



July 18, 2005

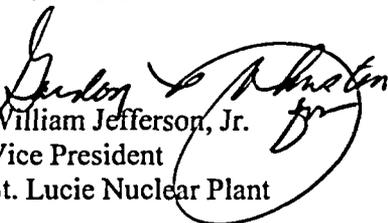
L-2005-155
10 CFR § 50.73

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

Re: St. Lucie Unit 1
Docket No. 50-335
Reportable Event: 2005-003-00
Date of Event: May 18, 2005
1A Emergency Diesel Generator Actuation

The attached Licensee Event Report 2005-003 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

IE22

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4. TITLE
1A Emergency Diesel Generator Actuation

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
05	18	2005	2005	- 003	- 00	07	18	2005	FACILITY NAME	DOCKET NUMBER

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

12. LICENSEE CONTACT FOR THIS LER

NAME Kenneth 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	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BK	2	A160	YES	-	-	-	-	-

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

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

On May 18, 2005, St. Lucie Unit 1 was in Mode 1 at 100 percent reactor power. The 4160V emergency bus undervoltage load shed relay test was in progress. During the undervoltage load shed relay test of the offsite feeder breaker to the 1A3 bus, breaker 1-20219, the breaker tripped. The 1A3 bus undervoltage condition caused the start of the emergency diesel generator, load shed, and load sequence initiated. All equipment was loaded except for containment cooling fan HVS-1B.

The emergency diesel generator start and load shed event was due to a design weakness that could allow the operation of an undervoltage load shed relay test switch to cause a breaker trip, in this case the offsite power feeder breaker to the safety-related 1A3 4160V bus. HVS-1B failed to load as expected due to a faulty time delay relay in its control circuit.

Immediate corrective actions included replacement of the HVS-1B time delay relay and procedure changes to ensure that operation of the undervoltage load shed relay test switch compensates for the design weakness.

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

Description of the Event

On May 18, 2005, St. Lucie Unit 1 was in Mode 1 at 100 percent reactor power. The 4160V emergency bus undervoltage load-shed relay test was in progress in accordance with procedure 1-OSP-100.07, "Schedule Of Periodic Tests, Checks, And Calibrations Week 7 St. Lucie Unit 1." During the test of breaker 1-20219, the offsite feeder breaker to the 1A3 bus tripped. This resulted in de-energizing the 1A3 safety-related bus, load shedding of the 'A' train 4160V and 480V loads, starting the 1A emergency diesel generator (EDG), and sequencing loads onto 1A EDG in accordance with design.

The EDG sequenced as expected and all equipment was loaded, except for containment cooling fan HVS-1B. This caused the unit to enter a 7-day Technical Specification (TS) Action entry in accordance with Technical Specification 3.6.2.1 for the containment cooling fan, and also a 72-hour TS Action in accordance with TS 3.8.1.1a. Normal power was restored to the 4160V 1A3 bus within 2 hours, and the fan cooler was restored to operable status within 2 days, therefore, plant conditions were returned to normal status within the Technical Specification allowed outage times. No electrical power systems TS allowed outage times were exceeded.

Cause of the Event

The cause for the trip of the 4160V 1A3 bus feeder breaker during the performance of the emergency bus undervoltage relay test was a design weakness involving potential overlapping contact closures. A key contributing cause was a procedural weakness that did not require the controlled operation of the breaker test switch. Specific operation guidelines were provided to ensure controlled (2-second) operation of the relay test switch.

Troubleshooting the HVS-1B containment cooling fan failure to automatically sequence onto the EDG after the load shedding event revealed that there was a failed time delay relay in the control circuit. The faulty relay was replaced and the fan and automatic sequencing logic were tested and returned to service.

Analysis of the Event

This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv) as a event or condition that resulted in the automatic actuation of the emergency AC electrical power system.

Each Class 1E 4160V bus (1A3 and 1B3) utilizes two undervoltage time delay relays, in a 2-out-of-2 coincident logic, for loss-of-voltage detection. The undervoltage relays function to initiate source disconnection, load shedding, diesel generator starting, and load sequencing on the affected train. A switch is provided for testing each of the 4160V emergency bus undervoltage load shed relays. Each switch has a spring return to normal (i.e., OFF) operation along with the LAMP TEST and RELAY TEST positions. Turning the test switch to the RELAY TEST position prevents an actual load shed by bypassing the undervoltage trip actuating relay contacts (disconnecting them from the actuating circuit) and connects them to the test lamp circuit.

At the time of the event, the only activity being performed was the 4160V emergency bus undervoltage relay test per procedure 1-OSP-100.07, Section 7.4.1.C. The sequence of events recorder showed that as the test switch was moved to the RELAY TEST position, breaker 1-20219 opened and then an undervoltage relay picked up on the 1A3 bus, resulting in the load shed event. Therefore, the investigation focused on

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the specific procedure step performed (Step 7.4.1.C.1) that required positioning the breaker 1-20219 undervoltage relay test switch to the RELAY TEST position, which operates the breaker undervoltage load shed relay.

The investigation monitored the circuit during the re-performance of the undervoltage test in accordance with the surveillance procedure. No sluggish operation of the relay or control switch was detected. However, testing confirmed that the faster the test switch was operated, the greater the chance that a switch contact overlap condition could be created and defeat the test switch "break-before-make" feature. Therefore, operation of the test switch could result in a "contact race" that energizes the breaker trip before the corresponding undervoltage load shed relay contacts are bypassed by the test switch.

The design weakness is isolated to the test feature associated with the 4160V emergency bus undervoltage relays. The actual undervoltage protection circuits remain unaffected. The test switch is designed with a spring return to OFF position that automatically restores the undervoltage trip circuit following a test. The extent of this condition is limited to each of the St. Lucie safety-related 4160V buses (i.e., 1A3, 1B3, 1AB, 2A3, 2B3, and 2AB).

A procedural weakness existed in that no guidance was provided to ensure controlled operation of the test switch. The slower the test switch is operated the better the control switch "break-before-make" feature performs.

Analysis of Safety Significance

During this event, the EDG automatically started and all the loads fed from the 1A3 4160V switchgear were stripped from the bus. This caused the unavailability of some loads normally fed by the bus for normal plant operations and the loading of other loads required for post-accident conditions during EDG load sequencing. Loss of the 1A3 bus does not cause an automatic reactor trip.

The operators entered several off-normal procedures due to the loss of normally operating equipment. Procedures include 1-0910054, "Loss of a Safety Related AC Bus", 1-0120034, "Reactor Coolant Pump," due to loss of component cooling water (CCW) to the 1A1 and 1B2 RCPs, and 1-ONP-02.03, "Charging and Letdown," due to loss of letdown flow. Performance of these procedures is an anticipated action given the loss of a vital bus, as stipulated in 1-0910054. Operators are trained to respond to these conditions and restore offsite power. There were no human performance issues associated with the operator recovery efforts, and no Technical Specification allowed outage times were exceeded during this time.

Based on the above information, there was no adverse impact on the safety and health of the public.

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Corrective Actions

1. Normal power was restored to the 1A3 bus.
2. The faulty HVS-1B time delay relay was replaced and tested under work order 35012544.
3. The sections of the operational test procedures "Schedule of Periodic Tests, Checks and Calibrations," that involve the testing of the 1A3, 1B3, 1AB, 2A3, 2B3, and 2AB 4160V emergency bus undervoltage relays were revised to ensure controlled operation of the test switch.

Other Information

Failed Equipment Identified

Component: 2L/308 Time Delay Pick Up (TDPU) Relay
 Manufacturer: Allen Bradley
 Model Number: Bulletin 700 Solid State Timing Relays

Similar Events

None