



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 58 TO FACILITY OPERATING LICENSE NO. DPR-67

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE UNIT 1

DOCKET NO. 50-335

Introduction and Summary

The criteria and staff positions pertaining to degraded grid voltage protection were transmitted to Florida Power and Light Company (FP&L) by NRC Generic Letter dated June 3, 1977. In response to this, by letters dated July 25, 1977, November 9, 1979, July 3, 1980, March 18, 1982 and May 24, 1982, the licensee proposed certain design modifications and changes to the Technical Specifications. A detailed review and technical evaluation of these proposed modifications and changes to the Technical Specifications was performed by Lawrence Livermore Laboratory (LLL), under contract to the NRC, and with general supervision by NRC staff. This work is reported by LLL in "Technical Evaluation Report on the Proposed Design Modifications and Technical Specification Changes on Grid Voltage Degradation for the St. Lucie Nuclear Power Plant, Unit 1" (attached). The staff reviewed this technical evaluation report and concurred in the conclusion that the licensee had not provided sufficient design details to complete an evaluation of the degraded grid voltage protection system. The licensee, in two additional submittals, both dated December 10, 1982, submitted revised design modifications to Technical Specifications associated with the degraded grid protection system. Further clarification was provided by letter dated March 11, 1983. After a review of these submittals, LLL submitted Revision 1 to their previous TER (attached). The staff has reviewed this additional information and concurs with LLL that the design of the degraded grid protection system meets the staff requirements and is therefore acceptable.

Evaluation Criteria

The criteria used by LLL in its technical evaluation of the proposed changes include GDC-17 ("Electric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 279-1971 ("Criteria for Protection Systems for Nuclear Power Generating Stations"); IEEE Standard 308-1974 ("Class 1E Power Systems for Nuclear Power Generating Stations"); and staff positions defined in NRC Generic Letter to FP&L dated June 3, 1977.

Proposed Changes, Modifications and Discussion

The existing design at St. Lucie Unit 1 utilizes one CV-2 undervoltage relay on each of the 4160 volt Class 1E buses. These relays are induction disc, inverse time, with a setpoint of 88.34% of nominal. The 4160 volt nominal setpoint corresponds to 85% of nominal at the 480 volt MCC buses.

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The 480 volt MCC buses contain undervoltage alarm relays. When actuated, the 4160 volt Class 1E bus relays will disconnect the degraded power source, initiate load shedding, start the emergency diesel generators and sequence the loads on the Class 1E buses when satisfactory diesel generator output voltage and frequency is achieved. These relays are automatically bypassed when the diesel generator output breaker is closed. If the diesel generator breaker should trip, the load shed and sequencing feature will be reinstated.

The licensee has proposed the following design changes:

1. Replacement of the above CV-2 with two definite-time delay relays on each 4160 volt Class 1E bus. This will provide a two-out-of-two coincident logic for loss-of-voltage detection per bus.

The voltage and time delay setpoints for this scheme will be 2900 ± 29 volts and $1 \pm .5$ seconds respectively. The function of these relays will be the same as the existing CV-2 relay (i.e., initiate offsite power source disconnection, load shedding, diesel generator starting, and load sequencing on the affected bus).

2. Addition of two sets of definite-time delay relays on each 4160-volt Class 1E bus with two-out-of-two coincident logic scheme. These relays will protect the Class 1E equipment from degraded voltage conditions. The first set of relays will be set at 3675 ± 36 volts (88.34% of 4160 volts) with a time delay of 7 ± 1 minutes. The second set of relays will be set at 3592 ± 36 volts (86.35% of 4160 volts) with a time delay of 18 ± 2 seconds.
3. Addition of second (ITE 27) undervoltage relay on each 480V Class 1E bus to provide a two-out-of-two coincident logic per bus. These relays will be interlocked with a safeguard signal to insure adequate starting voltage during accident conditions. The voltage and time delay setpoints for this scheme will be $429V \pm 5V$, $-0.V$ (89.38% of 480V) and 7 ± 1 seconds.

In the December 10, 1982 submittals, FP&L provided the design details on the interaction of onsite power sources with load shed feature and necessary Technical Specifications which cover the setpoints with tolerances, surveillance requirements and limiting conditions for operation. Once the onsite power sources start supplying power to the Class 1E buses, load shed feature is bypassed for a period of 0.2 seconds (i.e., the diesel generator breakers are closed) and is automatically reinstated following breaker trip. This bypassing/reinstatement feature is accomplished by utilizing close/trip signal from the diesel generator output breaker.

The staff has reviewed FP&L's proposed undervoltage relay scheme and LLL's revised Technical Evaluation Report. The proposed design modification and Technical Specification changes, when implemented, will protect the Class 1E equipment from sustained degraded voltage under accident or non-accident conditions by initiating automatic disconnection of Class 1E equipment from

the offsite source, load shedding, diesel generator starting and load sequencing. The staff finds the proposed modifications to the degraded grid voltage system and changes to Technical Specifications acceptable.

Conclusions

The staff has reviewed the LLL Technical Evaluation Report dated July 30, 1982 and Revision 1 dated March 23, 1983 and concurs in the findings that sufficient information had been provided to complete the evaluation.

The FP&L submittals provided the design details of the proposed St. Lucie Plant, Unit 1 undervoltage relay scheme and changes to Technical Specifications. The staff has reviewed these submittals along with the LLL TERs and finds that the system as designed, including the revised Technical Specifications, meets the staff requirements for degraded grid protection at St. Lucie 1. The voltage and time delay trip settings will protect the Class 1E equipment from sustained degraded voltages from offsite power sources during accident and non-accident conditions. The staff, therefore, finds the degraded grid protection system and changes to technical specifications acceptable.

Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated, does not create the possibility of an accident of a type different from any evaluated previously, and does not involve a significant reduction in a margin of safety, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: May 3, 1983

Attachments:

1. TER (UCID-19450), July 30, 1982
2. TER (UCID-19450, Rev. 1), March 23, 1983

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