



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA STREET, N.W.  
 ATLANTA, GEORGIA 30323

Report No.: 50-302/89-22

Licensee: Florida Power Corporation  
 3201 34th Street, South  
 St. Petersburg, FL 33733

Docket No.: 50-302

License No.: DPR-72

Facility Name: Crystal River 3

Inspection Conducted: August 28 - September 1, 1989

Inspector: C. A. Julian for 10/19/89  
 M. D. Hunt Date Signed

Approved by: C. A. Julian for 10/19/89  
 T. E. Conlon, Chief Date Signed  
 Plant Systems Section  
 Engineering Branch  
 Division of Reactor Safety

SUMMARY

Scope:

This routine announced inspection was conducted in the areas of Emergency Diesel Generator (EDG) overload, equipment qualification violation closures, and inspector follow-up item (IFI) closures. Two electrical problems were reviewed during this inspection: failure of a safety-related transformer and the Class IE battery configuration/loading.

Results:

In the areas inspected, violations or deviations were not identified.

The licensee presented more than ample data to permit closure of the violations and IFIs. The corrective actions for the EDG indicate that efforts are being made to bring the emergency power loading into conditions that will provide additional assurance of Technical Specification compliance. Indications are that management awareness of the electrical problems has increased. This is especially true in the area of equipment qualification. A special engineering group has been established within site nuclear engineering services that is devoted to EQ control, records, and verification.

During review of the event created by the failure of the 4160V to 480V step-down transformer, it was noted that the operators handled the situation in a controlled manner. This effort reduced the possibility of the loss of RCS cooling from becoming a major excursion into an unacceptable condition.

The engineering groups appear to be more involved in the overall operation of the plant. Operations personnel appear to understand the involvement of engineering and cooperation of these organizations appeared good.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- D. H. Beach, Supervisor Electrical/IAC
- \*G. A. Becker, Manager, Site Nuclear Engineering Services
- G. L. Boldt, Vice President, Nuclear Production
- A. H. Gelston, Supervisor, Site Nuclear Engineering Services (EQ)
- R. J. Marchese, Nuclear Engineer
- \*V. R. Roppel, Manager, Nuclear Plant Maintenance
- \*W. L. Rossfield, Manager, Nuclear Compliance
- \*R. C. Widell, Director, Nuclear Operations Site Support
- \*M. S. Williams, Nuclear Regulatory Specialist
- \*K. R. Wilson, Manager, Nuclear Licensing

Other licensee employees contacted during this inspection included engineers, operators, technicians, and administrative personnel.

#### NRC Resident Inspector

\*P. Holmes-Ray

\*Attended exit interview

### 2. Failure of Engineered Safeguards Auxiliary Transformer 3A (93702)

At approximately 0237 hours on August 28, 1989, while the plant was in Mode 5, Safeguards Auxiliary Transformer 3A failed causing a loss of power to Engineered Safeguards Bus 3A (480V). The loss of 480V Bus A caused the loss of power to the Decay Heat Removal Closed Cycle Cooling Water (DC) Pump 3A, Engineered Safeguards (ES) Motor Control Centers (MCC) 3A-1, 3A-2, 3A-3, and the control complex water chiller 3A.

At the time transformer 3A failed, the plant was using the DC Pump 3A to provide the cooling source for decay heat removal. DC Pump 3B was tagged out of service. When the 3A DC Pump lost power and cooling water circulation stopped, the reactor coolant temperature increased to 203°F and the core temperature was 208°F after approximately 15 minutes. Decay Heat Pump 1B was returned to service approximately 19 minutes after the transformer failed and the incore temperatures were reduced below 200°F.

The Safeguards Auxiliary Transformer 3A, a step-down transformer (4160V to 480V), was originally installed with the engineered safeguard Bus 3A (480V). The inspector reviewed MAR 80-05-14-03 which added ESMCC 3A3 and ESMCC 3B3 to the 480V ES Buses 3A and 3B, respectively. As the result of these additional loads, the 4160V to 480V step-down transformers feeding

the 480V ES Buses 3A and 3B were upgraded from 1000 KVA to 1333 KVA by installing cooling fans, associated instrumentation, and automatic controls to start the fans at 190°C transformer core temperature. The new rating was approved by the supplier and it was the fan cooled rating for the transformer.

Inspection of the faulted transformer plainly revealed that the B phase winding had failed. It was also evident that the cooling fans had not operated for any extended period of time. The transformer was removed and shipped to the vendor for failure analysis. Records indicate that high temperature alarms had not been received prior to the failure. A spare transformer which was certified as an equal replacement was installed.

The temperature sensing elements, alarm circuits and fans were all found to be in calibration/working conditions and were reinstalled.

Review of operations data indicated that the core temperature was at 208° degrees approximately 14 minutes into the event, and the incore temperature was reduced to "below 200°" approximately 7 minutes after decay heat pump 1B was restored to service.

It appeared that the operations personnel responded in a knowledgeable manner that prevented an uncontrolled temperature rise.

Within the areas examined, violations or deviations were not identified.

### 3. Station Battery B Profile Discrepancy (93702)

During the inspection, the licensee filed an Event Notification, Event No. 16452, regarding the B Station Battery which was declared inoperative. It was determined that an error existed in the assumption of the load profile for "B" battery. A load study determined that the DC powered nonsafety-related hydrogen-seal-oil pump would start much sooner than anticipated under a loss-of-offsite-power and failure of the B EDG to start.

The licensee is currently performing an analysis to determine what corrective action is appropriate. The Senior Resident Inspector and appropriate regional personnel are following this situation.

### 4. Action on Previous Inspections Findings (92702)

(Closed) Violation 302/87-41-01, Diesel Generator (DG) Overload Due to Inadequate Design Control. The licensee submitted his letter No. 3 F0688-03 dated June 3, 1987 which defined the corrective actions to be taken as the result of this violation.

A total Emergency Diesel Generator (EDG) loading and design basis evaluation was performed. As a result, the worst case EDG load was reduced to less than 3300 KW for all postulated scenarios. Various loads were removed and other loads reassigned. The DG vendor conducted an

upper piston wrist pin bushing inspection for the "A" D/G as the result of exceeding the cumulative 30 minute rating. A timer has been installed to measure the DG run time. The testing requirements required by the surveillances in the Technical Specifications have been clarified. The EDG ratings listed in the FSAR were clarified in Revision 10. A portion of the load shifts and reassignments were directed by Temporary Modifications Approval Requests (TMAR). Several loads will be restored at the completion of the EDG upgrade program. There are numerous work requests and MARs to be accomplished during the upcoming refueling outage which will provide an adequate means of tracking these licensee commitments. This item is closed.

(Closed) Violation 302/88-27-01 - The licensee failed to environmentally qualify feedwater valves FWV-33 and 36 and associated control circuitry for HELB accidents. The licensee submitted their response to this violation by letter dated November 14, 1988. The licensee provided a qualification of these components by analysis along with a justification for continued operation. Modification Approval Request (MAR)#88-06-15-01 was issued August 29, 1988, which detailed the replacement of terminal blocks in the terminal boxes for valves FWV-33 and FWV-36. Work request #104007 has been issued to cover the work which is scheduled to be completed during the Refueling outaged scheduled for March 1990.

A training course entitled "EQ Awareness training" was developed to provide the CR-3 personnel and craft with a basic knowledge of the EQ program. The training was held August 23, 24, & 25, 1989 for engineering and craft personnel. The engineers were trained in all three of the following modules. The crafts received training in modules 1 & 3.

- Module 1-Introduction
  - Definitions
  - Regulations
  - Program Description
- Module 2-Long Term Compliance
  - Evaluate MARs
  - Replacement Equipment
- Module 3-Maintenance
  - EQ Configurations
  - Aging Degradation

This violation is closed.

(Closed) Violation 302/88-27-02, FPC EQ Program Was Inadequate In That The Specified Instrument Accuracies Did Not Consider Error Contributions From All Components In The Loop (i.e., Cable Splices, And Penetrations) During Accident Conditions. The licensee submitted his acknowledgement of this violation on November 18, 1988, and committed to have instrument loop accuracy

and loop insulation resistance calculations for safety-related instrument loops prepared and placed in the EQ files.

These calculations are on site and a sample was examined by the inspector. The system component evaluation sheets (SCEW) were modified to reference the calculation number for the loop in which the component is installed. The calculation sheet has the SCEW sheet number listed to provide the cross referencing. This item is closed.

5. Inspector Followup Items (IFI) 92701

(Open) IFI 302/88-19-01, No Specific Identification For Instrumentation On The Control Boards. Discussions with the operations personnel were held regarding the identification of Post Accident Monitoring Indications as identified by RG 1.97 categories 1 and 2. The licensee reinforced his stand not to use any unique identifier for the RG 1.97 indicators based on the following information issued August 31, 1989 entitled "Main Control Board Indicator Identification of R.G 1.97 Instruments"

RG 1.97, Revision 3, dated May 1983, states that RG 1.97 variables located in the main control room should be uniquely identified. Specifically, Table 1, under Equipment Identification, states that "type A, B, and C instruments designated as categories 1 and 2 should be specifically identified with a common designation on the control panels so that the operator can easily discern that they are intended for use under accident conditions."

RG 1.97 is a guide and not a legal requirement unless specifically endorsed. FPC's position was reviewed and a determination made to consciously not mark RG 1.97 indicators on the main control board. Our procedures are symptom oriented and do not specify which indicators the operators are to use. The operators are trained to use the best available indications for particular situations. Marking instruments for other special requirements such as Appendix R etc, would cause additional identification markings to be placed on control board instruments. These markings add additional clutter to the control board. Human factors guidelines suggests that multiple color coded markings to indicators create too many uses for the same color and therefore add confusion to the meaning of the color definitions on the control board.

Therefore, FPC took exception to the RG 1.97 guidance to physically mark the control board indicators to identify RG 1.97 instruments.

This information will be forwarded to NRR for evaluation.

(Closed) IFI 88-19-02, Verify That Containment Atmospheric Temperature Recorder is Located Properly. The inspector discussed the fact that this recorder is located on the back panel of the main

control board with NRR personnel who advised that this location is acceptable and has been accepted at other sites. It should be noted that the operator can trend or call for a print out of the containment temperatures as an additional method of monitoring this parameter. This item is closed.

(Closed) IFI 88-19-03, Verify Adequacy of Emergency Power Source Indication. Discussions with the operations personnel were held regarding how the operators can verify that adequate power is available from inverters 3A, 3B, 3C and 3D; 250 VDC Batteries 3A and 3B; 4160 volt bus 3A and 3B and 480 volt Bus 3A and 3B. In addition to the indicating lights, there are annunciators to indicate failures of the listed equipment. The annunciator signal is received from a different source. It is felt that this provides the operator with adequate and reliable information in this regard. This item is closed.

(Closed) IFI 89-09-09, Operability of Reactor Coolant Inventory Tracking System (RCITs). The inspector reviewed calculations for the insulation resistance (IR) of the Weidmuller terminal blocks when used in harsh environments at CR-3. The IR values used for the calculation are based on data obtained for Weidmuller type SAK 4 terminal block qualification reports as follows:

Wyle Laboratories Report Number 58687, Revision A, dated August 5, 1982; Loss of Coolant Accident Testing of Five Weidmuller Terminal Blocks for Washington Public Power Supply System, FRC File No. W179-3TR-002.

FRC Final Report F-C5205-3 dated October 1979 "Qualification Test Programs for Terminal Blocks, FRC File No. W179-3TR-001.

One conclusion stated is "The IR is at least three orders of magnitude greater than the wire resistance and lead length compensation, and in general has only a second order effect in measurement accuracy". Therefore the IR value of  $3.2 \times 10^4$  ohms can be used for Weidmuller terminal blocks at temperatures of 300°F and below.

Additionally, MAR 89-05-01-02 was developed to modify the terminal boxes by drilling drain holes.

This item is closed.

## 6. Exit Interview

The inspection scope and results were summarized on September 1, 1989, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed above. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.