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L-84-166  
July 2, 1984

Mr. James P. O'Reilly  
Regional Administrator, Region II  
U. S. Nuclear Regulatory Commission  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

Dear Mr. O'Reilly:

Re: St. Lucie Unit 2  
Docket No. 50-389  
IE Bulletin 83-08

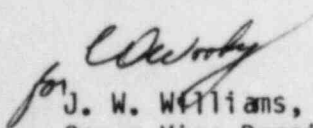
Florida Power & Light has completed the review of IE Bulletin 83-08 (Electrical Circuit Breakers With an Undervoltage Trip Feature in Use in Safety Related Applications Other than the Reactor Trip System). Our initial response for St. Lucie Unit 2 was provided in our letter L-84-83, dated March 29, 1984.

We have now completed a design review of the safety related breakers which utilize an undervoltage trip attachment, and have determined that the design margin available to open the breakers is sufficient to justify our current maintenance and surveillance program.

Our response to Item 2 of the Bulletin is attached. This completes our effort on this bulletin.

Should you or your staff have any questions on this information, please contact us.

Very truly yours,

  
for J. W. Williams, Jr.  
Group Vice President  
Nuclear Energy

JWW/PLP/js

Attachment

cc: J. P. O'Reilly, Region II  
Harold F. Reis, Esquire  
PNS-LI-84-223

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## ATTACHMENT

Re: St. Lucie Unit 2  
Docket No. 50-389  
IE Bulletin 83-08

FPL response to Question 2 of IE Bulletin 83-08 (Electrical Circuit Breakers With an Undervoltage Trip Feature in Use in Safety Related Applications Other Than the Reactor Trip System) for St. Lucie Unit 2.

### Question 2a

Review the design of the UVTA and the connecting linkage. Using input from the breaker manufacturer, determine the design margin available to open the breaker. Evaluate whether or not this design margin is adequate in view of safety applications, considering possible problems of alignment, lubrication, adjustment of spring tension, etc., discussed in the "Description of Circumstances."

### Response 2a

#### EVALUATION OF UNDERVOLTAGE TRIP ATTACHMENTS

##### INTRODUCTION

IE Bulletin 83-08 requires holders of construction permits and licenses to respond to questions on the Undervoltage Trip Attachments (UVTA) circuit breakers other than Westinghouse and General Electric used in safety related applications. Paragraph 2a on page 3 of the bulletin requires a determination of the design margin available to open the breaker and whether or not this design margin is adequate in view of safety applications, considering possible problems of alignment, lubrication, adjustment of spring tension, etc. The discussions which follow are based on vendor input and field testing.

##### APPLICATION

The UVTAs are used for isolating non-safety related loads from the safety buses on loss of power. The following is a list of circuit breakers, other than Reactor Trip Breakers, having UVTAs in safety-related applications. All of the circuit breakers listed are Brown-Boveri Electric Type K600.

<u>Switchgear</u>	<u>Compartment</u>	<u>Load</u>
2A2	2B	Spare
	4A	Spare
	4B	2 HVE-10A
	4C	CEA MG Set 2A
	4D	Spare
2B2	4A	Spare
	4B	2HVE-10B
	4C	CEA MG Set 2B
	4D	Spare
	6A	RCB Crane #2
	6B	Spare
2A5	3A	Spare
2B5	3A	Spare

On all loads except the RCB Crane #2, dual trip signals are used, the UVTA and the shunt trip.

#### UVTA & BREAKER TRIP OPERATION

The undervoltage relay on the K2000 and under is installed on the right side of the breaker (facing the breaker). Dropout has a range of adjustment from 30 to 60% of rated voltage. A bracket with adjusting screw is attached directly to the plunger of the undervoltage device. Upon dropout, a spring forces this assembly down against the breaker tripper bar. Per the manufacturer, the tripper bar offers ample surface for the screw to act on to allow for some misalignment. The adjusting screw on the undervoltage plunger can be adjusted to act on a secondary latch directly beneath the tripper bar. The shunt trip device acts on this latch. Therefore, in the K2000 and under circuit breaker, there is a certain amount of redundancy in design because the undervoltage device can be made to also act on the latch on which the shunt trip operates.

Brown Boveri has addressed the following points to be considered in the UVTA evaluation:

1. No lubrication is required or recommended for the UVTA.
2. Gravity assists in the operation of the relay although it is not dependent on it for operation.
3. The hardware used on the undervoltage devices is such that vibration due to breaker operation would not put it out of adjustment. Pins with crimped C-shaped retainers and bolts with lock washers or locking nuts ensure the integrity of the device.
4. The undervoltage devices are located in sheltered locations in the breakers which expose them to less dust accumulation. The orientation of the magnet is such that accumulated dust would not build up between the magnet and armature.

Brown Boveri has informed us that this UVTA design has been repeated on the market for nearly twenty years with no significant problems being reported.

### DESIGN MARGIN

FPL electrical maintenance personnel at the plant performed tests on each of the breakers of concern to determine the actual force required to trip the breaker and the force available by the UVTA. Results of these tests are given below and the margin calculated.

<u>Swgr</u>	<u>Compt.</u>	<u>Breaker Trip Force (lbs)</u>	<u>Undervoltage Force (lbs)</u>	<u>Margin %</u>
2B2	6B	1.25	5	400
	4A	1.0	5	500
	4D	1.0	5	500
2A2	4A	1.25	5.25	420
	4D	1.0	5	500
	2B	0.75	5	667
2A5	3A	0.75	5	667
2B5	3A	0.75	5	667

According to the circuit breaker instruction manual, with the circuit breaker in the "CLOSED" position, the push required to trip the circuit breaker must be between 16 an 29 ounces.

Brown Boveri Corporation has informed us that they normally do not assign quantities for the UVTA output nor the trip bar force requirement.

However, given a typical 5 pound force delivered by the undervoltage device and the 29 ounce trip force as a worst case requirement, the calculated design margin is 276%.

### CONCLUSION

Based on the results of the field tests and the input provided by the vendor with regard to operation, lubrication and design of the UVTA. FPL concurs with the manufacturer in that sufficient design margin is available to open the breaker.

### **Question 2b**

Describe the current breaker surveillance program, including details of test frequency, methodology, and response time measurement of UVTA device.

### **Response 2b**

St. Lucie's current breaker surveillance program requires the breakers mentioned in the response to Question 2a to be maintained in accordance with the plant maintenance procedure every five years. This procedure requires inspection for cleanliness, broken or loose parts, proper lubrication, tightened bolts, wiring connections, alignment and contact faces. The operation checks require the breaker to open and close manually and electrically. The electrical tests check overcurrent devices for proper operation to manufacturer's specifications.

**Question 2c**

Review operating experience with the circuit breakers in your plant(s) identified in Item 1. Provide a list of all malfunctions (both failure to trip and failure to close on demand) associated with the UVTA, including the connecting linkages and latching mechanisms. The list should include the date of each malfunction, and the operating time prior to failure or date of installation, and the date(s) of major maintenance. In general, when the circuit breaker UVTA is actuated on undervoltage and the breaker contacts do not open within the design time response value, then NRC considers the breaker to have failed.

**Response 2c**

We are aware of no failures associated with these breakers at St. Lucie Unit 2.

**Question 2d**

Describe any preventive or corrective measures you have taken, or intend to take, based on the results of Items 2a, 2b, and 2c. Include any revisions to the surveillance test program and methodology. Specifically, address the inherent reliability of the UV trip feature in view of its apparent heavy dependence on intensive maintenance and surveillance and whether a basic design change is warranted to correct the problem, e.g., using a voltage sensitive relay to sense loss of voltage and energize the shunt trip coil from an independent dc power source.

**Response 2d**

Because of the results of the design margin evaluation and the absence of heavy dependence on intensive maintenance, we have concluded that our current program of breaker maintenance is sufficient and we consider that no additional measures are warranted.

STATE OF FLORIDA    )  
                          )  
COUNTY OF DADE    )    ss.

C. O. Woody, being first duly sworn, deposes and says:

That he is Vice President Nuclear Operations of Florida Power & Light Company, the licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said Licensee.

\_\_\_\_\_  
C. O. Woody

Subscribed and sworn to before me this

2nd day of July, 1984.

\_\_\_\_\_  
*Louise Jordan*

NOTARY PUBLIC, in and for the County of Dade, State of Florida.

My commission expires: \_\_\_\_\_

NOTARY PUBLIC STATE OF FLORIDA AT LARGE  
MY COMMISSION EXPIRES DEC 8 1984  
BONDED THRU GENERAL INS. UNDERWRITERS