At approximately 1625, utility Instrument and Control (I&C) technicians discovered smoking connector cards in computer multiplexer cabinet RK045D1, rack M-7 and de-energized the rack, thus returning most MCB annunciators to a functional status. At approximately 2230 CDT, utility engineers determined that although the power supplies had not failed during the subject 25-minute period, it could not positively be determined that the majority of MCB annunciators had been functional from 1600 to 1625. Notification was made that conditions had existed between 1600 and 1625 which placed Callaway Plant in an Unusual Event. This report is being made voluntarily to address the root cause and corrective actions for a declared Unusual Event.

The cause of the post event emergency declaration was inadequate procedural guidance. The utility Nuclear Engineering department will perform a comprehensive system design review to identify probable failure modes and potential design enhancements. Applicable procedures have been revised to more clearly define criteria for a "failed" power supply. Integrated training will be conducted on this event with utility personnel.

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TEXT (If more space is required, use additional NRC Form 366A's)(17)

BASIS FOR REPORTABILITY:

On 7/19/97 at approximately 1600 CDT, two lightning strikes occurred in the area of the Callaway Plant water treatment facility during a severe thunderstorm causing a short circuit condition in a Control Room cabinet for the non-safety related Main Control Board (MCB) annunciator system ⁽¹⁾. This fault resulted in a degraded output voltage of 25VDC on the four field power supplies ⁽²⁾. Normal output voltage for these power supplies is 125 to 135VDC. This condition existed from 1600 CDT to 1625 CDT at which time utility Instrument and Control (I&C) technicians discovered smoking connector cards in computer multiplexer cabinet RK045D1 ⁽³⁾, rack M-7 and de-energized the rack. Upon de-energization of M-7, most MCB annunciators returned to a functional status.

Emergency Plant Implementing Procedure EIP-ZZ-00101, Classification of Emergencies, Group 4 System Malfunctions requires declaration of an Unusual Event on an unplanned loss of most or all alarms (annunciators) ⁽⁴⁾ for greater than 15 minutes. Indicators for a loss of most or all MCB annunciators per EIP-ZZ-00101 include "3 of 4 field power supplies have failed for greater than 15 minutes." Initial testing by utility personnel determined that the referenced field power supplies had not failed and numerous annunciators were functional following this event. At approximately 2230 CDT, utility engineers determined that although the power supplies had not failed during the subject 25-minute period, it could not be positively determined that the majority of main control board annunciators had been functional from 1600 to 1625. Notification was therefore made to the NRC, state, and local authorities that conditions had existed between 1600 and 1625 which had placed Callaway Plant in an Unusual Event.

This report is being made voluntarily to address the root cause and corrective actions for a declared Unusual Event.

CONDITION AT TIME OF EVENT:

Mode 1 - Power Operations
95 percent reactor power

DESCRIPTION OF EVENT:

On 7/19/97 at approximately 1600 CDT, several Callaway Plant employees observed two lightning strikes in the area of the water treatment plant during a severe thunderstorm. Coincident with this event, numerous non-safety related MCB annunciators and SA066X Window 21Q ⁽⁵⁾ "RK ANN POWER SPLY FAILURE" were received. Licensed utility operators immediately verified plant parameters, entered Off-Normal Operating Procedure OTO-RK-00001, "Loss of Control Room Alarms", and contacted I&C technicians. The Field Supervisor checked the annunciator logic and field power supplies per OTO-RK-00001. All logic power supply LEDs were lit indicating they were functioning properly. The four field power supplies

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were indicating 25 VDC at approximately 3 Amps. Based on OTO-RK-00001 guidance and the SA066X 21Q alarm, the primary focus was looking for a failed (i.e. de-energized) power supply.

At approximately 1610, the utility Shift Supervisor contacted the Emergency Duty Officer (EDO) and discussed his intention to declare an Unusual Event per EIP-ZZ-00101, Emergency Action Levels Group 4A even though the indicators for declaring an Unusual Event did not exist.

At 1611 another lightning strike occurred, transmission line Cal-Bland tripped and switchyard breakers V43 and V45 both opened and auto re-closed. The annunciators for these trips were received in the Control Room. Based on the fact that these annunciators appeared to be functioning properly, the utility Shift Supervisor directed Equipment Operators to conduct further annunciator testing in an attempt to determine what percentage of annunciators were functioning. Several tests were performed on various control room annunciators. Initial tests appeared to indicate that most of the annunciators tested were functional. It was determined that an Unusual Event was not necessary due to the fact that all field and logic power supplies were operating, most annunciators were not lost as indicated by the V43/V45 MCB annunciators, and the majority of local annunciator panels tested alarming in the Control Room as expected.

I&C technicians arrived in the Control Room minutes after the event and began troubleshooting. The technicians observed the field power supplies at 25 volts.

At approximately 1625, I&C technicians found smoking connector cards in RK045D1 rack M-7, de-energized the rack, and field power supply voltage and current returned to normal. Most of the annunciators cleared at this point; however approximately 40 windows remained lit. It was estimated that approximately the same number of annunciators were inoperable in a dark condition. It was estimated that approximately 5 - 10% of plant annunciators were inoperable at this time.

Several System Engineers were contacted to assist in the troubleshooting. At approximately 2230, based on technical evaluation of the degraded voltage condition by engineering personnel, it was determined that although the power supplies had not completely failed during the subject 25-minute period, it could not be positively demonstrated that the majority of MCB annunciators had been functional from 1600 to 1625. Notification was therefore made to the NRC, state, and local authorities that conditions existed between 1600 and 1625 which placed Callaway in an Unusual Event.

On 7/20/97 at 0348, repairs were completed and the annunciator system was fully restored.

ROOT CAUSE:

1. The cause of the loss of annunciators was two lightning strikes in the vicinity of the water treatment plant. A subsequent voltage surge occurred on field inputs to the non-safety related annunciator system. Wiring connectors on a connector card in rack M-7 of cabinet RK045D1 shorted out creating a short circuit across the 130 VDC field power supplies. This short circuit condition loaded down the

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four field power supplies causing a drop in output voltage and resulted in electrical burn damage to the affected card and three adjacent cards.

2. The root cause of the post event Unusual Event declaration was lack of adequate procedural criteria to ascertain the status of the annunciator system and therefore determine if "most or all" annunciators were lost per the guidance of EIP-ZZ-00101.

CORRECTIVE ACTIONS:

1. The utility Nuclear Engineering department will perform a comprehensive design review of the RK system to identify probable failure modes and evaluate potential design enhancements.
2. Applicable procedures have been revised to more clearly define criteria for a "failed" power supply.
3. Integrated training will be conducted on this event with Operations, EDO's and I&C personnel.

SAFETY SIGNIFICANCE:

Callaway Plant remained stable during this event with no impact on reactor power or damage to any safety related equipment. All control room instrumentation and the plant computer were available to operators to monitor plant status. All OTO-RK-00001 compensatory measures were implemented until the annunciator system was fully restored. The loss of non-safety related annunciators in this event did not pose a threat to the public health and safety.

PREVIOUS OCCURRENCES:

Voluntary LER 92-011-00 was similar to this event in that a single fault rendered all four of the field power supplies de-energized, however in the 1992 event, an emergency declaration and offsite notifications were never made.

This event is not a recurrence of the 1992 event because in 1992, the loss of all four field power supplies was caused by an error during a repair activity, while in this most recent event, it was caused by a lightning strike. In addition, the 1992 event resulted in a complete failure of all four power supplies while during this event the power supplies did not completely fail, but continued to operate at a degraded voltage output. Further, in this instance, several annunciators were demonstrated to function.

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FOOTNOTES:

The system and component codes listed below are from IEEE Standards 805-1984 and 803A-1983 respectively:

- 1) System - IU
- 2) System - EJ, Component - JX
- 3) System - EJ, Component - CAB
- 4) System - IU, Component - ANN
- 5) System - JE, Component - ANN