



Callaway Plant

May 11, 1992

U. S. Nuclear Regulatory Commission  
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Washington, DC 20555

ULNRC-2635

Gentlemen:

DOCKET NUMBER 50-483  
CALLAWAY PLANT UNIT 1  
FACILITY OPERATING LICENSE NPF-30  
LICENSEE EVENT REPORT 92-005-00  
AUXILIARY FEEDWATER SWAPOVER TO ESSENTIAL SERVICE  
WATER OCCURRED WHEN INSTRUMENT AC POWER BUS WAS  
DE-ENERGIZED WITH AN ESFAS CABINET DE-ENERGIZED

The enclosed Licensee Event Report is submitted pursuant to  
10 CFR 50.73(a)(2)(iv) concerning an unplanned automatic  
Engineered Safety Feature Actuation.

J. D. Blosser  
Manager, Callaway Plant

<sup>TPS</sup>  
JDB/TPS/MKD/lrj

Enclosure

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1): Callaway Plant Unit 1	DOCKET NUMBER (2): 0 5 0 0 0 4 8 3	PAGE (3): 1 OF 0 4
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TITLE (4) Auxiliary Feedwater Swapover To Essential Service Water Occurred When Instrument AC Power Bus Was De-energized With An ESFAS Cabinet De-energized

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																																																									
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)																																																							
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<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">OPERATING MODE (9): N</td> <td colspan="11">THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)</td> </tr> <tr> <td rowspan="6">POWER LEVEL (10): 1 0</td> <td>20.402(b)</td> <td></td> <td>20.406(a)</td> <td><input checked="" type="checkbox"/></td> <td>50.73(a)(2)(v)</td> <td></td> <td>73.71(b)</td> </tr> <tr> <td>20.406(a)(1)(i)</td> <td></td> <td>50.38(c)(1)</td> <td></td> <td>50.73(a)(2)(vi)</td> <td></td> <td>73.71(c)</td> </tr> <tr> <td>20.406(a)(1)(ii)</td> <td></td> <td>50.38(c)(2)</td> <td></td> <td>50.73(a)(2)(vii)</td> <td></td> <td>OTHER (Specify in Abstract below and in Text NRC Form 366A)</td> </tr> <tr> <td>20.406(a)(1)(iii)</td> <td></td> <td>50.73(a)(2)(i)</td> <td></td> <td>50.73(a)(2)(viii)(A)</td> <td></td> <td></td> </tr> <tr> <td>20.406(a)(1)(iv)</td> <td></td> <td>50.73(a)(2)(ii)</td> <td></td> <td>50.73(a)(2)(viii)(B)</td> <td></td> <td></td> </tr> <tr> <td>20.406(a)(1)(v)</td> <td></td> <td>50.73(a)(2)(iii)</td> <td></td> <td>50.73(a)(2)(ix)</td> <td></td> <td></td> </tr> </table>												OPERATING MODE (9): N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)											POWER LEVEL (10): 1 0	20.402(b)		20.406(a)	<input checked="" type="checkbox"/>	50.73(a)(2)(v)		73.71(b)	20.406(a)(1)(i)		50.38(c)(1)		50.73(a)(2)(vi)		73.71(c)	20.406(a)(1)(ii)		50.38(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text NRC Form 366A)	20.406(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)			20.406(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)			20.406(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(ix)		
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LICENSEE CONTACT FOR THIS LER (12):

NAME Thomas P. Sharkey, Supervising Engineer, Site Licensing	TELEPHONE NUMBER 3 1 1 4 6 1 7 1 6 1 - 1 8 1 3 1 3 1 6
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13):

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
E	B A	C O N L	2 0 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14):

YES (If yes, complete EXPECTED SUBMISSION DATE):	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15):	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16):

On 4/10/92 at 2144 CDT, an Auxiliary Feedwater (AFW) low suction pressure swapover to Essential Service Water signal was received when non-licensed utility operators de-energized instrument AC power bus (NNO4) as part of a planned evolution, while an Engineered Safety Features Actuation System (ESFAS) cabinet was de-energized. With the exception of Turbine Driven AFW pump supply valve, AL-HV-32, all valves operated as expected. The reactor vessel had been defueled.

The undervoltage condition on NNO4, with the ESFAS cabinet downpowered, satisfied the automatic ESF logic for AFW swapover. The licensed operators had put low priority on restoring NNO4 since the vessel was defueled. They overlooked procedure precautions that flagged the two evolutions as a potential ESF actuation. AL-HV-32 failed to open due to a broken motor power lead lug. It broke due to cyclic fatigue when the valve motor started on receipt of the ESF signal.

Procedures will be revised to require a specific control room briefing prior to performing these evolutions. The broken lug was replaced. Inspection of other AFW valves revealed no lug cracking. Thirty-two other safety-related valves were inspected for broken lugs; no additional broken lugs were identified. However, one valve was discovered with two cracked lugs which were subsequently replaced. Lugs will be included in inspections of future electrical equipment work.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)  Callaway Plant Unit 1	DOCKET NUMBER (2)  0 5 0 0 0 4 8 3	LER NUMBER (6)			PAGE (3)	
		YEAR 9 2	SEQUENTIAL NUMBER 0 0 5	REVISION NUMBER 0 0 0	2	OF 0 4

TEXT (If more space is required, use additional NRC Form 356A's) (17)

BASIS FOR REPORTABILITY:

On 4/10/92 at 2144 CDT, an Auxiliary Feedwater<sup>1</sup> low suction pressure swapover to Essential Service Water (ESW)<sup>2</sup> signal was received when non-licensed utility operators momentarily de-energized instrument AC power bus (NNO4)<sup>3</sup> as part of a planned evolution, while an Engineered Safety Features Actuation System (ESFAS) cabinet (SA036C)<sup>4</sup> was de-energized. This report is submitted pursuant to 10CFR50.73(a)(2)(iv) to report an event which resulted in the unplanned automatic actuation of an Engineered Safety Feature (ESF).

CONDITIONS AT THE TIME OF EVENT:

Reactor vessel defueled.

DESCRIPTION OF EVENT:

On 4/10/92, at 2115, the licensed utility Shift Supervisor was informed that the non-licensed equipment operators were preparing to restore instrument AC power bus (NNO4) from its backup power supply NN06<sup>5</sup> to its normal power supply NN14. Work had previously been completed on NN14 to replace an inverter<sup>6</sup> as a part of preventive maintenance activity. At approximately the same time, the licensed Control Room Supervisor authorized Instrument and Controls (I&C) technicians to downpower ESFAS cabinet SA036C to replace a power supply.

At 2137, the I&C technicians de-energized cabinet SA036C and began replacing the power supply. De-energizing this ESFAS cabinet established a 1 of 3 logic for an Auxiliary Feedwater swapover to ESW.

At 2144, an NNO4 undervoltage alarm was received in the control room. This undervoltage condition was expected since the switching of power supply busses is a dead bus transfer from one power supply to the other. This undervoltage condition completed the 2 of 3 logic required for the Auxiliary Feedwater (AFW) swapover to ESW.

The 'B' train valves<sup>7</sup> for ESW to Turbine Driven AFW Pump<sup>8</sup> (TDAFP) and ESW to Motor Driven AFW Pump<sup>9</sup> (MDAFP) (AL-HV-33 and AL-HV-30) opened as expected. The ESW to MDAFP 'A' valve (AL-HV-31) did not open since it was tagged out of service for maintenance. The ESW to TDAFP 'A' valve (AL-HV-32) failed to open. The AFW supply valves from the condensate storage tank<sup>10</sup> did not close as they were already closed and tagged out of service to support on-going maintenance.

Water moved through the system since both the MDAFPs and the TDAFP were tagged out for maintenance.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TEXT (If more space is required, use addenda) NRC Form 366A (6-89) (17)

ROOT CAUSE:

The AFW swapover to ESW was a direct result of the undervoltage condition on NN04. With ESFAS cabinet SA036C downpowered, this satisfied the automatic ESF logic for low suction pressure swapover.

The following factors contributed to the event:

1. The operators put a low priority on restoring NN14 to its normal power supply since there was no fuel in the reactor vessel.
2. Licensed operations personnel overlooked precautions and limitations in procedures OTN-NN-00001, 120V Vital AC Instrument Power - Class 1E (NN), and OTS-SA-00001, De-energizing and Energizing Engineered Safety Features Actuation Systems, which if reviewed together would have flagged the operators that the two evolutions would result in an ESF actuation.
3. Troubleshooting revealed that AL-HV-32 failed to open due to a broken lug<sup>11</sup> on one phase of the motor power lead. The lug showed signs of cyclic fatigue. This resulted from various testing and inspection activities which either moved the wire with the lug fixed or determined/terminated the lug. It is most likely that the lug failed when the motor started on receipt of the AFW swapover signal. The valve had been satisfactorily tested three times since the last maintenance activity in October 1991. It was most recently tested satisfactorily on March 2, 1992.

CORRECTIVE ACTIONS:

1. Licensed personnel will be reminded that ESF actuation reportability is not mode dependent.
2. Procedures OTN-NN-00001 and OTS-SA-00001 will be revised to require specific control room briefing prior to performance under all plant conditions.
3. The defective lug on AL-HV-32 was replaced and subsequently tested satisfactorily.
4. Inspection of other AFW valves revealed no additional lug cracking. Thirty-two other safety-related motor operated valves were inspected for broken lugs. No additional broken lugs were identified. However, one valve was discovered with two cracked lugs which were subsequently replaced. Plant electricians and I&C technicians will be instructed to check lugs when working on plant equipment. The Operating Quality Control Manual (OQCM) will be revised to include terminal lug inspections requirements on all electrical equipment.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 56.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

SAFETY SIGNIFICANCE:

The AFW functions to ensure that the reactor coolant system can be cooled down to less than 350 degrees F from normal operating conditions in the event of a total loss of offsite power and is not required to be operable with the reactor vessel defueled.

The ESF AFW swapover to ESW equipment performed as expected in response to the logic signal with the exception of AL-HV-32. Investigation revealed that the broken lug which prevented AL-HV-32 from stroking open failed at the time of the motor demand. Inspections of other valves in the AFW system revealed no terminal lug cracking. If the AFW swapover had occurred as a valid signal during plant operation, both trains' supply to the MDAFP and the B train supply to the TDAFP would have been capable of providing their safety function. Additionally, AL-HV-32 is located in an area where it could be manually operated if necessary. This event had no adverse affect on the public health and safety.

PREVIOUS OCCURRENCES:

LER 89-010-01, transmitted by ULNRC-2085, dated 10/3/89, in part details an AFW swapover to ESW which was generated when an ESFAS cabinet was powered up prior to resetting the ESF logic. No corrective actions taken for LER 89-010-01 could have been expected to prevent the event of LER 92-005-00.

FOOTNOTES:

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

1. System - BA
2. System - BI
3. System - EB, Component - BU
4. System - JE, Component - CAB
5. System - EB, Component - JX
6. System - EB, Component - INVT
7. System - BA, Component - V
8. System - BA, Component - P
9. System - BA, Component - P
10. System - KA, Component - TK
11. System - BA, Component - CON