

# CATEGORY 1

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9612260079 DOC.DATE: 96/12/20 NOTARIZED: NO  
 FACIL:50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co.  
 AUTH.NAME AUTHOR AFFILIATION  
 NOBLE,R.E. Florida Power & Light Co.  
 STALL,J.A. Florida Power & Light Co.  
 RECIPIENT NAME RECIPIENT AFFILIATION

DOCKET #  
05000335

SUBJECT: LER 96-016-00:on 961122,insufficient testing & maint were noted on 125 vdc bus cross-tie breakers.Caused by lack of effective maint & testing.All four 125 vdc cross-tie breakers will be refurbished.W/961220 ltr.

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Florida Power & Light Company, P.O. Box 128, Fort Pierce, FL 34954-0128

December 20, 1996

L-96-338  
10CFR 50.73

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

Re: St. Lucie Unit 1  
Docket No. 50-335  
Reportable Event: 96-016  
Date of Event: November 22, 1996  
Insufficient Testing and Maintenance on 125 VDC Cross-tie Breakers

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,

J. A. Stall  
Vice President  
St. Lucie Plant

JAS/REN

Attachment

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

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an FPL Group company

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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: 60.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20565-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

<b>FACILITY NAME (1)</b> ST LUCIE UNIT 1	<b>DOCKET NUMBER (2)</b> 05000335	<b>PAGE (3)</b> 1 OF 6
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**TITLE (4)**  
Insufficient Testing and Maintenance on 125 VDC Bus Cross-tie Breakers

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 NAME	DOCKET NUMBER
11	22	96	96	016	00	12	20	96	N/A	
									N/A	

**OPERATING MODE (9)** 1

**POWER LEVEL (10)** 100

**THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)**

20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
20.2203(a)(2)(iii)	50.38(c)(1)	X 50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iv)	50.38(c)(2)	50.73(a)(2)(vii)	

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

<b>NAME</b> Richard E. Noble, Licensing Engineer	<b>TELEPHONE NUMBER (Include Area Code)</b> (561) 467 - 7022
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**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

**SUPPLEMENTAL REPORT EXPECTED (14)**

<b>YES</b> (If yes, complete EXPECTED SUBMISSION DATE).	X	<b>NO</b>	<b>EXPECTED SUBMISSION DATE (15)</b>	MONTH	DAY	YEAR
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**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On November 22, 1996, with St. Lucie Unit 1 operating in Mode 1 at 100 percent reactor power, a test of the 1AB-1B cross-tie breaker between the 1AB "swing" bus and the 1B 125 vdc bus was performed to confirm operability of the installed undervoltage release mechanism. Operability of the cross-tie breakers was questioned during a licensee initiated design review. The test resulted in a determination that the undervoltage release mechanism was inoperable as a result of age related degradation. The degraded condition of the tested breaker was evaluated as being applicable to the three other dc tie breakers based on their similar design and operating history. Based on the potential for common degraded condition of these breakers, the dc bus transfer function and, consequently, the "C" AFW pump were declared out of service. The appropriate technical specification limiting condition for operation action was entered for the "C" AFW pump. The two breakers on the swing bus were removed. Maintenance and testing was performed and the breakers were returned to service within the time specified in the technical specifications. The transfer function has been restored and is currently in service.

Corrective actions include: 1)The two 125 vdc molded case breakers on the 1AB bus were removed, cleaned and exercised and then returned to service. 2)A review was performed for both units which determined that no other dc breakers utilized undervoltage release devices. 3)All four cross-tie breakers on Unit 1 will be refurbished by the vendor during the next refueling outage. 4)A surveillance and maintenance schedule will be established for the cross-tie breakers. 5)A preventative maintenance schedule will be established to monitor molded case circuit breakers for age related degradation.

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

**DESCRIPTION OF THE EVENT**

During a licensee initiated design review, a condition was discovered which could potentially prevent a manual transfer of the dc power supply to the "C" turbine driven Auxiliary Feedwater (AFW) (EIS:BA) pump. Manual transfer of the "C" AFW dc power supply is required to mitigate certain design basis events. Manual transfer is dependant on proper functioning of the undervoltage release mechanism of at least one of two molded case circuit breakers connected in series separating the 125 vdc 1AB "swing" bus (EIS:EI) from a postulated safety bus (1A or 1B) fault (refer to figure 1). It was determined that these undervoltage release mechanisms had not been tested for an extended period, possibly since initial plant startup.

On November 22, 1996, with St. Lucie Unit 1 operating in Mode 1 at 100 percent reactor power, a test of the 1AB-1B breaker (one of the two cross tie breakers between the 1AB bus and the 1B 125 vdc bus) was performed to confirm operability of the undervoltage release mechanism. The test determined that the undervoltage release mechanism was inoperable as a result of age related degradation. The degraded condition of the tested breaker was evaluated as being applicable to the three other dc tie breakers based on their similar design and operating history. The "C" AFW pump was declared out of service. The appropriate technical specification limiting condition for operation action was entered for the "C" AFW pump. The two breakers adjacent to the swing bus were removed. Maintenance and testing was performed and the breakers were returned to service within the time specified in the technical specifications. The transfer function has been restored and is currently in service.

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**CAUSE OF THE EVENT**

The event was discovered as a result of a detailed licensee design and UFSAR review. The primary cause for the common failure condition of the undervoltage release devices on the 125 vdc cross-tie breakers was lack of effective maintenance and testing. Movement of the strike pin which trips the breaker when activated by the undervoltage device was inhibited due to lubricant degradation or dust accumulation or a combination of these age related factors. Although proper breaker operation has been observed on an ongoing basis during routine swing bus transfer operations, the undervoltage release function is not exercised during normal bus transfer.

The critical role of the undervoltage release in the performance of AFW for certain design basis scenarios (i.e., scenarios requiring manual transfer of the swing 1AB 125 vdc bus to repower the "C" AFW pump) was not recognized and consequently not properly translated in maintenance and testing intervals. The installation of an integral undervoltage device into molded case circuit breakers is a unique application for the St Lucie plants and is used only in these dc cross-tie breakers.

**ANALYSIS OF THE EVENT**

This event was determined to be reportable under 50.72 (b)(2)(iii)(D) and 50.73(a)(2)(v) as "any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: mitigate the consequences of an accident." The condition of the 125 vdc cross-tie breakers resulted in a determination that the AFW system may not have performed as required during certain specific design basis events.

**Description of AFW System and 125 VDC Design**

The AFW system consists of three trains. The "A" and "B" train consist of independent and redundant flow paths and 100% ac motor driven pumps. Electrical power is supplied from the respective "A" and "B" safety trains. The "C" AFW train utilizes redundant flow paths and a greater capacity steam turbine driven turbine pump. Control power for the turbine throttle valve and associated motor operated valves is supplied from the 1AB 125 vdc swing bus which can be powered from either the safety related 1A or 1B 125 vdc busses. Transfer of the 1AB bus is accomplished manually via switches in the control room when the swing bus is aligned to the bus that experienced the single failure.

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ANALYSIS OF THE EVENT Continued

Assessment of Safety Significance

The degraded condition of the breaker undervoltage mechanisms on the 125 vdc cross-tie breakers could have prevented successful manual 1AB bus transfer during specific design basis events. Only one of two breakers operated in series would have been required to function to meet the specific design scenarios. Although only one of the two breakers was determined to be inoperable by direct testing, the degraded condition of the undervoltage device was considered applicable to all four cross-tie breakers.

The specific design basis events that require manual transfer of the 1AB bus are associated with restoring the "C" AFW pump in a loss of main feedwater scenario. The two specific scenarios are: (1) Loss of offsite power, coincident with a main feedwater line break resulting in a faulted steam generator, with a dc bus failure on the train opposite the faulted generator and the 1AB "swing" bus aligned to the bus that experienced the single failure. (2) Loss of offsite power, coincident with a high energy line break on the discharge of one motor driven AFW pump, with a dc bus failure on the train opposite the faulted generator and the 1AB "swing" bus aligned to the bus that experienced the single failure. Both of these events are very specific low probability scenarios. Based on event frequencies from the Probabilistic Safety Assessment (PSA), the frequency of the above described events is on the order of 1E-10. If manual 1AB bus transfer from the control room could not be accomplished due to the condition of the undervoltage release devices on the tie breakers, additional manual actions outside the control room would be required to restore AFW. If steam generator cooling could not be restored, the emergency operating procedures require the establishment of feed and bleed to maintain core cooling. Based on the above, the protection of the health and safety of the public was not adversely affected by the event.

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CORRECTIVE ACTIONS

1. The two 125 vdc molded case breakers on the 1AB bus were removed, cleaned and exercised and returned to service.
2. A review was performed for both units which determined that no other dc breakers utilized undervoltage release devices.
3. All four 125 vdc cross-tie breakers will be refurbished by the vendor during the next refueling outage.
4. A surveillance and maintenance schedule will be established for all four 125 vdc cross-tie breakers.
5. A preventative maintenance schedule will be established to monitor molded case circuit breakers for age related degradation.
6. There are several ongoing efforts to assure that design basis requirements have been adequately incorporated into applicable plant procedures. These efforts include: (1) Reviews are being conducted in accordance with Generic Letter 96-01, "Testing of Safety-Related Logic Circuits". The purpose of these reviews is to identify any internal circuit components in the reactor protection system or engineered safety features actuation system that are not currently directly tested by technical specification surveillance. (2) Ongoing reviews of the UFSAR and plant procedures by a dedicated group of engineers and plant operators to identify and correct discrepancies between these documents.

ADDITIONAL INFORMATION

Failed Components

Component: Molded Case Circuit Breaker  
 Manufacturer: ITE  
 Model: ETJL 350

Previous Similar Events

None

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FIGURE 1

DC POWER SUPPLIES

