

December 19, 2003

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



ULNRC-04930

Ladies & Gentlemen:

**DOCKET NUMBER 50-483  
CALLAWAY PLANT UNIT 1  
UNION ELECTRIC CO.  
FACILITY OPERATING LICENSE NPF-30  
LICENSEE EVENT REPORT 2003-009-00  
Failure of electrical inverter results in  
Technical Specification required plant shutdown.**

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(i)(A), to report a plant shutdown required by Technical Specifications. Repairs to electrical inverter NN11 were not completed within the time allowed by Technical Specifications and a plant shutdown was performed while repairs to NN11 were completed. After repairs were completed, a plant startup was conducted and normal plant operation resumed.

*Warren A. Witt*  
Warren A. Witt  
Manager, Callaway Plant

WAW/ewh

Enclosure

IE22

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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-8 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.

<b>1. FACILITY NAME</b> CALLAWAY PLANT UNIT 1	<b>2. DOCKET NUMBER</b> 05000 483	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Failure of NN11 inverter results in a Technical Specification required plant shutdown.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	21	2003	2003	009	00	12	19	2003	FACILITY NAME	DOCKET NUMBER
										05000
										05000

<b>9. OPERATING MODE</b>	1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check all that apply)</b>								
<b>10. POWER LEVEL</b>	100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)					
		<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)					
		<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 73.71(a)(4)					
		<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(5)					
		<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A					
		<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)						
		<input type="checkbox"/> 20.2203(a)(2)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)						
		<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)						
		<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)								

**12. LICENSEE CONTACT FOR THIS LER**

NAME Mark A. Reidmeyer	TELEPHONE NUMBER (Include Area Code) (573) 676-4306
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	EF	INVT	S250	Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE			
YES (If yes, complete EXPECTED SUBMISSION DATE)		NO			MONTH	DAY	YEAR

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

At 0721, 10/20/03, with Callaway Plant at 100 percent power, inverter NN11 failed causing a momentary loss of electrical power to safety related AC bus NN01. The Control Room staff used approved plant procedures to recover from the event and stabilize plant conditions. Subsequent repair investigations extended past the 24 hour Technical Specification (T/S) Action time limit and a T/S required plant shutdown was performed. It was determined that the NN11 failure was due to a faulted static transfer switch circuit board. Repairs were completed and NN11 was declared Operable at 2202, 10/21/03. A plant startup was performed on 10/24/03 and normal plant operations resumed.

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Callaway Plant Unit 1	05000483	2003	- 009	- 00	2 OF 4

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 per 10CFR50.73(a)(2)(i)(A), a plant shutdown required by Technical Specifications.

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

Callaway Plant was in Mode 1 at 100 percent power.

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

Electrical power inverter NN11 failed on 10/20/03 and repairs were not completed prior to exceeding Technical Specification 3.8.7 Action completion time limits which required a plant shutdown.

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

At 0721, 10/20/03, while Callaway was operating at 100 percent power, electrical inverter NN11 [Model SV12075 manufactured by Solidstate Controls, Inc.] failed causing a momentary loss of voltage on safety-related 120 VAC bus NN01. Normally, the transfer between power supplies is "bumpless" where there is no interruption of power to the downstream loads and is accomplished using a static transfer switch. In this event, a zener diode failed in the static transfer switch circuit and prevented a bumpless transfer from occurring.

When the static transfer switch circuit failed, a momentary loss of power lasting approximately four seconds occurred. As a result of the momentary power loss, the following plant perturbations were experienced:

- BNLCV0112D, the Refueling Water Storage Tank (RWST) suction supply valve to "A" Centrifugal Charging Pump (CCP), opened,
- "A" and "B" Reactor Coolant Pump (RCP) Thermal Barrier Heat Exchanger component cooling water isolation valves BBHV0013 and BBHV0014 isolated,
- EFHV0043, "A" Essential Service Water to Service Air Compressor "A", closed,

and when NNO1 re-energized:

- ABPIC0001A, "A" Steam Generator Atmospheric Steam Dump (S/G ASD) controller, returned to service in the MANUAL control mode with a 50 percent OPEN signal,
- Pressurizer master Pressure Controller BBPK0455A, did not respond to increasing Reactor Coolant System (RCS) pressure.

When the CCP suction swapped to the RWST, the Control Room staff isolated normal letdown and maintained charging through the RCP seals. In response to BBPK0455A not operating as expected, a Reactor Operator took manual control of BBPK0455A, restored Pressurizer pressure to its normal band, returned BBPK0455A to automatic, and then verified that it operated correctly. After the initial response, the Control Room staff used plant off-normal procedure OTO-NN-0001 to respond to the event and complete required immediate actions. The plant was stabilized and power remained at 100 percent.

T/S 3.8.7 Action A, for Inverters – Operating, was entered at 0721, 10/20/03. This allowed 24 hours to restore the faulted inverter to Operable or enter Action B which required entering Mode 3 within 6 hours and Mode 5 in 36 hours. Troubleshooting efforts had not identified the failure mechanism by the end of

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

the 24-hour Action A time limit. In anticipation of non-compliance with T/S Action A, a controlled plant shutdown was commenced at 0100, 10/21/03 and ENS Event Notification 40263 was made at 0420 (Central Time), 10/21/03.

Investigation of the NN11 failure mechanism ultimately identified the failure to be the result of a failed zener diode in the static transfer switch circuitry. Replacement of the static transfer switch electronic circuit board corrected the fault and NN11 was declared Operable at 2202, 10/21/03. A reactor startup was performed on 10/24/03 and normal power operation resumed.

During the troubleshooting process to determine the failure mechanism of NN11, additional investigations were conducted to determine if the observed plant perturbations were to be expected for a momentary loss of power. It was determined that all alarms and automatic actions were expected results for a loss of power to NN01, except for the automatic closure of BBHV0013 and BBHV0014. A definitive cause for closure could not be established, however, research concluded the most probable cause for their operation was due to a momentary spike in the power supply for the valve flow control circuitry when power was restored to NN01.

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

The discovery of the failure of NN11 was identified through simultaneous alarm annunciators and plant responses. The failure mechanism was identified through subsequent troubleshooting efforts.

**II. EVENT DRIVEN INFORMATION**

**A. SAFETY SYSTEMS THAT RESPONDED**

No safety systems were actuated as a result of this event.

**B. DURATION OF SAFETY SYSTEM INOPERABILITY**

Inverter NN11 was inoperable for 38 hours, 41 minutes.

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

This event did not result in a significant challenge to nuclear safety or a significant risk to the health and safety of the public. With the exception of the events immediately surrounding the momentary loss of power and the restoration of power, the components powered by NN01 remained functional. Additionally, the redundant train remained operable throughout this event.

No unanticipated alarms or automatic actions were caused by this event. An approved procedure providing specific guidance for a loss of power to NN01 was available and was implemented. Plant operations were conducted in compliance with Technical Specification requirements.

Therefore, this event did not result in a significant challenge to nuclear safety.

**III. CAUSE OF THE EVENT**

The cause of the event was the failure of the static transfer switch in NN11. An extensive review of internal and external Operating Experience (OE) concluded that this particular failure was an uncommon, random failure and not documented as occurring previously.

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

**IV. CORRECTIVE ACTIONS**

Corrective actions were to replace the faulted static transfer switch circuit board.

Callaway Action Request (CAR) 200307636 was written to document this event. Procedure OTO-NN-0001 will be reviewed for potential revision to include actions identified by this event.

**V. PREVIOUS SIMILAR EVENTS**

CAR 200307636 documents a historical review of past CARs in an effort to identify similar past occurrences. No past CARs were identified that were applicable to the static transfer switch failure.

A review of past LERs from 2000 to present was performed and no similar LERs were identified.

**VI. ADDITIONAL INFORMATION**

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

System: EF

Component: INVT