



FPL

Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

April 16, 2003

L-2003-084
10 CFR § 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: 2003-002-00
Date of Event: February 17, 2003
Invalid 4.16kV Bus Undervoltage Condition
During Maintenance Caused EDG Start

The attached Licensee Event Report 2003-002 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,

William Jefferson, Jr.
Vice President
St. Lucie Nuclear Plant

WJ/KWF
Attachment

JEZ

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 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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 1	2. DOCKET NUMBER 05000335	3. PAGE Page 1 of 3
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4. TITLE
Invalid 4.16kV Bus Undervoltage Condition During Maintenance Caused EDG Start

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	17	2003	2003	002	00	04	16	2003		

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more)									
10. POWER LEVEL 100	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)			
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)			
	20.2203(a)(1)		50.36(c)(1)(i)(A)		X 50.73(a)(2)(iv)(A)		73.71(a)(4)			
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)			
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER			
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A			
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)					
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)					
20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)						
20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)						

12. LICENSEE CONTACT FOR THIS LER	
NAME Kenneth W. Frehafer, Licensing Engineer	TELEPHONE NUMBER (include Area Code) (772) 467 - 7748

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
E	EA	2	X999	-	-	-	-	-	-

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE		
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO		MONTH	DAY	YEAR

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On February 17, 2003, St. Lucie Unit 1 was in Mode 1 at 100 percent reactor power. While St. Lucie maintenance personnel were performing the replacement of a failed 1B3 4.16kV bus undervoltage (UV) relay, a bus UV shed signal was generated. This resulted in momentary loss of the 1B3 4.16kV bus while loads were stripped and reloaded to the 1B emergency diesel generator. During the event all safety equipment operated as designed.

FPL could not definitively determine whether the event was caused by personnel error or spurious operation of the UV protection relay.

The defective relay was replaced and FPL plans to replace the existing 1B3 4.16kV switchgear relays with a different model relay during the next refueling outage.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

Description of the Event

On February 17, 2003, St. Lucie Unit 1 was in Mode 1 at 100 percent reactor power. St. Lucie maintenance personnel were in the process of replacing a failed 1B3 4.16kV bus undervoltage (UV) relay [EIIS:EA:2]. However, during the maintenance activity a bus UV shed signal was generated. This resulted in momentary loss of the 1B3 4.16kV bus while loads were stripped and reloaded to the 1B emergency diesel generator (EDG). During the event all safety equipment operated as designed.

The 4.16kV bus undervoltage protection scheme monitors for loss of voltage or degraded grid voltage conditions on the 4.16kV busses. The protection scheme utilizes two-out-of-two coincident logic for both loss of voltage protection and degraded grid protection. The UV relays are set to trip at approximately 70 percent of nominal bus voltage with a nominal time delay of 1 second. The degraded grid voltage relays are set to actuate at approximately 92 percent of nominal bus voltage with a nominal time delay of 18 seconds. The function of the relays is to initiate the automatic disconnection of the affected bus from its offsite source, load shed the affected bus, start the EDG, and sequence loads on to the affected bus. In addition, a second set of UV relays is provided for each 4160 volt Class 1E bus, set to actuate at approximately 95 percent of nominal bus voltage with a nominal time delay of 23 seconds. These relays provide annunciation and are used to alarm the undervoltage condition in the control room.

Cause of the Event

The circuit that performs the 1B3 bus UV shed signal is comprised of two (normally open) series contacts of the Agastat DSC timing relays (tag numbers 2X-1 and 2X-2). Normally, both timing relays are required to operate to perform the shed function. On January 16, 2003, the 2X-2 relay failed to operate. In accordance with Technical Specification 3.3.2.1.b, Table 3.3-3, Functional Unit 6.a ACTION 12, the failed relay was placed in "trip" condition by placing a jumper across its relay output contacts. Therefore the circuit coincidence logic changed from two-out-of-two to one-out-of-one, and operation of the 2X-1 relay or closure of its contact would result in generation of the bus UV shed signal.

In order to support the replacement of the failed relay, the work sequence specified the installation of a jumper between a terminal strip and the 2X-1 relay. This jumper would electrically duplicate the existing jumper that was added to the 2X-2 relay after its failure on January 16, 2003. However, as the last connection was landed at the 2X-1 relay, a UV shed signal was generated on the 1B3 4.16kV bus.

The most likely cause of the event was either inadvertent contact with adjacent terminations of the 2X-1 relay or spurious operation of the 2X-1 relay. FPL could not definitively determine which of the above caused the event.

Analysis of the Event

Although the planned work package and pre-job briefs acknowledged the possibility of an inadvertent EDG start during the maintenance activity, an EDG start was not definitely expected to occur. Therefore, in accordance with NUREG-1022, Revision 2, and 10 CFR 50.73(a)(2)(iv)(A), this is reportable as an event that resulted in the manual or automatic actuation of the emergency AC electrical power system.

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

Analysis of Safety Significance

Although no UV condition existed on the 1B3 4.16kV bus, all equipment responded to the 1B3 4.16kV bus UV signal as required. There was no adverse effect on the reactor operation. Therefore, this event had no impact on the health and safety of the public.

FPL reviewed previous Agastat DSC relay failures and the events surrounding their replacement. This review indicated that, in this application, the preventive maintenance replacement frequency for the Agastat DSC relays is not conservative in that relay failures occur prior to the established 8-year replacement cycle. Once a UV/degraded grid relay failure occurs, the design configuration of the relays and high density of terminations are such that there is little room to perform a replacement without a high probability of contact with adjacent terminations.

Only the 1B3 4.16kV bus utilizes DSC type relays for UV/degraded grid timing functions. The 1A3 bus has been replaced with a newer series NTS812 relay that provides a longer qualified life (20 years) and an improved distance between terminations. This change to the newer relay was dictated by the obsolescence of the DSC type relay. FPL plans to replace the DSC relays with a different relay style.

Corrective Actions

1. The failed 2X-2 timing relay was replaced and all UV/degraded grid relays were tested successfully.
2. FPL issued work orders for the replacement of the UV/degraded grid relays 2X-1 through 2X-6 in the 1B-3 4.16kV switchgear during the SL1-19 refueling outage. These replacements will utilize a different style relay.

Additional Information

Failed Components Identified

Component: 1B3 4.16kV bus UV timing relay

Manufacturer: Agastat

Model Number: DSCXX0125DPBXAA

Similar Events

None