

February 1, 2002

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
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ULNRC-4605

Gentlemen:



**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2002-001-00
Manual Auxiliary Feedwater Actuation and subsequent gas binding of the "A"
Motor Driven Auxiliary Feedwater pump**

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(iv)(A) to report an event that resulted in the manual actuation of the Motor Driven Auxiliary Feedwater pumps and the subsequent gas binding of the "A" Motor Driven Auxiliary Feedwater pump.

Warren A. Witt

Warren A. Witt
Manager, Callaway Plant

WAW/ewh

Enclosure

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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, NEOB-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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

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TITLE (4)

Manual Auxiliary Feedwater Actuation and subsequent gas binding of the "A" Motor Driven Auxiliary Feedwater pump

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	3	2001	2002	001	00	2	1	2002	FACILITY NAME	DOCKET NUMBER
										05000
										05000
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
			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)
POWER LEVEL (10)			20.2203(a)(1)			50.36(c)(1)(i)(A)		X	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 Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)	
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)	
			20.2203(a)(2)(v)			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)	

LICENSEE CONTACT FOR THIS LER (12)

NAME M. A. Reidmeyer, Supervisor, Regional Regulatory Affairs	TELEPHONE NUMBER (Include Area Code) (573)676-4306
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BA	P	I075	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

X YES (If yes, complete EXPECTED SUBMISSION DATE).				NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
						3	1	2002

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

On 12/3/01, a normal plant shutdown was being conducted to facilitate repairs to the Main Generator. After electrically unloading the Main Generator, high vibration occurred on the main turbine requiring breaking condenser vacuum to expedite stopping the main turbine. Both Motor Driven Auxiliary Feedwater (MDAFW) pumps were started prior to breaking vacuum. "B" MDAFW pump operated normally, but "A" MDAFW pump failed to develop sufficient pressure and flow. The Turbine Driven Auxiliary Feedwater (TDAFW) pump was placed in service to supply all Steam Generators (S/G). "A" and "B" MDAFW pumps were secured, and an investigation was begun to determine the problem with "A" MDAFW pump. The gas binding of "A" MDAFW pump was caused by a piece of foam from a floating cover inside the Condensate Storage Tank (CST), momentarily blocking the pump suction and creating a partial gas binding situation. The floating cover was repaired to prevent future degradation and the CST cleaned, inspected, and returned to service. The high turbine vibration was due to a rapid cooldown of the main turbine, which affected internal component clearances. Procedures have been revised to provide additional guidance to maintain acceptable cooldown rates for the Main Turbine.

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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 LER is being submitted per 10CFR50.73(a)(2)(iv). It is characterized by a manual actuation of the Auxiliary Feedwater System while conducting a normal plant shutdown.

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

Callaway Plant was in Mode 1 at 12 percent reactor power conducting a normal plant shutdown to facilitate repairs to the Main Generator.

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

The initial review of plant Structures, Systems, or Components (SSC) did not indicate any SSCs inoperable at the start of the event that contributed to the event. Identification of Foreign Material (FM) in the Condensate Storage Tank (CST) has led to inspections and repairs. A past operability evaluation of the CST is being conducted and if SSCs are found to have been Inoperable at the time of the event, this section will be revised, as necessary, in a Supplement to the LER.

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

On 12/3/01, Callaway Plant was in Mode 1 at 12 percent reactor power conducting a normal plant shutdown to facilitate repairs to the Main Generator. Upon electrically securing the Main Generator at 2248, a high vibration condition was experienced during turbine coastdown. This high vibration condition required breaking condenser vacuum. Realizing that main feedwater to the Steam Generators (S/G) would be lost once condenser vacuum was broken, the On-Shift Operation staff took the action of manually actuating the Auxiliary Feedwater system instead of relying upon plant parameters to cause an automatic actuation. Both "A" and "B" MDAFW pumps were started prior to breaking condenser vacuum. "B" MDAFW pump operated properly. "A" MDAFW pump failed to sustain sufficient pressure or flow. The Turbine Driven Auxiliary Feedwater (TDAFW) pump was started to compensate for the lack of flow normally provided by the "A" MDAFW pump and "A" MDAFW pump was secured. With the TDAFW pump in service, the "B" MDAFW pump was not necessary and it was secured. Once the Main Turbine was stopped, condenser vacuum was restored. While the condenser was unavailable, S/G atmospheric Power Operated Relief Valves (PORV) were used to control the plant cooldown. Upon restoration of condenser vacuum, the normal condenser steam dumps were used to control plant cooldown.

The manual shutdown of the reactor plant was completed without incident. Investigations revealed that the "A" MDAFW pump had become gas bound. As a remedial action, shifftly venting of the Auxiliary Feedwater system was instituted while root cause investigations continued. To date, no gas has been identified during the shifftly vents. In addition, monthly surveillance testing of the Auxiliary Feedwater Pumps was implemented.

In an effort to determine the cause of the gas binding, the pump vendor and Dominion Engineering were contracted to provide assistance in the investigation. Initial troubleshooting of the gas binding of "A" MDAFW concentrated on potential sources of gas. Several issues were considered and dismissed including:

- Nitrogen coming out of solution
- Net Positive Suction Head issues
- Combinations of low CST levels and high CST temperatures
- Air intrusion through packing leaks
- Adequacy of filling and venting methods

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After eliminating the possibility of gas binding from external sources, it was suspected that foreign material could have blocked the pump suction and caused a gas binding condition. This was supported by a small piece of polyurethane foam that was found in the seal water line on the pump casing. The Condensate Storage Tank (CST), which supplies water to the AFW pumps, was inspected for foreign material.

Internal to the CST is a floating cover that provides a separation boundary between water and any gas contained within the tank. This floating cover has a foam ring attached to the edge of the cover, and this ring is composed of a polyurethane foam core enclosed within a Teflon coated fiberglass cloth. During the inspection, a five-foot section of the foam ring was found damaged. Twenty-five inches of foam was still attached at the damaged section but trapped under the floating cover. It is believed a piece of this foam migrated to the "A" MDAFW pump and caused gas binding of the pump. A small amount of foam, cloth, and other minor material originating from the tank internals were found in the tank sump and on the tank bottom. The material from the tank sump and the tank bottom was removed. The damaged foam ring was repaired. On January 31, 2002, a decision was made to remove the floating cover. The plant commenced a shutdown to Mode 4 to facilitate this removal. At the time of this LER submittal, all actions have not been completed. Further information will be included in a Supplement to this LER.

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

The main turbine vibration became evident as the turbine was being taken off-line. Several vibration alarms were experienced during the evolution, which alerted the operators of the problem.

The failure of "A" MDAFW pump was discovered while monitoring discharge pressure and flow after starting the pump.

II. EVENT DRIVEN INFORMATION

A. SAFETY SYSTEMS THAT RESPONDED

The Motor Driven Auxiliary Feedwater pumps were manually started prior to an automatic Auxiliary Feedwater Actuation Signal (AFAS). The S/G blowdown system was isolated when the automatic AFAS was generated.

B. DURATION OF SAFETY SYSTEM INOPERABILITY

The "A" MDAFW pump was declared Inoperable at 2307, 12/3/01 and was declared Operable at 2110, 12/5/01 for a total Inoperability time of 46 hours 3 minutes.

A past operability evaluation of the CST and Auxiliary Feedwater pumps is being conducted. It has not been completed as of submittal of this LER. An evaluation concerning the final determination will be included in a Supplement to this LER.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT.

A preliminary estimated Conditional Core Damage Probability (CCDP) for this event was determined to be approximately 7×10^{-6} . This preliminary estimate was based upon the Inoperability of the "A" MDAFW pump on 12/3/01. Further evaluations concerning the length of Inoperability and potential safety significance are still being conducted as of 1/31/02. A past operability evaluation of the CST is being conducted along with inspections of the CST, AFW piping, and AFW pumps. The results of the inspections and operability determination will affect the CCDP so a final safety significance determination cannot be concluded at present. When the final determination

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

has been completed, this value will be included in a Supplement to this LER.

III. CAUSE OF THE EVENT

The initiating precursor was a main turbine high vibration condition. Analysis of available plant data indicated that an excessive cooldown rate of the main turbine occurred. This in turn negatively affected component tolerances with a resulting high vibration condition. Plant shutdown procedures did not provide adequate warnings or precautions against this cooldown rate.

The failure of the "A" MDAFW pump was due to gas binding of the pump caused by foreign material momentarily blocking the pump suction. This foreign material was determined to be from a foam ring attached to a floating cover contained within the CST. The foam ring had deteriorated causing a piece of the foam to tear loose and be drawn into the suction piping of the "A" MDAFW pump.

IV. CORRECTIVE ACTIONS

To prevent similar turbine vibration issues in the future, several procedures have been revised. Additional operator training is being conducted on these procedure changes.

Concerning the gas binding problem, the foam ring was repaired. Future internal inspections of the CST are being planned. Visual inspections of the suction supply piping from the CST to the AFW pumps are being conducted to verify no additional foreign material. Removal of the floating cover is being evaluated.

V. PREVIOUS SIMILAR EVENTS

A review of the Callaway Action Request System (CARS) and Callaway LERs is continuing.

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: P