

April 2, 2002

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
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ULNRC-4632

Gentlemen:



**DOCKET NUMBER 50-483  
CALLAWAY PLANT UNIT 1  
UNION ELECTRIC CO.  
FACILITY OPERATING LICENSE NPF-30  
LICENSEE EVENT REPORT 2002-003-00**

**Auxiliary Feedwater Valve Inoperable due to faulty electronic circuit board.**

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(i)(B) to report an Inoperable Auxiliary Feedwater Valve due to the failure of an electronic circuit board. The Inoperable Auxiliary Feedwater Valve rendered the respective train of Auxiliary Feedwater Inoperable for a period longer than allowed by Technical Specifications.

A handwritten signature in cursive script that reads "Warren A. Witt".

Warren A. Witt  
Manager, Callaway Plant

WAW/ewh/glw

Enclosure

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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 information 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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOF-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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

05000 483

## 3. PAGE

1 OF 4

## 4. TITLE

Auxiliary Feedwater Valve Inoperable due to faulty electronic circuit board.

## 5. EVENT DATE

MO DAY YEAR  
2 7 2002

## 6. LER NUMBER

YEAR SEQUENTIAL REV  
NUMBER NO  
2002 - 003 - 00

## 7. REPORT DATE

MO DAY YEAR  
4 2 2002

## 8. OTHER FACILITIES INVOLVED

## FACILITY NAME

## DOCKET NUMBER

05000

## FACILITY NAME

## DOCKET NUMBER

05000

9. OPERATING  
MODE

4

10. POWER  
LEVEL

0

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

20.2201(b)

20.2203(a)(3)(ii)

50.73(a)(2)(ii)(B)

50.73(a)(2)(ix)(A)

20.2201(d)

20.2203(a)(4)

50.73(a)(2)(iii)

50.73(a)(2)(x)

20.2203(a)(1)

50.36(c)(1)(i)(A)

50.73(a)(2)(iv)(A)

73.71(a)(4)

20.2203(a)(2)(i)

50.36(c)(1)(ii)(A)

50.73(a)(2)(v)(A)

73.71(a)(5)

20.2203(a)(2)(ii)

50.36(c)(2)

50.73(a)(2)(v)(B)

OTHER

20.2203(a)(2)(iii)

50.46(a)(3)(ii)

50.73(a)(2)(v)(C)

Specify in Abstract below or in  
NRC Form 366A

20.2203(a)(2)(iv)

50.73(a)(2)(i)(A)

50.73(a)(2)(v)(D)

20.2203(a)(2)(v)

X 50.73(a)(2)(i)(B)

50.73(a)(2)(vii)

20.2203(a)(2)(vi)

50.73(a)(2)(i)(C)

50.73(a)(2)(viii)(A)

20.2203(a)(3)(i)

50.73(a)(2)(ii)(A)

50.73(a)(2)(viii)(B)

## 12. LICENSEE CONTACT FOR THIS LER

## NAME

MARK A. REIDMEYER

## TELEPHONE NUMBER (Include Area Code)

(573) 676-4306

## 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
X	BA	FCV	M120	Y					

## 14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete EXPECTED SUBMISSION DATE)

X

NO

15. EXPECTED  
SUBMISSION  
DATE

## MONTH

## DAY

## YEAR

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

On 2/6/02, with Callaway Plant in Mode 4, 0 percent reactor power, a Modification package was completed that reduced the flow control setpoints for Auxiliary Feedwater (AFW) flow control valves. This modification was implemented to reduce full flow on the Motor Driven Auxiliary Feedwater (MDAFW) pumps to prevent reaching run-out conditions.

On 2/7/02, at approximately 0950, during the performance of a retest procedure to verify proper valve operation, AFW flow control valve, ALHV0011, failed to reduce and control flow at setpoint. Troubleshooting revealed a faulty electronic circuit card in the flow control circuit. After this card was replaced on 2/8/02, ALHV0011 performed satisfactorily. A review of past test data revealed that this problem first occurred on 5/15/01 during a retest on a different AFW flow control valve. ALHV0011 was not directly associated with the 5/15/01 retest document and the unsatisfactory data was not detected.

This past unsatisfactory data indicated that ALHV0011, and thus "A" train of Auxiliary Feedwater, was inoperable from 5/15/01 until 2/1/02 when Callaway Plant entered Mode 4 and Auxiliary Feedwater was no longer required per Technical Specification 3.7.5.

# LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
Callaway Plant Unit 1	05000483	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		2002	- 003	- 00	

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

## I. DESCRIPTION OF THE REPORTABLE EVENT

### A. REPORTABLE EVENT CLASSIFICATION

This event is reportable under 10CFR50.73(a)(2)(i)(B), a condition prohibited by Technical Specifications (T/S).

### B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

On 2/7/02, Callaway Plant was shutdown in Mode 4 at 0 percent reactor power.

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

None.

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

On 2/6/02, Modification Package 02-1003 was implemented to reduce the maximum flow on the MDAFW pumps by reducing the setpoint for the AFW flow control valves ALHV0005, 7, 9, and 11, to 142,500 Lbm/hr. During a retest, ALHV0011 ramped up to 163,000 Lbm/hr and then began hunting +/- 10,000 Lbm/hr when flow was secured through ALHV0009, a similar valve which is supplied by a common MDAFW pump. Troubleshooting revealed a problem in the electronic flow control circuitry. By replacing a faulty electronic circuit board, ALHV0011 was restored to proper operation on 2/8/02.

A past operability review revealed that the ALHV0011 flow control problem first occurred on 5/15/01 during ALHV0009 maintenance testing. During the test on ALHV0009, flow data was first recorded for just ALHV0009 and then the combination of ALHV0009 and ALHV0011. When analyzed, this combined flow data revealed that ALHV0011 was not controlling flow at the desired setpoint. Since ALHV0011 was not being retested, the unsatisfactory flow data was not recognized. This unsatisfactory data rendered ALHV0011 inoperable, and thus "A" train of AFW, inoperable from 5/15/01 until 2/1/02 when Callaway Plant entered Mode 4 and the T/S 3.7.5 requirement for Auxiliary Feedwater, was no longer applicable.

Although ALHV0011 did not meet the T/S limit for maximum flow, the "A" train of Auxiliary Feedwater was still capable of performing its safety function. This is based on:

- 1) ALHV0011 was still able to throttle flow enough to prevent pump run-out on the "A" MDAFP in the most limiting NPSH conditions.
- 2) ALHV0011 was still able to throttle flow enough in the most limiting case (Feed Water Line Break on the "C" steam generator) to allow at least the minimum required flow to the "B" steam generator.

Therefore, the "A" train of the Auxiliary Feedwater system was still capable of performing its intended safety function.

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

The Tech Spec Bases for the Auxiliary Feedwater System states:

- a) "The motor driven pumps supply flow to the steam generators through a normally open motor operated valve that automatically throttles flow to prevent pump run-out conditions under all steam generator pressure conditions."
- b) "The AFW System design is such that it can perform its function following an FWLB between the MFW (Main Feedwater) isolation valves and containment, combined with a loss of offsite power following turbine trip, and a single active failure of one motor driven AFW pump. This results in minimum assumed flow to the intact steam generators. One motor driven AFW pump would deliver to the broken MFW header at a flow rate throttled by the motor operated "smart" discharge valve until the problem was detected, and flow terminated by the operator. Sufficient flow would be delivered to the intact steam generators by the residual flow from the affected pump plus the turbine driven AFW (TDAFW) pump."
- c) "This SR (Surveillance Requirement 3.7.5.3) verifies that AFW can be delivered to the appropriate steam generator in the event of any accident or transient that generates an ESFAS (Engineered Safety Features Actuation System), by demonstrating that each automatic valve in the flow path actuates to its correct position on an actual or simulated actuation signal. This SR includes the requirement to verify that each AFW motor-operated discharge valve, ALHV0005, 7, 9 and 11, limits the flow from the motor-driven pump to each steam generator to 300 gpm (300 gpm was 320 gpm prior to MP 02-1003)."

Calculation AL-24 evaluated the effect of dissolved nitrogen on the available NPSH for the AL pumps. Running the limiting accident scenarios on the Plant Simulator validated the results of this calculation. Case 10 in the calculation determined there was adequate Net Positive Suction Head (NPSH) available from the Condensate Storage Tank (CST) at the T/S minimum level to support running 2 MDAFW pumps at 775 gpm per pump. Other Auxiliary Feedwater pump combinations are less limiting due to the TDAFW pump causing the motor operated Auxiliary Feedwater flow control valves to close which reduces the MDAFW pump flow and required NPSH. Conservatively assuming ALHV0009 limits flow to 320 gpm, ALV0011 limits flow to 328 gpm and mini-flow is 120 gpm, the total flow for the "A" MDAFW would be 768 gpm. Therefore, although ALHV0011 did not limit flow to the required T/S value, it was still capable of limiting flow enough to prevent a pump from operating under run-out conditions.

Accident Analysis evaluated the ability of the "A" train of Auxiliary Feedwater to perform its design function with ALHV0011 unable to limit flow to 320 gpm. The FWLB was the limiting accident. Assuming the "B" MDAFW pump fails and the FWLB occurs on the "C" steam generator, ALHV0011 still limits flow through the break enough to provide at least the minimum assumed flow of 93.3 gpm to the "B" steam generator. Therefore, ALHV0011 limited Auxiliary Feedwater flow enough at 328 gpm to allow the "A" train of Auxiliary Feedwater to fulfill its Safety Analysis function.

## Conclusion:

Although ALHV0011 did not meet the T/S limit for maximum flow, the "A" train of Auxiliary Feedwater was still capable of performing its intended safety function.

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

The failure of ALHV0011 to control flow at the T/S limit was discovered on 2/7/02, while performing tests associated with Callaway Modification Package 02-1003.

Subsequent review of historical data for past operability determined that ALHV0011 had been inoperable since 5/15/01.

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Callaway Plant Unit 1	05000483	2002	- 003	- 00	4 OF 4

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

### II. EVENT DRIVEN INFORMATION

#### A. SAFETY SYSTEMS THAT RESPONDED

Not applicable.

#### B. DURATION OF SAFETY SYSTEM INOPERABILITY

The total duration of the time that the "A" train Auxiliary Feedwater system was inoperable was from 1259, 5/15/01 until 0426, 2/1/02 when the Callaway Plant entered Mode 4 and the Auxiliary Feedwater system was no longer required to be Operable per T/S 3.7.5. Callaway Plant was still in Mode 4 when repairs were completed on ALHV011 and the valve was declared operable. The total time of Inoperability was 260 days, 15 hours, 27 minutes.

#### C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT.

This event did not represent a significant safety concern. Based upon an evaluation contained within this LER that details how the "A" train of Auxiliary Feedwater remained capable of satisfying its intended safety function, this event did not pose an increase in core damage frequency.

### III. CAUSE OF THE EVENT

The primary cause of this event was failure of an electronic circuit board for ALHV0011. A contributing factor was the failure to recognize the unsatisfactory test data recorded for ALHV0011 on 5/15/01.

### IV. CORRECTIVE ACTIONS

Corrective actions were to replace the faulty electronic circuit board for ALHV0011 and perform a satisfactory retest on 2/8/02. Additional corrective actions addressing the failure to recognize unsatisfactory test data are being evaluated.

### V. PREVIOUS SIMILAR EVENTS

A review was conducted of LERs written within the last 3 years and there were no similar LERs. A review of Callaway Action Request System (CARS) data for the last 3 years revealed 3 CARs related to flow control problems associated with ALHV0005, 7, 9, and/or 11. They were CARs 199903183, 200103109, and 200200577.

### VI. ADDITIONAL INFORMATION

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

System: BA

Component: FCV