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

Report Nos.: 50-250/90-01 and 50-251/90-01

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: January 8 - 12, 1990

Inspector: A B Ruff for M. D. Hunt 2/1/90
M. D. Hunt, Team Leader Date Signed

Team Members: A. B. Ruff
N. Merriweather

Approved by: T E Conlon 2/1/90
T. E. Conlon, Chief Date Signed
Plant Systems Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine announced inspection was in the areas of the licensee's conformance to Regulatory Guide (RG) 1.97, Instrumentation for Light - Water Cooled Nuclear Power Plant to Assess Plant and Environs Conditions during and following an Accident. Information on an Inspector Followup Item (IFI) in the Environmental Qualification of Electrical Equipment area was also examined and considered to be satisfactory.

Results:

In the areas inspected, violations or deviations were not identified. The licensee has performed the installation and modification of instruments to comply with Regulatory Guide 1.97, Revisions 3.

Strength:

An attribute in the engineering and management areas was identified in that these organizations acted prudently and effectively in the implementation of RG 1.97 criteria and in the preparation for the NRC inspection of the same. Instrument loop diagrams, a new revised RG 1.97 instrument list, which will be included in the FSAR by a 1990 amendment, and individual instrument packages that contained all the pertinent data to support RG 1.97 commitments were provided to the NRC inspectors to aid in the inspection. The RG 1.97 Types A, B, and C, Categories 1 and 2 instruments were environmentally qualified and uniquely identified in the Control Room and Simulator so that the operators can easily discern that these instruments are intended for mitigation of accident conditions. The instruments in the field were tagged for easy identification including tagging for EQ qualification. The above referenced documentation for record and audit purposes, plus field work performed by the licensee indicated that they recognized what was needed and committed resources to complete the actions necessary to enact the RG 1.97 program at Turkey Point.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

K. N. Harris, Vice President
*J. Cross, Plant Manager
*J. Arias, Jr., Technical Assistant to Plant Manager
*T. V. Abbatiello, QA Supervisor
*D. L. Smith, Manager Electrical/I&C Engineering
*G. E. Regal, Manager Engineering Procurement
*J. Kovarik, I&C Maintenance Support Superintendent
G. Heisterman, Assistant Superintendent Electrical Maintenance
W. Busch, Electrical Engineer
C. Bible, Electrical Engineer
*M. Musrock, Associate Engineer I&C
*J. Osborne, I&C Lead Engineer
M. Pearce, Electrical Engineer
R. Rajan, Senior Plant Engineer Maintenance
*D. Herrin, Regulation and Compliance Head Engineer

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

Other Organizations

NRC Resident Inspectors

*R. Butcher, Senior Resident Inspector
G. Schnebli, Resident Inspector
T. McElhinney, Resident Inspector

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Inspection of Licensee's Implementation of Multiplant Action A-17: Instrumentation for Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97) (25587).

Criterion 13, "Instrumentation and Control," of Appendix A to 10 CFR Part 50 includes a requirement that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety. Regulatory Guide 1.97 (RG 1.97) describes a method acceptable to the NRC staff for

complying with the Commission's regulations to provide instrumentation to monitor plant variables and systems during and following an accident.

The purpose of this inspection was to verify that the licensee has an instrumentation system for assessing variables and systems during and following an accident, as discussed in Regulatory Guide (RG) 1.97. Under accident conditions it is necessary that the operating personnel have; (1) information that permits the operator to take preplanned actions to accomplish a safe plant shutdown, (2) determine whether the reactor triped, Engineered Safety-Feature Systems actuation (ESFS), and that other manually initiated safety systems important to safety are performing their intended functions, and (3) provide information to operators that will enable them to determine the potential for causing a gross breach of the barriers to radiation release and to determine if a gross breach of barrier has occurred. For this reason multiple instruments with overlapping ranges may be necessary. The required instrumentation must be capable of surviving the accident environment for the length of time its operability is required. It is desirable that components continue to function following seismic events.

As a result, five types of variables have been specified that serve as guides in defining criteria and the selection of accident-monitoring instrumentation. The types are: Type A - Those variables that provide information needed to permit the control room operating personnel to take specified manual actions for which no automatic control is provided and that are required for safety systems to accomplish their functions for design basis accident events; Type B - Those variables that provide information to indicate whether plant safety functions are being accomplished; Type C - Those variables that provide information to indicate the potential for barriers being breached or the actual breach of barriers to fission product release; Type D - Those variables that provided information to indicate operation of individual safety systems and other systems important to safety; Type E - Those variable to be monitored in determining the magnitude of the release of radioactive materials and for continuously assessing such release.

The design and qualification criteria are separated into the separate categories that provide a graded approach to requirements depending on the importance to safety of the measurement of a specific variable, Category 1 provides the most stringent requirements and is intended for key variables. Category 2 provides less stringent requirements and generally applies to instrumentation designated for indicating systems operating status. Category 3 is intended to provide requirements that will ensure that high-quality off-the-shelf instrumentation is obtained and applies to backup and diagnostic instrumentation. A key variable is that single accomplishment of a safety function (Types B and C), or the operation of a safety system (Type D), or radioactive material release (Type E). Type A variables are plant specific and depends on the operations that the designer chooses for planned manual actions. Inspection of Categories 1 and 2 equipment was performed as described below.

a. Category 1 and 2 Instrument for Units 3 and 4

The instrumentation listed in the Table, was examined to verify that the design and qualification criteria of RG 1.97 had been satisfied. The instrumentation was inspected by reviewing drawings, procedures, data sheets, other documentation and performing walkdowns for visual observation of selected installed equipment including CR indicators and recorders. The following areas were inspected:

(1) Equipment Qualification - The EQ Master Equipment List and the Q-List were reviewed for confirmation that the licensee had addressed environmental qualification requirements for Class 1E equipment.

(2) Redundancy - Walkdowns were performed to verify by visual observation that selected instruments were installed as specified and that separation requirements were met. In addition, loop drawings for all listed category 1 instrumentation were reviewed to verify redundancy and channel separation.

(3) Power Sources - Loop drawings were reviewed to verify the instrumentation is energized from a safety-related power source.

(4) Display and Recording - Walkdowns were performed to verify by visual observation that the specified display and recording instruments were installed. Loop drawings were reviewed to verify there was at least one recorder in a redundant channel and two indicators, one per division (channel) for each measured variable.

(5) Range - Walkdowns were performed to verify the actual range of the indicator/recorders was as specified in RG 1.97 or the SER. Review of calibration procedures verified sensitivity and overlapping requirements of RG 1.97 for instruments measuring the same variable.

(6) Interfaces - The loop drawings and Q - List were reviewed to verify that safety-related isolation devices were used when required to isolate the circuits from non safety systems.

(7) Director Measurement - Loop drawings were reviewed to verify that the parameters are directly measured by the senors.

(8) Service, Testing, and Calibration - The maintenance program for performing calibrations and surveillances was reviewed and discussed with the licensee. Calibration and surveillance procedures and the latest data sheets for each instrument were reviewed to verify the instruments have a valid calibration.

CATEGORY 1 INSTRUMENTS

Units 3 and 4 unless otherwise indicated

Variable	Instrument Number Channel or Train
RCS Pressure	PT-404 A QSPDS A PT-406 B QSPDS B
RCS Hot Leg Temperature	TE-413 A TE-413 B TE-423 A TE-423 B TE-433 A TE-433 B TR-413 records loops A, B, C for Train A QSPDS A Display A QSPDS B Display B
RCS Cold Leg Temperature	TE-410 A TE-410 B TE-420 A TE-420 B TE-430 A TE-430 B TR-413 records loops, A,B.C for Train A QSPDS A Display A QSPDS B Display B
Reactor Building Level	LT-6309 A LI-6309 A LR-6308 A LT-6309 B LI-6309 B LR-6308 B
Reactor Building (Containment) Pressure Normal Range	PT-6425 A PI-6425 A PR-6306 A PT-6425 B PT-6425 B PR-6306 B

CATEGORY 1 INSTRUMENTS (cont'd)

Variable	Instrument Number Channel or Train
Reactor Building (Containment) Pressure Extended Range	PT-6306 A PI-6306 A PR-6306 A PT-6306 B PI-6306 B PR-6306 B
Reactor Building (Containment) Hydrogen Concentration	AE-6307 A AI-6307 A RAR-6311 A (Hydrogen recorder) AE-6307 B AI-6307 B RAR-6311 B (Hydrogen Recorder)
Steam Generator Level Narrow Range (Unit 4 only)	LT-474 S/G A Ch I LI-474 S/G A Ch I LT-475 S/G A Ch II RI-475 S/G A Ch II LT-476 S/G A Ch III LI-476 S/G A Ch III FR-478 LT-484 S/G B Ch I LI-484 S/G B Ch I LT-485 S/G B Ch II LI-485 S/G B Ch II LT-486 S/G B Ch III LI 486 S/G B Ch III FR-488 LT-494 S/G C Ch I LI-494 S/G C Ch I LT-495 S/G C Ch II LI-495 S/G C Ch II LT-496 S/G C Ch III LI-496 S/G C Ch III . FR-498
Refueling Water Storage Tank Level	LT-6583 A LI-6583 A LT-6583 B LI-6583 B ERDADS Recording capabilities
Neutron Flux	ND-6649 A NI-6649 A-2 ND-6649 B NI-6649 B-2 ERDADS Recording capabilities

CATEGORY 2 INSTRUMENTS

Units 3 and 4

Reactor Building (Containment) Sump Level	LT-6308 A LI-6308 A LR-6308 A LT-6308 B LT-6308 B LR-6308 B	
Steam Generator Pressure	PT-474 S/G A Ch II PI-474 S/G A Ch II PT-475 S/G A Ch III PI-475 S/G A Ch III PT-476 S/G A Ch IV PI-476 S/G A Ch IV PT-484 S/G B Ch II PI-484 S/G B Ch II PT-485 S/G B Ch III PI-485 S/G B Ch III PT-486 S/G B Ch IV PI-486 S/G B Ch IV PT-494 S/G C Ch II PI-494 S/G C Ch II PT-495 S/G C Ch III PI-495 S/G C Ch III PT-496 S/G C Ch IV PI-496 S/G C Ch IV	
SIS Flow in HPI System	FT-940 FI-940	
RHR Flow	FT-605 FI-605	
RHR Ht Xchr Outlet Temperature	TE-606 TR-604	
Pressurizer Heater Status	3811 Control Group 3812 Back-up Group 3A 3813 Back-up Group 3B	Monitoring and Display of of electric current to determine operating status is by the ERDADS

b. Discussion and Conclusion

The licensee was well prepared and expended considerable effort to assist the inspectors in performing the RG 1.97 inspection. All previously requested documentation including the Q-List, the EQ-List, electrical drawings, instrument loop diagrams, and calibration data sheets were pulled and available in an organized manner. This information was also included or referenced in individual RG 1.97 instrument packages.

The Licensee had an up-dated RG 1.97 instrument list, which was a considerable aid in the inspection. This new revised list is to be incorporated in the FSAR by an amendment in 1990. The instrument loop diagrams, which were specifically developed for this NRC inspection, were very helpful in the inspection and were considered to be a quality product. The instrument loop diagrams contain the necessary information, including electrical cables numbers, wiring, termination and test points for a technician to trouble shoot and understand how the loop operates. Instrument Loop drawings are considered to be one of the important tools at an operating facility. The licensee states that the plant's file of controlled drawings will be enhanced to include the information from these loop instrument diagrams.

All RG 1.97 Types A, B, and C, Categories 1 and 2, instruments were uniquely marked with magenta tape in the Control Room and the Simulator to clearly identify the instruments intended for use during postulated accidents. In addition, the tags on the instruments in the field were color-coded and properly inscribed for easy identification. Tagging to designate EQ qualification was also on field instruments to alert maintenance personnel to special requirements.

The results of the inspection were that the licensee satisfactorily met the requirements and intent of RG 1.97 Guidelines.

3. Actions on Previous Inspection Findings (92701)

a. (Closed) IFI 250, 251/87-08-16, Brand Rex Coax Jacket Integrity. During the March 1987, NRC EQ Audit, concerns were raised with respect to the use of this cable with the General Atomic High Range Radiation Monitor (HRRM). The concerns were: (1) the file contained a record of a telephone conversation with regard to qualification procedure for the HRRM but there was no confirming letter in the file; and (2) the test report indicated that numerous jacket cracks had been observed in the tested sample and these were not discussed or addressed with regard to EQ. A 1988 inspection showed the licensee addressed these concerns by including appropriate formal correspondence in the DOC PAC and the cable jacket integrity was addressed and discussed in the summary DOC PAC 5.0. The testing of the Branch Rex Cable referenced in the DOC PAC was at a much more

severe environment and environmental transient condition than that which would be anticipated at Turkey Point and the report did not consider the protective characteristics utilized in the Turkey Point installed configuration (cable run in conduit).

As a result of this correspondence, concerns were raised in that it appeared that the HRRM may not meet RG 1.97 accuracy guidelines (Table 3 Note of the RG states that accuracy is to be within a factor of two over the entire range). At abnormally high containment temperatures (peak accident temperature) and low radiation levels the HRRM indication could be slightly over the factor of two requirement. The licensee, however, considered that the HRRM was environmentally qualified and met the intent of RG 1.97. FP&L subsequently provided the Turkey Point resistive values (cable, penetration, etc.) and other pertinent data with regard to the Turkey Point HRRM installation to their consultant and General Atomic Company. Calculations were performed to show that the accuracy the Turkey Point HRRM installation meets the accuracy requirement of the R.G. The applicable EQ DCO PAC's (Number 11.0 and 5.0) have been up-dated to reflect the additional analysis and calculations. Discussions with FP&L engineers and review of the data in the DOC Pac's resolved this IFI concern.

4. Exit Interview

The inspection scope and results were summarized on January 12, 1990, with those persons indicated in Paragraph 1. The inspector described the area inspected and discussed in detail the inspection results indicated above. Proprietary information is not contained in this report.

5. Acronyms and Initialisms

EQ	Environmental Qualification
EQ DOC PAC	Environmental Qualification Documentation Package
ERDADS	Emergency Response Data Acquisition Display System
FSAR	Final Safety Analysis Report
HRRM	High Range Radiation Monitor
HT	Heat
IFI	Inspector Follow-up Item
FI	Flow Indicator
FR	Flow Recorder
FT	Flow Transmitter
HPI	High Pressure Injection
LI	Level Indicator
LR	Level Recorder
LT	Level Transmitter
ND	Neutron Detector
NI	Neutron Indicator
PAM	Post Accident Monitoring
PI	Pressure Indicator

PR	Pressure Recorder
PT	Pressure Transmitter
QSPDS	Quality Safety Parameter Display System
RAR	Recorder Area Radiation
RHR	Residual Heat Removal
RC	Reactor Coolant
RCS	Reactor Coolant System
R.G.	Regulatory Guide
RWST	Refueling Water Storage Tank
SER	Safety Evaluation Report
SIS	Safety Injection System
S/G	Steam Generator
TE	Temperature Element
TI	Temperature Indicator
TR	Temperature Recorder
XCHR	Exchanger