

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) CRYSTAL RIVER UNIT 3	DOCKET NUMBER (2) 050000302	PAGE (3) 1 OF 03
---	--------------------------------	---------------------

TITLE (4)  
VITAL BUS TESTING RESULTS IN ENGINEERED SAFETY FEATURE ACTUATION

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	
1	2	07	8	5	8	5	0	3	1	N/A
										N/A

OPERATING MODE (9) 3

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

20.402(b)	20.405(e)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)
20.406(a)(1)(i)	50.36(a)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	73.71(a)
20.406(a)(1)(ii)	50.36(a)(2)	<input type="checkbox"/>	50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.406(a)(1)(iii)	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(vii)(A)	
20.406(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(vii)(B)	
20.406(a)(1)(v)	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME W. K. Bandhauer, Nuclear Safety Supervisor	TELEPHONE NUMBER
	AREA CODE 9104 7915-164816

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

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if yes, complete EXPECTED SUBMISSION DATE)       NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR
07	01	86

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

On December 7, 1985, the plant was in Hot Standby. Preparations were being made for tests to determine the electrical characteristics of vital bus transfer switches (VBXS) during a transfer between the preferred and alternate power sources. The vital bus loads were being manually transferred to the alternate power source to clear the transfer switches for the tests. Electrical oscillations between the power sources occurred upon the transfer. An undervoltage transient was experienced on the vital bus, which tripped the "B" Reactor Protective System, one channel in the "A" and "B" Engineered Safeguards System and actuated the "B" Emergency Feedwater Initiation and Control (EFIC) System train.

Reasons for the failure of the loads to cleanly transfer to the alternate source, the oscillations and undervoltage transient are not completely understood. The undervoltage transient affected power to the "B" EFIC trip module and resulted in the actuation of all functions under its control.

The VBXS's have been placed in manual mode to prevent automatic transfer of the vital bus and an oscillation/undervoltage transient.

A study of the cause and remedies for the power source transfer failure are underway, as well as studies to determine methods for upgrading the EFIC system power supplies.

8601130660 860106  
PDR ADOCK 05000302  
S PDR

IE22  
1/1

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  CRYSTAL RIVER UNIT 3	DOCKET NUMBER (2)  0 5   0   0   0   3   0   2 8   5	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		85	031	0	012	OF

TEXT (If more space is required, use additional NRC Form 366A (1/77))

EVENT DESCRIPTION

On December 7, 1985, Crystal River Unit 3 was in operating Mode 3 (hot standby) with the group 1 (safety) control rods fully withdrawn. Preparations were being made for tests to determine the electrical characteristics of vital bus static transfer switches (EF, JS) 1B and 3B (VBXS 1B and 3B) during a transfer between the inverter (EF, INVT) (preferred power source) and the regulating transformer (EF, XFMR) (alternate power source). These tests were being performed as part of an investigation into recent problems with vital bus static transfer switches (Reference Crystal River Unit 3 LER 85-023). The vital bus distribution panels (EF, PL) (VBDP's) were being manually transferred to the regulating transformer in order to clear the automatic portion of the transfer switches for the tests. The first VBDP was transferred with no apparent problems. At 1740, transfer of the second VBDP was attempted. Electrical oscillations between the inverter and regulating transformer occurred upon the transfer and continued for approximately 20 seconds. During the oscillations, an undervoltage transient was experienced on the vital bus (EF, BU), which caused the following events.

- o Trip of the "B" Reactor Protective System (RPS) (JC) Channel.
- o Partial trips of the "A" and "B" Engineered Safeguards System (ES) (JE) channels.
- o Full actuation of the "B" Emergency Feedwater Initiation and Control (EFIC) System (JE) train, which resulted in:
  - Automatic closure of all four main steam isolation valves (SB, ISV)
  - Automatic isolation of both trains of the Main Feedwater System (SJ) to the once through steam generators (AB, SG)
  - Automatic trip of both main feedwater pumps (SJ, P)
  - Automatic start-up of the turbine driven emergency feedwater pump (BA, P)

The EFIC system was allowed to control emergency feedwater for approximately 12 minutes until main feedwater was restored. The tripped Reactor Protection System, Engineered Safeguards System and EFIC channels were reset and plant status was returned to normal at 1805.

CAUSE

The reasons for the failure of the VBDP's to cleanly transfer from the inverter to the regulating transformer, and the subsequent oscillations and undervoltage transient are not completely understood. These events are under investigation and will be addressed in a supplement to this report.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  CRYSTAL RIVER UNIT 3	DOCKET NUMBER (2)  051000302	LER NUMBER (6)			PAGE (3)	
		YEAR 85	SEQUENTIAL NUMBER 031	REVISION NUMBER 010	013	OF 03

TEXT (If more space is required, use additional NRC Form 365A (1/77))

The cause of the EFIC actuation has not been positively identified, however, the investigation is continuing. It is believed at this time that the root cause involves a failure of the design to meet the single failure criteria as described in the design basis. That is, the degradation of a single power source should not have caused the actuation of any equipment.

SAFETY CONSIDERATIONS

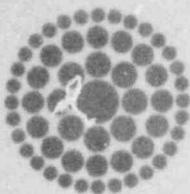
The RPS and Engineered Safeguards System channels responded to the undervoltage condition as expected, and tripped. These trips had no further effect upon the plant because they were single channel trips in systems which have two-out-of-four and two-out-of-three actuation logic schemes. However, the undervoltage transient had an unexpected effect upon the "B" EFIC channel. The undervoltage transient caused a single channel failure in the EFIC system which resulted in an unnecessary engineered safety feature actuation. This condition is not in accordance with the design criteria for the failure of a single channel as referenced in the design basis. However, the EFIC system is capable of performing its intended function upon receipt of a valid actuation signal. The transient occurred while the plant was shutdown, so the impact was minimal. If the plant had been at power when this event occurred, an anticipatory reactor trip on loss of both main feedwater pumps would probably have resulted.

CORRECTIVE ACTIONS

The vital bus transfer switches have been placed in the "manual" mode. This will prevent automatic transfer of the vital bus from the inverter to the regulating transformer and preclude the oscillation/undervoltage transient. If an inverter fails, vital bus power will be lost until a manual transfer to the alternate power source is affected. Crystal River Unit 3 is designed to sustain the loss of a single vital bus and this is how the vital bus power supplies were originally designed and installed. The automatic transfer switches were installed later to improve the reliability of the power supply to the 120 VAC vital busses. Investigation into the cause of and remedies for the vital bus power source transfer failure is underway. Investigations are also in progress to determine methods for upgrading the EFIC system power supplies to meet the single failure criteria referenced in the design basis. The results of these investigations will be reported in a supplement to this LER.

PREVIOUS SIMILAR EVENT

This was the twentieth EFW actuation by EFIC since EFIC was installed in August 1985. This was the seventeenth spurious actuation but the first due to loss of vital power supply.



**Florida  
Power**  
CORPORATION

January 6, 1986  
3FO186-06

Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Subject: Crystal River Unit 3  
Docket No. 50-302  
Operating License No. DPR-72  
Licensee Event Report No. 85-031-00

Dear Sir:

Enclosed is Licensee Event Report (LER) No. 85-031-00 which is submitted in accordance with 10 CFR 50.73.

Should there be any questions, please contact this office.

Sincerely,

G. R. Westafer  
Manager, Nuclear Operations  
Licensing and Fuel Management

AEF/feb

Enclosure

cc: Dr. J. Nelson Grace  
Regional Administrator, Region II  
Office of Inspection & Enforcement  
U.S. Nuclear Regulatory Commission  
101 Marietta Street N.W., Suite 2900  
Atlanta, GA 30323

IE22  
1/1