



JUL 14 2017

L-2017-126
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Re: St. Lucie Unit 2
Docket No. 50-389
Reportable Event: 2017-002-00
Date of Event: May 15, 2017
2A3 4.16 KV Bus De-Energization Due to Voltage Meter Failure

Licensee Event Report 2017-002-00 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Respectfully,

A handwritten signature in blue ink that reads "Daniel DeBoer".

Daniel DeBoer
Site Director
St. Lucie Plant

DD/KWF

Attachment

cc: USNRC Regional Administrator, Region II
USNRC Senior Resident Inspector, St. Lucie Nuclear Plant



LICENSEE EVENT REPORT (LER)
(See Page 2 for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@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 St. Lucie Unit 2	2. DOCKET NUMBER 05000389	3. PAGE 1 Of 3
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4. TITLE
2A3 4.16 KV Bus De-Energization Due to Voltage Meter Failure

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
5	15	2017	2017	002	0	07	14	2017	FACILITY NAME	DOCKET NUMBER
										05000
										05000

9. OPERATING MODE **11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)**

1	<input type="checkbox"/> 20.2201(b)	<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)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
100	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<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)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT K. W. Frehafer – Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (772) 467-7748
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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
B	EK	MTR	G080	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)

On May 15, 2017, at 1800 hours, the St. Lucie Unit 2 2A3 4.16 KV Bus undervoltage protection relays actuated resulting in a loss of power to the bus. The 2A emergency diesel generator (EDG) did not respond to this event as this EDG had been properly removed from service for pre-planned maintenance. The 2A3 4.16 KV Bus was restored to service at 2340 hours.

The 2A3 4.16 KV Bus was de-energized when an internal fault within the 2A EDG local voltmeter blew fuses that removed power from the undervoltage relays that resulted in the loads powered from this bus being stripped. Corrective actions included replacing the fuses and replacing the susceptible local EDG voltmeter, as well as the interim use of caution tags on the susceptible voltmeter selection switches until modifications to remove the vulnerability are complete.

During this event the B train safety related electrical busses remained operable and energized. All other equipment responded to the event per the existing plant conditions and the unit remained at 100% power. The A train safety related electrical bus was restored to service well within the Technical Specification allowed outage time. Therefore, this event had no significant impact on the health and safety of the public.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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1. FACILITY NAME	2. DOCKET	6. LER NUMBER		
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REV NO.
		2017	- 002 -	0

NARRATIVE

Description

On May 15, 2017, St. Lucie Unit 2 was in Mode 1 at 100 percent reactor power. The 2A emergency diesel generator (EDG) [EIS:DG] was removed from service due to planned maintenance. At 1800 hours, the 2A3 4.16 KV Bus undervoltage protection relays [EIS:27] actuated resulting in a loss of power to the bus [EIS:SWGR]. However, the 2A EDG did not respond to this event as this EDG had been properly removed from service for pre-planned maintenance. The troubleshooting team identified blown potential transformer (PT) fuses [EIS:FU] in the 2A EDG metering circuit. The failed fuses were replaced and the 2A3 4.16 KV Bus was repowered at 2340 hours. The required NRC ENS notification for the system actuation was completed by 0017 hours on May 16, 2017. During this event the B train safety related electrical busses remained operable and energized and the unit remained at 100% power.

Cause of the Event

The direct cause of the bus de-energization was determined to be failed secondary side PT fuses which provide power to the under voltage/degraded grid sensing circuitry. The root cause was an internal failure within the local 2A EDG GE AB40 voltmeter [EIS:MTR] causing a phase to phase short across the variable resistor. This condition resulted in the failure of the secondary PT fuses, resulting in the actuation of the 2A3 4.16 KV Bus UV relays. A contributing cause to this event was a latent design deficiency from original construction; the meter circuit did not have isolation fuses from the PT fuses. This allows an internal fault of the meter to open the protective circuit fuses and subsequently de-energize the UV relays.

Analysis of the Event

Even though the 2A EDG did not respond to the loss of the 2A3 bus because it was properly removed from service, the 2A3 4.16 KV bus UV protection relays did respond to the event and their actuation is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A).

Two conditions contributed to the plant response to the event:

1. The local voltmeter selector switch was in the 1-3 position. This position allowed the meter fault to be simultaneously communicated to both phases of the PT fuses. These fuses provide sensing power to the UV relays which provide electrical isolation to the safety related 2A3 4.16 KV bus. Upon sensing the loss of power to the onsite power system, the safety portion of the system is automatically isolated from the non-safety portion of the system by the operation of circuit breakers on the lines between non-safety and safety related buses.
2. The 2A EDG was out of service for the on-line preventive maintenance period. This precluded the 2A EDG from starting and assuming the loads of the 2A3 4.16 KV bus. Section 8.3 of the UFSAR, Table 8.3-6 4.16 KV Safety Related System – Failure Modes and Effects Analysis describes the consequences of loss of offsite and EDG power to the 2A3 or 2B3 bus. The analysis states that the loss of an EDG in this case will result in the loss of a one safety related bus, however, the redundant safety system remains to supply the redundant safety related loads. Additionally, DC control power in this event remained unaffected, and the A side instrument inverters remained powered throughout by the A side DC battery.

FPL performed extent of condition/extent of cause reviews for AC voltage metering circuits containing the GE AB40 voltmeter, as well as other voltmeters, for both units' safety related 4160 and 480 volt buses. The review determined that, with one exception, all remote voltage indication associated with the reactor turbine generator board (RTGB) voltmeters are all fused providing isolation of the metering circuit from their respective protective functions. The exception involves the Unit 2 local EDG voltmeters. The U2 EDG local metering circuits were determined to be the only safety related 4160 and 480 volt metering circuit whose failure could initiate a



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NARRATIVE

protective function (e.g., blown PT fuses resulting in the de-energization of its associated bus UV relays). These reviews also identified several metering circuits that were not fuse protected; however, in these cases any proposed meter failure would only annunciate with no corresponding automatic protective function.

Safety Significance

The 2A EDG received a start signal from the under voltage condition on the 2A3 bus, but did not start as the EDG had been properly removed from service for preplanned maintenance. Upon a loss of indicated power to the potential transformers, the 2A3 4.16 KV bus responded appropriately for the existing plant conditions (e.g., the under voltage circuit relays actuated, the incoming breaker to the 4.16 KV bus opened, and a start signal was provided to the associated 2A EDG which was properly removed from service). Although the safety related 2A3 loads were lost during this event, the redundant loads serviced by the 2B3 train 4.16 KV safety related electrical bus remained unaffected by the event and the unit remained at 100% power.

Normal power was restored to the 2A3 4.16KV bus within 6 hours of the event, well within the allowable 8-hour Technical Specification action statement for restoring the 2A3 4.16 KV bus. Therefore, this event had no significant impact on the health and safety of the public.

The Unit 2 UFSAR section 8.3 describes Failure Modes and Effects for the 4.16 KV safety related system. This analysis bounds the observation of the event described in this LER.

Corrective Actions

1. As an interim corrective action until action 4 below is completed, caution tags were placed on the Unit 2 EDG voltmeter selector switches directing that the switches not be left in the 1-3 position.
2. The local voltmeter for the 2A EDG was replaced.

The following corrective action is being managed under the Corrective Action Program:

3. The local voltmeter for the 2B EDG will be replaced.
4. FPL is developing a modification to the 2A and 2B EDG metering circuit to install coordinated fuses between the metering circuit and the PT fuses to isolate the metering circuit from the UV relays in the event of a voltmeter fault.

Failed Components Identified

General Electric AB40 voltmeters

Additional Information

None