

April 20, 2010

ULNRC-05695

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

10CFR50.73(a)(2)(iv)(A)



Ladies and Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2010-003-00
SAFETY SYSTEM ACTUATION AFTER LOSS OF A SWITCHYARD BUS**

The enclosed licensee event report is submitted in accordance with 10CFR50.73(a)(2)(iv)(A) to report a valid automatic actuation of systems listed in 10CFR50.73(a)(2)(iv)(B):

- (3) Emergency core cooling systems (ECCS) for pressurized water reactors (PWR),
- (6) PWR auxiliary or emergency feedwater systems,
- (8) Emergency AC electrical power systems, and
- (9) Emergency service water systems which do not normally run.

This letter does not contain new commitments.

Sincerely,

A handwritten signature in dark ink, appearing to read "D. Neterer", written over a horizontal line.

David W. Neterer
Plant Director

CSP/nls
Enclosure

ULNRC-05695

April 20, 2010

Page 2

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Index and send hardcopy to QA File A160.0761

Hardcopy:

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(Certrec receives ALL attachments as long as they are non-safeguards and may be publicly disclosed.)

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NRC FORM 366 (9-2007)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB: NO. 3150-0104		EXPIRES: 08/31/2010												
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)										Estimated burden per response to comply with this mandatory 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 and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 an 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 05000483			3. PAGE 1 OF 6											
4. TITLE Safety System Actuation After Loss of a Switchyard Bus																			
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED										
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME		DOCKET NUMBER								
02	19	2010	2010	003	00	04	20	2010	FACILITY NAME		DOCKET NUMBER								
9. OPERATING MODE 1			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)																
10. POWER LEVEL 100%			<input type="checkbox"/> 20.2201(b)		<input type="checkbox"/> 20.2203(a)(3)(i)		<input type="checkbox"/> 50.73(a)(2)(i)(C)		<input type="checkbox"/> 50.73(a)(2)(vii)										
			<input type="checkbox"/> 20.2201(d)		<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)										
			<input type="checkbox"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)										
			<input type="checkbox"/> 20.2203(a)(2)(i)		<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)										
			<input type="checkbox"/> 20.2203(a)(2)(ii)		<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)										
			<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)										
			<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)										
			<input type="checkbox"/> 20.2203(a)(2)(v)		<input type="checkbox"/> 50.73(a)(2)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> OTHER										
			<input type="checkbox"/> 20.2203(a)(2)(vi)		<input type="checkbox"/> 50.73(a)(2)(i)(B)		<input type="checkbox"/> 50.73(a)(2)(v)(D)		Specify in Abstract below or in NRC Form 366A										
12. LICENSEE CONTACT FOR THIS LER																			
FACILITY NAME T.B. Elwood, Supervising Engineer, Regulatory Affairs and Licensing								TELEPHONE NUMBER (Include Area Code) 314-225-1905											
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	EA	XFMR		Yes															
14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO								15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR							
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) Loss of B Train Off-site Vital Power Callaway Plant was in Mode 1 at 100 percent power on February 19, 2010. Work was in progress to install grounds on a switchyard breaker. At 2145, the 'A' Safeguard Transformer was lost which resulted in loss of the 'A' switchyard bus. Electricians in the switchyard reported hearing a loud boom and saw what looked like an arc off of one of the ends of the 'A' safeguard transformer, and then saw sparks cascading down. The loss of the 'A' switchyard bus combined with the breaker the electricians were working on being out of service, resulted in loss of 'B' train offsite power with subsequent actuations consistent with loss of one vital AC train. The 'B' emergency diesel generator started and loaded. 'A' train offsite vital power and emergency diesel generator were available. Emergency systems responded as expected, except for one steam generator blowdown isolation valve. The cause for the loss of the 'A' Safeguard Transformer was a low side phase-to-phase fault external to the 'A' Safeguard Transformer. The most probable cause of the fault was a conductive foreign material or that an animal bridged the air gap between transformer low side bushing terminals. No evidence of the fault initiator was found and therefore a root cause could not be verified.																			

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 6
		2010	- 003	- 00	

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

1. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):

Callaway Plant switchyard and offsite power to 4160 VAC safety related busses:

The 345-kV Callaway switchyard [EIIS system FK] consists of circuit breakers [EIIS component BKR], disconnect switches [EIIS component MOD], buses [EIIS component BU], transformers [EIIS component XFMR], and associated equipment. The switchyard is arranged in a breaker-and-a-half configuration as shown in Callaway FSAR Site Addendum (SA) Figure 8.2-5, "345 KV One Line and General Arrangement Callaway Plant." The figure is shown on the last page of this LER. The switchyard breakers mentioned in this LER are designated as MDV## where ## is the specific breaker number. On the figure, they are shown as V##.

A 345/13.8-kV Safeguard Transformer is connected directly to each 345-kV bus through a disconnect switch which is capable of interrupting magnetizing current. Safeguard Transformer A is a three-winding transformer rated 60/80/100-MVA. Safeguard Transformer B is a two-winding transformer rated 30-MVA. Each transformer has two low side breakers connected so that either transformer may supply via underground duct a 13.8/4.16-kV Engineered Safety Feature (ESF) Transformer [EIIS system EA, EIIS component XFMR] at the plant. The 13.8-kV breakers are electrically interlocked so that the low side windings of the Safeguard Transformers cannot be connected together.

Another offsite supply consists of a 345-kV overhead circuit from the switchyard to the Start-up Transformer [EIIS system EA, EIIS component XFMR]. A tap off one of the secondaries of this Start-up Transformer supplies the second ESF Transformer. The two ESF transformers with their associated capacitor banks and supply circuits from the 345-kV Switchyard provide two independent sources of offsite power for the Class 1E buses [EIIS system EB, EIIS component BU], NB01 and NB02.

The normal lineup is for ESF Transformer 1 (XNB01) to be supplied power from one of the Safeguard Transformers. ESF Transformer 2 (XNB02) is supplied from the Startup Transformer. Transformer XNB01 is the normal source of offsite power to the "A" train vital 4160-volt bus NB01. Transformer XNB02 is the normal source of offsite power to the "B" train vital 4160-volt bus NB02. The "A" emergency diesel generator, NE01 [EIIS system EK, EIIS component DG], is the onsite source of power to bus NB01. The "B" emergency diesel generator, NE02 [EIIS system EK, EIIS component DG], is the onsite source of power to bus NB02.

2. INITIAL PLANT CONDITIONS:

Callaway Plant was operating in Mode 1 at 100 percent power at the time of the event on February 19, 2010. Switchyard breakers MDV43 [EIIS system FK, EIIS component BKR] and MDV45 were open and out-of-service. This resulted in the "A" switchyard bus as the power supply to the Startup Transformer via switchyard breaker MDV41.

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	3 OF 6
		2010	- 003	- 00	

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

Offsite power to bus NB02 was supplied by the Startup Transformer via PA02 and transformer XNB02.

Electricians were in the switchyard hanging grounds on two phases of switchyard breaker MDV43.

3. EVENT DESCRIPTION:

On February 19, 2010, at 2145, the "A" Safeguard Transformer was lost which resulted in switchyard breakers MDV41, MDV51, MDV71 and MDV81 tripping open and subsequent loss of the "A" switchyard bus. Electricians in the switchyard reported hearing a loud boom and saw what looked like an arc off of one of the ends of the "A" Safeguard Transformer, and then saw sparks cascading down.

Since switchyard breakers MDV45 and MDV43 were already open and out-of-service, the loss of the "A" switchyard bus resulted in loss of off-site power to the Startup Transformer and transformer XNB02.

Loss of the Startup Transformer and XNB02 resulted in loss of offsite power to "B" train bus NB02 which, in turn, resulted in the following actuations:

- load shed on "B" train vital 4160 volt bus (NB02),
- shutdown sequencer actuation for bus NB02,
- "B" train emergency diesel generator start,
- "B" centrifugal charging pump (CCP) start (an emergency core cooling system [ECCS] pump) [EIIS system BQ, EIIS component P],
- turbine driven auxiliary feedwater pump (AFP) start [EIIS system BA, EIIS component P],
- realignment of "B" train essential service water (ESW) valves [EIIS system BI, EIIS component HCV],
- "B" and "A" ESW pump starts [EIIS system BI, EIIS component P],
- "B" train motor driven AFP start [EIIS system BA, EIIS component P],
- steam generator blowdown [EIIS system WI] and sample isolations [EIIS system KN].

"B" emergency diesel generator started and carried loads on NB02. "A" train offsite vital power and emergency diesel generator were available. The preceding actuations were consistent with loss of one vital AC train.

After it was determined that the "A" Safeguard Transformer was the initial cause of the loss of the "A" switchyard bus, the lockout was cleared, the Safeguard Transformer was isolated by opening MDV21.

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	4 OF 6
		2010	- 003	- 00	

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

Switchyard breakers were closed on February 20, 2010, at the following times:

0115 MDV81

0122 MDV71

MDV51 auto-reclosed when the reclosure switch was taken to "Auto"

0132 MDV41 was closed which energized the Startup Transformer and XNB02.

At 0222 offsite power was restored to NB02.

Emergency systems responded as expected with the following exception:

Loss of power to bus NB02 initiates a steam generator blowdown isolation signal (SGBIS). During the SGBIS, valve BMHV0002, steam generator "B" blowdown isolation valve, had dual indication. Attempts to shut the valve were unsuccessful. Valve BMV0013, steam generator "B" blowdown outer containment isolation valve (downstream isolation valve for valve BMHV0002), was closed at 2238 which isolated steam generator blowdown from the "B" steam generator. Investigation indicated the valve was fully closed but the limit switch was not made up. The stem mounted arm that actuates the limits switch was adjusted and proper limit switch indication was restored.

4. ASSESSMENT OF SAFETY CONSEQUENCES:

This event was evaluated with the Callaway PRA model. The evaluation determined the conditional core damage probability (CCDP) of this event was less than 1E-6; therefore, this event was of very low risk significance. Use of the PRA model to evaluate the event provides for a comprehensive, quantitative assessment of the potential safety consequences and implications of the event, including consideration of alternative conditions beyond those analyzed in the FSAR.

In addition, the deterministic Accident Analyses already assume that offsite power is unavailable and thus the degraded offsite AC power system did not impact the results contained in the Accident Analyses of record.

5. REPORTING REQUIREMENTS:

This LER is submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A) to report a valid automatic actuation of systems listed in 50.73(a)(2)(iv)(B):

- (3) Emergency core cooling systems (ECCS) for pressurized water reactors (PWR),
- (6) PWR auxiliary or emergency feedwater systems,
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- (9) Emergency service water systems which do not normally run.

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	5 OF 6
		2010	- 003	- 00	

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

6. CAUSE OF THE EVENT:

The loss of the "A" switchyard bus and the "A" Safeguard Transformer were self-revealing. The cause for the loss of the "A" Safeguard Transformer was a low side phase-to-phase fault external to the 'A' Safeguard Transformer. The most probable cause of the fault was a conductive foreign material or that an animal bridged the air gap between transformer low voltage bushing terminals. No evidence of the fault initiator was found and therefore a root cause could not be verified.

7. CORRECTIVE ACTIONS:

Diagnostic testing and inspection of the 'A' Safeguard Transformer (i.e. oil/gas analysis, power factor, high potential, leakage reactance, sweep frequency response analysis) was performed to ensure the transformer was in an acceptable condition to return to service.

A preventive maintenance task has been established for periodically checking the switchyard fences for holes/gaps that would easily allow animals to enter.

8. PREVIOUS SIMILAR EVENTS:

On August 6, 2006, Callaway Plant lost switchyard bus "B" due to relay testing. The loss of the bus resulted in loss of offsite power to the "A" safety train and subsequent diesel generator and other system actions. The event is described in Callaway Plant LER 2006-005-00.

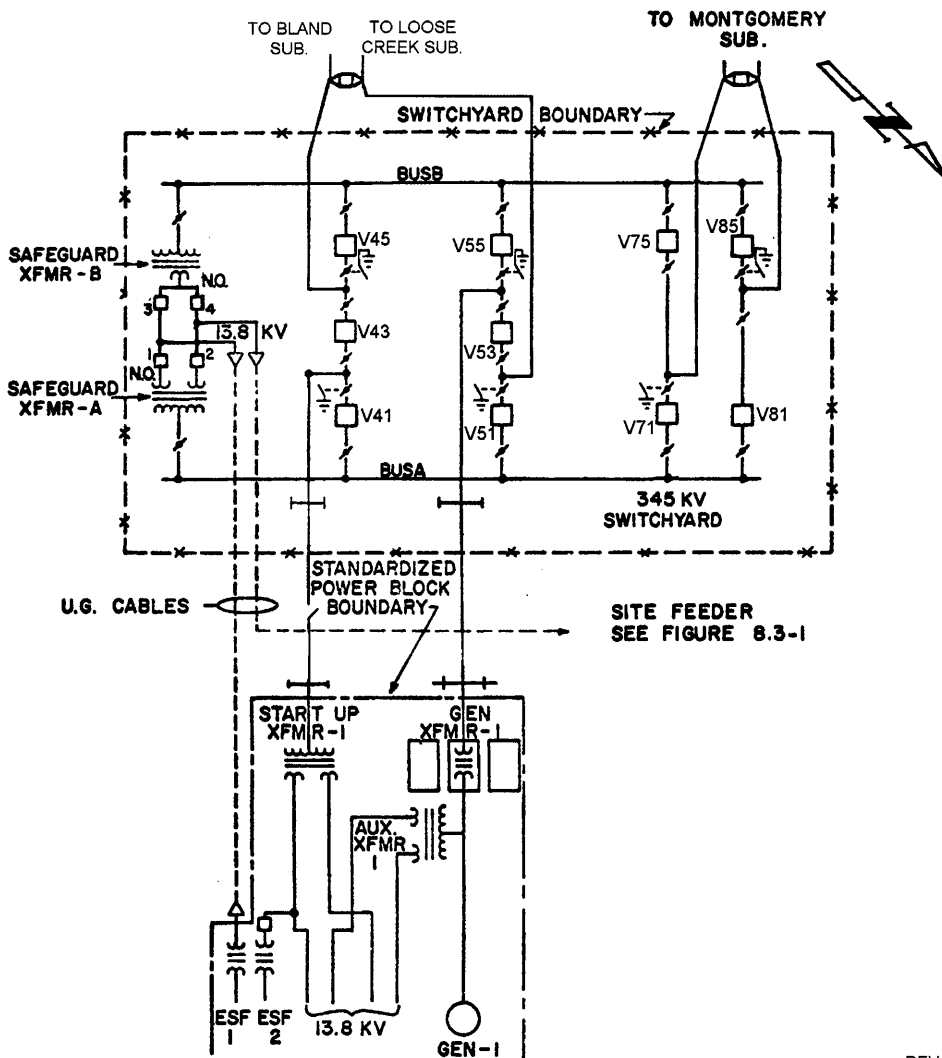
9. OTHER INFORMATION:

A figure of the Callaway switchyard is on the next page.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Callaway Plant Unit 1	05000483	2010	- 003	- 00	6 OF 6

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



UNION ELECTRIC COMPANY
CALLAWAY PLANT
FINAL SAFETY ANALYSIS REPORT

FIGURE 8.2-5
345 KV ONE LINE AND
GENERAL ARRANGEMENT
CALLAWAY PLANT