

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9005220165      DOC. DATE: 90/05/15      NOTARIZED: NO      DOCKET #  
 FACIL: 50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co.      05000335  
 AUTH. NAME      AUTHOR AFFILIATION  
 WEEKS, J.W.      Florida Power & Light Co.  
 SAGER, D.A.      Florida Power & Light Co.  
 RECIP. NAME      RECIPIENT AFFILIATION

SUBJECT: LER 90-005-00: on 900418, EDG automatic start due to loss of electrical bus caused by breaker failure.

W/9      ltr.

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EXTERNAL:	EG&G STUART, V.A	4 4	L ST LOBBY WARD	1 1
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MAY 15 1990

L-90-176  
10 CFR 50.73

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

Gentlemen:

Re: St. Lucie Unit 1  
Docket No. 50-335  
Reportable Event: 90-05  
Date of Event: April 18, 1990  
Emergency Diesel Generator Automatic Start due to  
Loss of Electrical Bus Caused by Breaker Failure

The attached Licensee Event Report is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,

A handwritten signature in dark ink that reads "D. A. Sager". The signature is written in a cursive style with a large, prominent "D" and "S".

D. A. Sager  
Site Vice President  
St. Lucie Plant

DAS/GRM/slh

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, St. Lucie Plant

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# LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <b>St. Lucie Unit 1</b>	DOCKET NUMBER (2) <b>0 5 0 0 0 3 3 5</b>	PAGE (3) <b>1 OF 0 3</b>
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TITLE (4)  
**Emergency Diesel Generator Automatic Start Due to Loss of Electrical Bus Caused by Breaker Failure**

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)
0 4	1 8	9 0	9 0	0 0 5	0 0	0 5	1 5	9 0	N/A		0 5 0 0 0 1 1 1

OPERATING MODE (9) <b>5</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check one or more of the following) (11)						
POWER LEVEL (10) <b>0 0 0</b>	20.402(b)	20.405(c)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)	OTHER (Specify in Abstract below and in Text NRC Form 366A)	
	20.405(a)(1)(I)	50.36(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	73.71(c)		
	20.405(a)(1)(II)	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(vii)			
	20.405(a)(1)(III)	50.73(a)(2)(I)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)			
	20.405(a)(1)(IV)	50.73(a)(2)(II)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)			
20.405(a)(1)(V)	50.73(a)(2)(III)	<input type="checkbox"/>	50.73(a)(2)(x)				

**LICENSEE CONTACT FOR THIS LER (12)**

NAME <b>J. W. Weeks, Shift Technical Advisor</b>	TELEPHONE NUMBER
	AREA CODE
	<b>4 0 7 4 6 5 - 3 5 5 0</b>

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	E L	B K R	W 1 2 0	Y					

**SUPPLEMENTAL REPORT EXPECTED (14)**

<input type="checkbox"/> 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)**

At 1105 on April 18, 1990, while St. Lucie Unit 1 was in Mode 5, the Auxiliary Transformer breaker to the 1B2 4160V bus (breaker no. 20301) was being racked in to prepare for the planned startup of the unit. When the breaker control fuses were installed, the breaker closed in. This caused the 1B Startup Transformer to be shorted to the Main Generator and the Main Transformers, which were deenergized. As a result, the 1B Startup Transformer feeder breaker to the 2B4 4160V bus (breaker no. 2-20705) then tripped on overcurrent. Power was lost to the 'B' side electrical buses. The 1B Emergency Diesel Generator then started and picked up the 1B3 emergency bus loads as designed.

The root cause of the event was equipment failure. Excessive wear on the breaker closing mechanism mounting plates allowed the closing latch mechanism to move excessively which prevented the closing latch from performing its designed function. The charging spring motor charged the closing spring but the closing latch would not latch the mechanism. This allowed the breaker to close in as soon as the closing spring was charged.

Corrective actions taken were to test the 1B Startup Transformer, the Auxiliary Transformers, the Main Transformers, and the Main Generator to ensure no damage had occurred to them, and to remove the Auxiliary Transformer breaker and ship it to the repair vendor for troubleshooting and repair. Other similar breakers were inspected. Four were shipped to the vendor for repair.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  St. Lucie Unit 1	DOCKET NUMBER (2)  050033590	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		00	05	00	02	OF	03

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

**DESCRIPTION OF THE EVENT**

At 1105 on April 18, 1990, St. Lucie Unit 1 was in Mode 5 after completing a refueling outage. Plant personnel were racking the 4160V circuit breaker number 20301 into its cubicle in preparation for plant startup. This breaker is the Auxiliary Transformer (EIS:EL) supply breaker to the 1B2 4160V switchgear. This breaker is closed in by the plant operators when the unit is on line and on-site power is being transferred from the off-site supplied Startup Transformers (EIS:EA) to the Auxiliary Transformers powered from the unit Main Generator (EIS:EL).

At the time the breaker was being racked in, the Main Generator was deenergized and was not spinning. The Main Transformers (EIS:EL) and Auxiliary Transformers were also deenergized. After the breaker was installed in its cubicle, the control fuses for operating the breaker were installed. At this time the spring charging motor charged the closing spring, but the latching mechanism failed to latch open the closing spring and the breaker closed. No operating switches were manipulated. When the breaker closed, the Auxiliary Transformer became energized from the Startup Transformer, as did the Main Generator and Main Transformers. This caused a large in-rush of current which caused the 1B Startup Transformer feeder breaker number 2-20705 to trip on overcurrent. Subsequently all 4160V power to the 'B' side electrical buses was lost. The 1B Emergency Diesel Generator (EIS:EK) started on detection of an undervoltage condition on the 1B3 emergency bus (EIS:EB) and the Diesel Generator picked up the emergency bus loads as designed. The faulty Auxiliary Transformer breaker, which was now deenergized, was then racked back out of its cubicle.

Troubleshooting commenced to determine whether damage had occurred to the Startup Transformer or its feeder breaker. At 1345 on April 18, 1990, it was determined that the Startup Transformer breaker had operated correctly and was not damaged. At this time the breaker was closed in which restored normal power to the non-emergency buses. The 1B Diesel Generator was paralleled to the grid and was then secured. Off-site power was then carrying all buses in the normal configuration.

The faulty breaker was bench tested and the charging motor operated but the breaker failed to latch open when control power was provided to the breaker. This had not occurred when it was bench tested prior to installation in its cubicle. The breaker was then shipped to the repair vendor for further troubleshooting and repair.

**CAUSE OF THE EVENT**

The root cause of the event is due to equipment failure. The front plates and splined bearings on the breaker frame are the same size for larger breakers (Westinghouse model nos. 50DHP350 and 75DHP500) as for smaller breakers (Westinghouse model no. 50DHP250). The larger breakers have larger charging motors and charging springs which induce more force on the mounting frames. Therefore, after repeated spring chargings, the holes in the breaker frame where the plates and bearings are press-fit mounted became enlarged, allowing some movement to take place. This movement was enough to cause the closing latch to fail to engage when the closing spring was charged, thus allowing the breaker to close inadvertently.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  St. Lucie Unit 1	DOCKET NUMBER (2)  0500033590	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		0	05	00	03	03	OF

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

**ANALYSIS OF THE EVENT**

The Auxiliary Transformer breaker was racked into its cubicle in preparation for the unit startup. It had been previously bench tested and was in working order. However, when its control fuses were installed, it malfunctioned and closed in. This caused the Main Generator, Main Transformers, and Auxiliary Transformers to become energized from the 1B Startup Transformer. An overcurrent condition resulted causing the Startup Transformer breaker to trip. This then caused loss of power to the 'B' side electrical buses. The 1B Emergency Diesel Generator started on undervoltage on the 1B3 emergency bus. The Diesel Generator picked up the 1B3 bus as designed and power was maintained on the emergency bus.

The Auxiliary Transformers and their respective switchgear are not safety related components. However, the failure of this breaker caused the loss of electrical power to the 'B' side, including the safety related emergency bus; thus forcing the 1B Emergency Diesel Generator to start, reenergize the 1B3 bus, and perform its designed safety function. Therefore this event is reportable to the NRC under 10CFR50.73(a)(2)(iv) as any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature.

Due to the fact that the 1B Emergency Diesel Generator started and loaded the 1B3 emergency bus as designed, and that the 'A' side electrical buses were not affected; the health and safety of the public was not endangered at any time during this event.

**CORRECTIVE ACTIONS**

The 1B Startup Transformer, its feeder breaker, Auxiliary Transformers, Main Transformers, and Main Generator were tested to ensure no damage had occurred.

The faulty breaker was removed and sent to the repair vendor for troubleshooting and repair. The vendor recommended spot welding the bearings in place on the breaker frames to prevent future movement. This was reviewed by FPL Engineering and was approved. The breaker was repaired.

All other similar breakers on Unit 1 were inspected. Four were found to exhibit the same wear characteristics. These breakers were found to function properly; however, they were sent to the repair vendor for rework to preclude future failures.

All similar breakers on Unit 2 will be inspected during the next refueling outage scheduled for September, 1990.

**ADDITIONAL INFORMATION**

**COMPONENT FAILURES**

Westinghouse circuit breaker model nos. 50DHP350 and 75DHP500.

**PREVIOUS SIMILAR EVENTS**

Failures of this type had been previously identified by the repair vendor during the overhaul of these breaker models at other facilities. No inspection criteria is provided in the Manufacturer's Technical Manual for checking for excessive axial or radial movement of the bearings.