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

Report Nos.: 50-250/86-29 and 50-251/86-29

Licensee: Florida Power and Light Company
9250 West Flagler Street
Miami, FL 33102

Docket Nos.: 50-250 and 50-251 License Nos.: DPR-31 and DPR-41

Facility Name: Turkey Point 3 and 4

Inspection Conducted: April 28 - May 2, 1986

Inspectors: M D Hunt 7/10/86
M. D. Hunt Date Signed

R Brewer for 7/29/86
R. Brewer Date Signed

Accompanying Personnel: T. E. Conlon
P. Fillion

Approved by: A B Ruff for 7/10/86
T. E. Conlon, Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This special announced inspection was performed at the licensee's Engineering Office and the plant site to review the control and distribution of emergency electrical loads which are connected to the emergency diesel generators (EDG) in the event of a design base accident (LOCA). This report includes the evaluation made as the result of a meeting held in RII offices on May 20, 1986 between FP&L personnel and NRC.

Results: One unresolved item was identified - Emergency Diesel Generator Load Control, paragraph 7.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

J. J. Zudans, Nuclear Energy (Attended Meeting No. 2)
C. Baker, Plant Manager (Attended Meeting No. 2)
J. D. Kirk, Project Manager (Attended Meeting Nos. 1 & 2)
C. M. Wethy, Vice President (Attended Meeting Nos. 2 & 3)
J. A. Labarrague, Technical Department (Attended Meeting No. 2)
D. D. Grandage, Operations Superintendent (Attended Meeting No. 2)
F. G. Flugger, Power Plant Engineering (Attended Meeting Nos. 1, 2 & 3)
P. L. Pace, Nuclear Licensing Department (Attended Meeting Nos. 2 & 3)
J. L. Montgomery, Power Plant Engineering (Attended Meeting No. 2)
J. Arias, Jr. Regulation and Compliance Superintendent (Attended Meeting No. 2)
E. Preast, Site Engineering Manager (Attended Meeting Nos. 2 & 3)
L. L. Craig, Electrical Engineering Superintendent (Attended Meeting Nos. 2 & 3)
S. A. Verduci, Licensing Department (Attended Meeting No. 1)

Other Organization

T. M. Patterson, Bechtel Power Corp. (BPC) (Attended Meeting No. 2)

NRC Resident Inspectors

D. R. Brewer (Attended Meeting Nos. 1, 2, & 3)
T. Peebles (Attended Meeting No. 2)

1. Attended Exit Meeting at Juno Beach Offices April 29, 1986
2. Attended Exit Meeting at Turkey Point Site May 2, 1986
3. Attended Meeting at Region II May 20, 1986

2. Exit Interview

The inspection scope and findings were summarized on May 2, 1986, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

- Unresolved item - Emergency Diesel Generator Load Control, paragraph 7.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. One new unresolved item identified during this inspection is discussed in paragraph 7.

5. Background Review of Emergency Diesel Generator Electrical Loads

In April 1981, the licensee received INPO Significant Operating Experience Report (SOER) 81-10, Event Sequences Not Considered in Design of Emergency Bus Control Logic. SOER 81-10 recommended that plants review their control logic schemes for Emergency Diesel Generator (EDG) breaker control, load shedding and load sequencing to ensure that the emergency power system would meet the design intent under all accident conditions involving loss of off-site power prior to or following the actuation of engineered safety features (ESF) equipment.

The licensee began an engineering review of SOER 81-10 for applicability to Turkey Point Units 3 and 4 in September 1982. The review, completed in March 1983, concluded that Turkey Point Units 3 and 4 appeared to be susceptible to one of the three scenarios postulated in the SOER. The specific concern involved a postulated loss of off-site power with no ESF actuation initially required. In this scenario, the shutdown loads would be carried by each EDG and would include loads which automatically load on the diesels and any manual loads added by the Control Room Operators (CROs). If an accident requiring automatic ESF actuation was to subsequently occur, the addition of the ESF loads to the emergency buses could create an EDG overload since the existing nonessential loads would not have automatically shed.

Engineering work for the performance of a modification, which would open the EDG output breakers on any ESF actuation, thus shedding existing loads and then resequencing essential loads for accident mitigation, was begun in August 1983 and was subsequently completed. In December 1983, the scope of the review was expanded to include a determination of those loads not automatically stripped on receipt of an ESF actuation signal while off-site power was unavailable.

Between September and October 1984, the licensee's review raised questions regarding the accuracy and completeness of loading data tabulated in the Final Safety Analysis Report (FSAR). A review was begun of all EDG loads to establish the method of actuation of each load start signal (manual or automatic, instantaneous or delayed, etc.). The review included the reevaluation of design logic drawings and requirements specified in Emergency Operating Procedures (EOPs). In May 1985, the Nuclear Steam Supply System (NSSS) vendor was requested to review the FSAR loading table with respect to the safety analysis to determine if the appropriate equipment, loading times, and operating times were shown. This review was completed in September 1985, and was made available for incorporation into the EDG loading evaluations previously implemented.

In December 1985, a preliminary report showed EDG loading higher than expected with actual loading values different from those recorded in the FSAR. An engineering evaluation of the situation in the format of a Justification for Continued Operation (JCO) was issued on December 15, 1985.

The NRC was informed of the problem and the licensee's proposed corrective actions via the Emergency Notification System (ENS) as required by 10 CFR 50.72(b)(1)(ii)(B), on December 14, 1985. The licensee believed that the EDGs were in a condition that was outside the design basis of the plant. Turkey Point Units 3 and 4 remained at 100 percent power operation while the administrative controls specified in the JCO were implemented. Turkey Point Unit 4 entered a scheduled refueling outage in January 1986. Unit 3 was shutdown on March 4, 1986, as a compensatory action stemming from a concern that the Component Cooling Water (CCW) system was not adequately delivering required flow to all equipment.

On January 8, 1986, the licensee met with the NRC Region II staff to discuss EDG loading concerns. The December 1985, JCO was discussed as well as long term plans for corrective actions.

In February 1986, the final report (as opposed to the December 1985 preliminary report) on EDG loading was completed. This report provided more accurate estimates of the kilowatt (KW) loads placed on the EDGs by equipment likely to be operated under accident conditions. Additionally, the final report utilized actual test data for the CCW pump KW load rating. The loading estimates for several components were increased over those used in the December 1985 JCO. The loading estimates for other loads decreased or remained unchanged.

In March 1986, the licensee performed reviews of those manual actions which would be required during the assumed accident scenario to limit EDG loading to less than 2950 KW. The licensee concluded that load increases identified in the final report in conjunction with the newly incorporated EOPs would require excessive dependence on operator actions to control EDG loading. The new EOPs, reflecting the initiatives of the Westinghouse Owner's Group emergency response guidelines, were implemented in March 1986, following the shutdown of Unit 3. The licensee concluded that the December 1985 JCO could no longer be considered valid.

On March 29, 1986, the licensee completed a second JCO which justified the operation of Unit 3 while requiring Unit 4 to remain in cold shutdown. This JCO was necessary because the final EDG loading report of February 1986 indicated pump KW loads in excess of those assumed to exist in the December 1985 JCO. The licensee estimated that during the assumed accident, the 2750 KW auto-connected Technical Specification (TS) surveillance limit and the 2950 KW limit incorporated in the EOPs could be exceeded. Since Unit 4 was in a refueling shutdown condition, the first phase of the March evaluation centered on a basis for continued operation of a single unit. Consequently, the results of the evaluation limit Unit 4 to the cold shutdown

condition. Additionally, to provide the EDGs with the load capacity for Unit 3 operation, the flow configuration of the Unit 4 intake cooling water (ICW) and component cooling water (CCW) systems were restricted such as the one ICW pump and one CCW pump together place a 500 KW load on the EDG as opposed to the 639 KW the Unit 4 pumps would normally draw.

Unit 3 was returned to power operation on April 9, 1986. Unit 4 remained in the cold shutdown condition while the licensee evaluated acceptable methods of load reduction and management. The licensee discussed long term corrective actions, which could lead to the operation of Unit 4 at power, with the NRC Region II staff on May 20, 1986.

6. NRC Review

The inspection was conducted April 28 - May 2, 1986, at the licensee's Engineering Offices at Juno Beach (Juno Plant Engineering (JPE)) and the plant site to review the various actions taken by the licensee to support continued operation of Turkey Point Unit 3. Various engineering documents were reviewed in addition to the results of tests conducted to determine the loads that would be placed on the EDGs in emergency conditions. Discussions were held with licensee representatives to discuss the reasons for the overload conditions and the corrective actions taken or proposed to correct this situation.

The licensee advised the inspectors that prior to the engineering evaluation completed in 1985, there was no positive control maintained to account for loads placed on the EDG emergency buses. A contributing factor to this situation was the fact that there was no review by FP&L for engineering work performed by contractors who had acceptable QA programs namely, Bechtel Power Corporation.

Additionally, JPE had used the EDG load tables contained in the FSAR, which have since been found to be inaccurate/non-conservative, when adding various cooling loads that were required by the TMI modifications.

Review of the 18-month EDG surveillance test required by the TS revealed that the EDGs were tested with only one unit experiencing the loss of off-site power and the other unit supplied by off-site power. The load testing of the diesel generators in this manner did not load them fully. The load testing of each EDG was at 2750 KW for two hours and 2500 to 2550 KW for six hours by connecting them to the power grid.

In order to reduce the load on the emergency buses during a loss of off-site power with one unit in an accident situation, the other unit going into hot shutdown conditions and failure of one EDG to start, the licensee instituted several corrective measures. Certain non-safety loads that sequence onto the 4160 VAC bus were identified. This equipment is the turbine generator bearing and turning gear oil pumps and the automatic turning gear motors for both units. Also, two instrument air compressors were found to start when the SI signal is reset. As previously stated, recent testing identified a

higher KW loads for single pump operation of the Intake Cooling and CCW pumps than indicated in the FSAR load table.

Administrative controls were developed along with changes made in the EOP to control the loads on the EDG buses. With the changes made, the JCO for Unit 3 was revised with Unit 4 to remain in cold shutdown in January 1986. Various other changes were instituted to provide for electrical load management for the EDGs in emergency situations.

7. NRC Concerns

As the result of inspections and various meetings with the licensee, three areas have been identified which appear to be outside of NRC regulations.

a. The TS 18-month EDG surveillance testing does not test the EDGs in a manner that would verify that they are capable of supporting both Units 3 and 4 in the event of a loss of offsite power and one unit in a design base accident condition. The method of testing does not place the actual unit loads on the EDG buses. It could be reasonably assumed that had this testing been performed with Units 3 and 4 both experiencing a LOP the overload condition might have been identified.

b. Secondly, the loading of the EDG was not fully recognized to the point that prior to December 1985, the EDGs would have been overloaded to approximately 3200 KW which is beyond any limit for which any analysis has been performed.

c. The third concern relates to the fact that both Units 3 and 4 continued to be operated at 100 percent power even though the loading of the EDGs under emergency conditions would have been excessive and the requirements of the JCO issued in December 1985, had not been fully instituted and the operators were not aware of various conditions that could have occurred. The only instruction available to the operator was a warning not to exceed 2950 KW load on each EDG.

Further evaluations of these concerns are being conducted by the NRC to determine their impact on safe plant operation as related to existing regulations. These concerns are identified as Unresolved Items 50-250, 251/86-29-01, Emergency Diesel Generator Load Control.