Florida Power
CORPORATION

October 19, 1984
3F1084-12

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz, Chief
Operating Reactors Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Degraded Grid Voltage Protection For The Class IE System

Dear Sir:

On April 29, 1983, Florida Power Corporation (FPC) committed to begin the design of the modifications to the undervoltage protection system necessary to fulfill the monthly testing requirement of IEEE 279-1971 and install the modifications by the end of Refuel V. Your office approved this plan in the Supplemental Safety Evaluation issued on August 24, 1983. FPC further committed to submit to your office the project schedule and the design when developed. The project schedule was submitted for your information on November 23, 1983. The design has now been developed and is enclosed for your review.

FPC committed to perform monthly bench testing of the undervoltage relays until the functional testing modifications are completed. The surveillance results obtained during the first six monthly bench tests have shown that the existing undervoltage relays drift randomly (both high and low) outside of their setpoint ranges. Therefore, during Refuel V, FPC will also change out the existing ITE 27D type relays with the ITE 27N type relays. The 27N relays are designed for applications where exceptional accuracy, repeatability, and long-term stability are required.

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Should you have any questions, please contact this office.

Sincerely,

G. R. Westafer

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

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Enclosure

cc: Mr. James P. O'Reilly
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street N.W., Suite 2900
Atlanta, GA 30323

ENCLOSURE

Florida Power Corporation
Crystal River - Unit 3
Undervoltage Protection System
Testing Modification

I. INTRODUCTION

FPC has committed to perform on-line, monthly testing of both the Engineered Safeguards buses first level undervoltage (loss of voltage) and second level undervoltage relaying systems (SLURS). Since both systems were designed to IEEE 279-1971 testing during refueling intervals only criteria, modifications must be made to allow testing on a monthly basis "at power" (i.e., plant on-line).

The modification proposed will provide an undervoltage test cabinet for each 4160 volt ES bus to allow monthly functional testing of the undervoltage protection system while the plant is on-line, such that performance of the test will not place the plant in a condition where it may inadvertently trip.

The undervoltage test circuit will provide output to an externally connected recorder to verify satisfactory operation of the undervoltage protection system. The test circuits will not require new power sources, but will be tied to the undervoltage protection circuits (Class 1E, 125 volts DC).

II. SPECIFIC REQUIREMENTS

No special test points are required for "Loss-of-Voltage" testing. Actuation of "Bus Undervoltage Alarm" (Events Recorder points 649 and 651), verifies actuation of "Loss-of-Voltage" auxiliary relays.

The test points TP1, TP2, and TP4 are located in the diesel generator output breaker closing and degraded voltage circuits to monitor the output of applicable undervoltage protection system relay contacts thus verifying their actuation.

Operation of the TP3 will be verified by monitoring the timing sequence of the applicable test points. Under a normal undervoltage condition, the signal to "close the diesel circuit breaker" (TP4) will occur 16 seconds after the "diesel start signal" (TP1) occurs. With an undervoltage condition with an ES signal present, the signal to "close the diesel circuit breaker" (TP4) will occur 3 seconds after the "signal to initiate undervoltage with ES signal present" (TP3) occurs. This signal (TP3) will occur when the undervoltage (U.V.) ES test pushbutton is pushed. All signals are measured between the identified Test Point (TP) and the "DC common" (TP5).

Relay	Function	Test Point (#/Location)	Test Point Voltage (Normal Condition/ U.V. Condition)
27BX	Diesel Start Signal	TP1/N.O. Contact, Term. Pt. 2	0 VDC/125 VDC
27BY	Initiate Loss of Voltage Relays	TP2/N.C. Contact, Term. Pt. 10	125 VDC/0 VDC
27BES	Initiate Under-voltage with ES Signal Present	TP3/U.V. ES Test Pushbutton	0 VDC/125 VDC
27BZ	Close Signal to Diesel Generator Breaker	TP4/N.O. Contact Term. Pt. 2	0 VDC/125 VDC

Trip blocking switches are located in series with the undervoltage contact within the applicable breaker trip circuits. The trip blocking switches are provided to prevent the tripping of the circuit breaker when testing with the plant on line.

Since the undervoltage tests will be performed while the plant is on-line, the test circuit design is based on the following interface criteria:

1. Diesel Generator Breakers 3209 and 3210 will not be closed by the test.

2. The normal feeder breakers will not be opened by the test.

3. The 4160 Volt ES bus under test will not be de-energized.

4. The associated 480 Volt ES bus will not be de-energized.

5. The test will allow the diesel generator to start, but not load.

6. The undervoltage testing will be performed in conjunction with monthly diesel tests as a means of starting the diesel generators.

7. The test will allow Bus Tie Undervoltage Lockout Relays 86/27BTA and 86/27BTB to operate.

III. DESCRIPTION

System Components - Each ES bus will have an undervoltage test cabinet comprised of the following components:

1. A ganged multi-pole, single throw, states type MTS test switch is used for the test points TP1, TP2, TP3, and TP4 and the "DC common" TP5.

2. A ganged multi-pole, single throw, states type MTS trip blocking switch is used for trip blocking the ES "A" bus circuit breakers 3205, 3207, 3211 and feeder breakers for makeup and purification pumps 3A and 3B (MUP-3A and -3B) and the ES "B" bus circuit breakers 3206, 3208, 3212, 3222 and feeder breakers for makeup and purification pumps 3B and 3C (MUP-3B and -3C). One of the poles on each of these trip blocking switches is connected in series with an alarm switch which will actuate events recorder points 2050 (Bus "A") and 2051 (Bus "B"). Each switch is a single throw configuration for trip blocking all of the circuit breakers concurrently along with indicating in the the control room:

"UNDERVOLTAGE TEST CABINET A (B)
TRIP BLOCKING SWITCH INITIATED".

3. A series of two-pole, single throw, states type MTS trip blocking switches mounted on a single base are used for trip blocking the ES "A" feeder breakers for; (1) decay heat sea water pump 3A (RWP-3A), (2) emergency nuclear service sea water pump 3A (RWP-2A), (3) emergency nuclear service closed cycle cooling water pump 3A (SWP-1A), (4) reactor building spray pump 3A (BSP-1A), (5) motor driven emergency feedwater pump 3A (EFP-1), and (6) 480V ES bus tie 3B, Unit 1C (Breaker 3391); and the ES "B" feeder breakers for; (1) decay heat sea water pump 3B (RWP-3B), (2) emergency nuclear service sea water pump 3B (RWP-2B), (3) emergency nuclear service closed cycle cooling water pump 3B (SWP-1B), (4) reactor building spray pump 3B (BSP-1B), and (5) 480V ES Bus tie 3A, Unit 1C (Breaker 3390). The remaining pole of each switch is connected in series with an alarm switch which will actuate events recorder points 2050 (Bus "A") and 2051 (Bus "B") and annunciate in the control room as described in 2 above. This series of single throw switches is provided for trip blocking circuit breakers individually depending upon the plant test configuration desired.

4. A set of 1 amp fuses are used for isolating the test points and "DC common" from the diesel generator output breaker closing and degraded voltage circuits.

5. The undervoltage ES test pushbutton is used to provide a circuit to relay 27BES thus simulating an "ES actuation signal present" when the undervoltage relay systems are tested.

NOTE: These switches give positive visual verification that switches are closed. Each group of switches will have removable clear plastic covers, such that the switches must be in a closed position to install the cover. This will help prevent leaving switches in open position after completion of tests.

Circuit Layout - The following circuits are provided for ES Bus "A":

1. From U.V. test cabinet to existing relay rack 3A for test points TP1, TP2 and U.V. ES pushbutton.

2. From U.V. test cabinet to ES Bus 3A, Unit 3A13 for test point TP4, test point "common", and all trip blocking switches.

3. From U.V. test cabinet to events recorder alarm point 2050.

The following circuits are provided for ES Bus "B":

1. From U.V. test cabinet to new relay rack 5B2 for test points TP1, TP2 and the U.V. ES pushbutton.

2. From U.V. test cabinet to ES Bus 3B, Unit 3B2 for test point TP4, test point "common", and all trip blocking switches.

3. From U.V. test cabinet to events recorder alarm point 2051.

Test Cabinets - All test cabinet components are to be arranged in a 2'-0" x 2'-0" enclosure. The test cabinets will be mounted in the Control Complex, Elevation 108'-0", which is considered a mild environment. Each cabinet is located within its respective 4160V ES switchgear room.

Each test cabinet will be key-locked to administratively control access for operation, maintenance and repair. No controls or components will be accessible from outside of the cabinets.

Raceway - Most of the circuit length is routed via existing Class IE cable tray. Short conduit lengths are required from test cabinets and switchgear up to existing cable tray (4160V ES switchgear rooms) and from existing cable tray up to events recorder cabinet #6 (cable spreading room).