Florida Power
CORPORATION

July 17, 1989
3F0789-16

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

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Licensee Event Report No. 89-023

Dear Sir:

Enclosed is Licensee Event Report (LER) 89-023 which is submitted in accordance with 10 CFR 50.73.

Should there be any questions, please contact this office.

Yours very truly,

Rolf C. Widell
Director, Nuclear Operations Site Support

WLR:mag

Enclosure

xc: Regional Administrator, Region II
Senior Resident Inspector

IE22
1/1

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): CRYSTAL RIVER UNIT 3

DOCKET NUMBER (2): 0 5 0 0 0 3 0 2

PAGE (3): 1 OF 0 6

TITLE (4): Technician Error and Relay Failure Leads to Degraded Off-site Power and Results in Reactor Trip and Emergency Feedwater Actuation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR
0 6	1 6	8 9	8 9	— 0 2 3	— 0 0	0 7	1 7	8 9

OTHER FACILITIES INVOLVED (8)	
FACILITY NAMES	DOCKET NUMBER(S)
N/A	0 5 0 0 0
N/A	0 5 0 0 0

OPERATING MODE (9)	1
POWER LEVEL (10)	0 1 2

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

20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
L. W. MOFFATT, NUCLEAR SAFETY SUPERVISOR	9 0 4 — 7 9 5 - 6 4 8 6

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	
B	F K	0 0 9 4	G 0 8 0	N		B	E K	0 0 4 4	G 0 8 0	Y	
B	B A	0 0 0 2	A 3 4 8	Y							

SUPPLEMENTAL REPORT EXPECTED (14)

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

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

On June 16, 1989 Crystal River Unit #3 was in MODE 1 (Power Operation) at 12% reactor power with the main turbine latched and rolling. At 1325, the Unit #3 Start-up Transformer became de-energized which resulted in a reactor/turbine trip. Both emergency diesel generators started due to the under voltage condition sensed on both 4160 V. buses. The diesel generators re-energized their respective buses. A loss of main feedwater occurred due to the loss of Unit #3 Start-up Transformer. The Emergency Feedwater Initiation and Control system actuated to supply feedwater to both Once Through Steam Generators. However, the motor driven emergency feedwater pump did not automatically start and was manually started. The cause of the degradation of off-site power was inadvertent actuation of a 230 KV feeder test trip circuit coincident with failure of a fault detector relay. The cause of the start failure of the emergency feedwater pump was a failed relay and a loose connection to a second relay in the automatic start circuit. Florida Power Corporation is evaluating the continued need for the test trip circuit pushbuttons in the off-site power supply control cabinets. A testing program for the relays which initiate Emergency Feedwater on a loss of off-site power will be developed.

EVENT DESCRIPTION

On Friday, June 16, 1989 Crystal River Unit #3 (CR-3) was in MODE 1 (Power Operation) at 12% reactor power with the Main Turbine [TA,TRB] latched and rolling. The Unit #3 Start-up Transformer [EB,XFMR] was supplying all 4160V and 6900V buses [EA,EB,BU]. Relay technicians were testing carrier signal levels in the Brookridge line metering cabinet [FK,CAB] in the 230 KV switchyard [FK]. At 13:25:51, a technician inadvertently bumped the Brookridge line test trip pushbutton. This action sent a trip signal to breakers 1690 and 1691 [FK,BKR] (Refer to Figure 1). Both breakers (1690 and 1691) tripped open; this action alone would only have de-energized the Brookridge line. However a fault detector relay [FK,RLY] in breaker 1691 failed which caused the breaker to indicate closed (even though it was open). The fault detector scheme opened breaker 1692 [FK,BKR] to clear the indicated fault. This action caused a loss of off-site power to the Unit #3 Start-up Transformer.

At 13:25:52, all Reactor Coolant Pumps [AB,P] de-energized and Reactor Coolant System [AB] (RCS) flow coastdown occurred. All 4 reactor protective channels [JC] actuated due to the loss of reactor coolant pumps as sensed by the reactor coolant pump-power monitors [JC,MON] and tripped the reactor. Due to the loss of power to the Engineered Safeguards Buses both Emergency Diesel Generators [EK,DG] automatically started and re-energized their respective Engineered Safeguard Buses [EB,BU].

At 13:25:52, both main feedwater pump turbines [SJ,TRB] tripped due to loss of power to their oil pumps [SJ,P] and resultant low lube oil pressure signal. Due to the loss of both main feedwater pumps and reactor coolant pumps, an automatic actuation of the Emergency Feedwater System [BA] occurred. The "B" Emergency Feedwater Pump [BA,P] (EFP), which is steam driven, automatically started as designed and the "A" EFP [BA,P] (motor driven) did not automatically start. At 13:30, the operators manually started the "A" EFP and took manual control of the Emergency Feedwater System due to initially high emergency feedwater flows.

Because the plant had been shutdown for several months prior to this startup, there was a low decay heat level in the reactor. Steam generator [SB,SG] pressure only reached a maximum of 975 psig post-trip. The operators, aware that decay heat level was low, secured post trip steam loads to minimize steam generator depressurization. At 10:37, the operators shut the Main Steam Isolation Valves [SB,ISV] (MSIV's) to further reduce steam flow. Additionally, due to the low decay heat level, thermal decoupling occurred in the "A" RCS loop for approximately 50 minutes. Natural circulation was maintained by the "B" RCS loop. At 17:10, forced circulation was restored.

The RCS was cooled down via natural circulation. Temperature, as measured by the in-core thermocouples, stabilized at approximately 486 degrees and the minimum post trip RCS pressure was 1925 psig.

CAUSE

The loss of power to the Unit #3 Start-up Transformer was caused by a combination of a fault detector relay failure and personnel error. A non-licensed utility employee (relay technician) inadvertently bumped a test trip circuit pushbutton while performing testing. Additionally a fault detector relay associated with breaker 1691 failed. During post-event troubleshooting a stuck contact was found in the fault detector relay which caused the relay not to actuate as required.

The "A" emergency feedwater pump (motor driven) did not automatically start upon emergency feedwater initiation signal coincident with a degradation of off-site power. During post-event troubleshooting two component failures were found in the EFP automatic start circuit. A five second time delay relay was found prior to restart which had a poor connection in its base socket. The second faulty relay was found after restart. It was an auxiliary relay which was to energize when the "A" Diesel Generator output breaker closed. Its function is to direct power to the previously discussed time delay relay. The failure to detect the failed auxiliary relay prior to restart was due to personnel error on the part of the utility engineers who performed the evaluation to determine the cause of start failure for the EFP. These components are located in the automatic start portion of the control circuit for the motor. This condition did not prevent a manual start of the EFP. Feedwater was supplied to both steam generators initially by the "B" emergency feedwater pump (turbine driven). The "A" emergency feedwater pump was manually started shortly into the event.

During transient assessment it was determined that thermal decoupling had occurred in the "A" RCS loop. This decoupling was not a significant problem and was due to the initial low decay heat level in the reactor. Natural circulation was maintained by the "B" RCS loop.

EVENT EVALUATION

The loss of power to Unit #3 Start-up Transformer caused a loss of power to all 4160V Engineered Safeguards Buses. Both Emergency Diesels started and re-energized their associated 4160V Engineered Safeguards Bus. Approximately one hour after the event was initiated, Unit #3 Start-up Transformer was re-energized. This transformer was used to re-energize the 4160V Unit Buses, the 6900V buses and one 4160V E.S. bus. The backup off-site power source (Unit #1 and #2 Startup transformer) was utilized to re-energize the remaining E.S. bus. No safety consequences resulted due to loss of power to Unit #3 Start-up Transformer since the Emergency Diesels performed as designed to regain power to the E.S. buses. There would have been no other safety consequences if this event occurred from 100% power.

The loss of power to Unit #3 Start-up Transformer resulted in the tripping of both main feedwater pumps. The emergency feedwater initiation and controls system automatically actuated as designed and sent a start signal to both emergency feedwater pumps. The motor driven pump failed to automatically start. It was immediately noted by the operators that the pump had failed to start. At 13:30, the motor driven pump was manually started by the operators. The steam driven pump was available and did automatically start and provide feedwater to both steam generators. The failure of the automatic start circuitry for the motor driven pump did not preclude starting the motor manually from the control room. Since feedwater was available to both steam generators throughout the event no safety consequences resulted. There would have been no other safety consequences if this event had occurred from 100% power.

At 13:51, thermal decoupling occurred in the "A" RCS loop. The thermal decoupling of the "A" steam generator from the RCS lasted for approximately 50 minutes. Throughout the event, natural circulation was maintained by the "B" RCS loop. Since continuous core cooling was maintained throughout the event, no safety consequences resulted. There would have been no other safety consequences if this event had occurred from 100% power since one RCS loop is adequate to remove the maximum decay heat in a natural circulation mode.

FAILED COMPONENT IDENTIFICATION

Fault detector relay
MFR. - General Electric
Model - 12CHC15A

5 sec. time delay relay
MFR. - Agastat
Model - ETR1413B001
Serial No. - 80365507

Diesel Generator Auxiliary Relay
MFR. - General Electric
Model - HFA-151A2H 125V. DC

CORRECTIVE ACTIONS

Florida Power Corporation (FPC) is reviewing off-site power supply configurations. Corrective action deemed necessary to improve off-site power will be pursued. FPC is considering removal of the circuit trip test button from the breaker testing scheme for the off-site power supply breakers.

The fault detector relay associated with breaker 1691 was tested and found to have a stuck contact. The relay was recalibrated and now functions correctly. A work order was generated which will change out this type of relay to a more state of the art type relay during the next refueling outage.

The five second time delay relay was removed from its socket in preparation for replacement. The relay was tested in the I & C shop and found to function correctly. The surveillance procedure was performed on the relay several times and the relay was found to function properly. It is suspected to have had a poor connection from the relay to the base which was corrected by removal and reinstallation.

The Diesel Generator auxiliary relay was tested and found not to function. The relay has subsequently been replaced. A surveillance program for the relays which initiate emergency feedwater on a loss of off-site power will be developed. The relays for other modes of starting the motor driven emergency feedwater pump are currently checked.

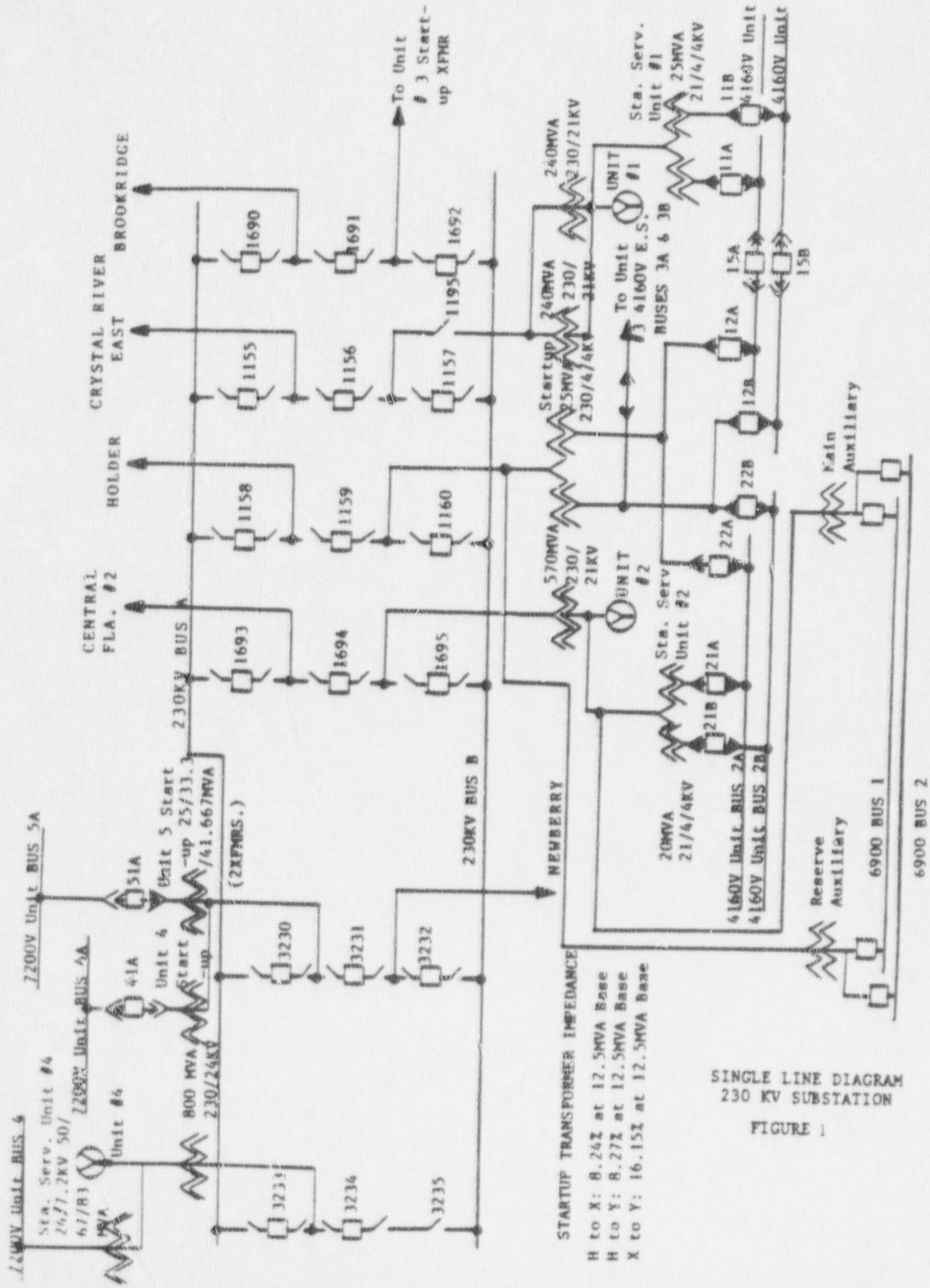
Engineers responsible for the analysis of the motor driven emergency feedwater pump not starting found the five second time delay to not be properly working. After this problem was corrected and tested satisfactorily plant startup was recommended. Subsequently, after plant startup while analyzing previously recorded data, the Diesel Generator auxiliary relay was found to be defective by the same engineers. This is believed to be an isolated event and the self-education process through which these individuals have gone is sufficient corrective action.

PREVIOUS SIMILAR EVENTS

Crystal River Unit 3 has reported two previous degraded off-site power events. This is the first report of a failure to start for the motor driven Emergency Feedwater Pump.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
CRYSTAL RIVER UNIT 3	0 5 0 0 0 3 0 2	8 9	0 2 3	0 0	0 6 OF 0 6

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



SINGLE LINE DIAGRAM
230 KV SUBSTATION

FIGURE 1