



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

CRYSTAL RIVER UNIT 3

FLORIDA POWER CORPORATION

DOCKET NO. 50-302

ADEQUACY OF STATION ELECTRIC DISTRIBUTION
SYSTEM VOLTAGES

Introduction and Summary

Florida Power Corporation (FPC) was requested by NRC letter dated August 8, 1979 to review the electric power system at Crystal River Unit 3 (CR-3). The review was to consist of:

- (a) Determining analytically the capacity and capability of the offsite power system and the onsite distribution system to automatically start as well as operate all required safety loads within their required voltage ratings in the event of (1) an anticipated transient, or (2) an accident (such as LOCA) without manual shedding of any electric loads.
- (b) Determining if there are any events or conditions which could result in the simultaneous or, consequential loss of both required circuits from the offsite network to the onsite distribution system and thus violating the requirements of GDC 17.

The August 8, 1979 letter included staff guidelines for performing the required voltage analysis and the licensee was further required to perform a test in order to verify the validity of the analytical results. FPC responded by letters dated April 3 and December 22, 1980. The Final Safety Analysis Report and phone communications of January 5, 1980 were also used in preparing this evaluation. A detailed report and technical evaluation of the submittal was performed by EG&G under contract to NRC, and with general supervision by the NRC staff. This work was reported in EG&G's Technical Evaluation Report (TER), "Adequacy of Station Electric Distribution System Voltages, Crystal River Unit 3" dated January 1981 (attached). We have reviewed this report and concur in the conclusions that the offsite power system and onsite distribution system are capable of providing acceptable voltages at the terminals of the Class 1E equipment for the worst case station electric load and grid voltages.

Evaluation Criteria

The criteria used by EG&G in the CR-3 TER includes GDC 5 ("Sharing of Structures, Systems, and Components"), GDC 13 ("Instrumentation and Control"), and GDC 17 ("Electric Power Systems"), of Appendix A to 10 CFR 50; IEEE Standard 308-1974 ("Class 1E Power Systems for Nuclear Power Generating Stations"); ANSI C84.1-1977 ("Voltage Ratings for Electric Power Systems and Equipment - 60 Hz"); and the staff position and guidelines in the NRC letter to FPC dated August 8, 1979.

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Analysis and Test Features

The FPC analysis assumed that each source of offsite power was under extremes of load with both maximum and minimum switchyard (grid) voltages (243.6 Kv and 236.4 Kv on the 230 Kv system), (540 Kv and 475 Kv on the 500 Kv system). FPC established that emergency 4 Kv loads would operate within allowable limits for the worst case conditions noted above.

FPC has committed to verify voltage analysis prior to peak summer loading by recording bus voltages on the plant auxiliary and Class 1E buses while CR-3 is operating. FPC will provide results of these tests to the NRC upon completion. FPC has, also, committed to changing the tap on the Unit 3 startup transformer from 224,240 V to 230,000 V during the Fall 1981 refueling outage.

Conclusions

We have reviewed the EG&G TER and concur in the findings that:

- (1) FPC must conduct tests to verify the voltage analysis. These tests should be conducted with the Class 1E buses and MCC's loaded to at least 30%. If this is not possible, FPC should define the basis used to accurately account for feeder and transformer voltage drops in their measurements.
- (2) Upon completion of tap changes on Unit 3 startup transformer and verification testing (Item 1 above), the Class 1E equipment terminal voltage will remain within acceptable operating limits for the postulated worst case conditions.
- (3) FPC's reaffirmation of compliance with GDC 17 requirements is acceptable.

We therefore find the CR-3 design to be acceptable with respect to the adequacy of station electric distribution system voltage subject to the verification testing and tap change. We shall address the verification testing and tap change in a supplement to this Safety Evaluation.

Dated: April 22, 1981