UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-250/84-26 and 50-251/84-27

Licensee: Florida Power and Light Company
9250 West Flagler Street
Miami, FL 33101

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

Facility Name: Turkey Point 3 and 4

Inspection Conducted: August 14 - 17, 1984

Inspectors: P. T. Burnett — Date Signed: 18 Sep 84

K. E. Davenport — Date Signed: 9/19/84

Approved by: F. Jape, Section Chief — Date Signed: 9/19/84
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection entailed 62 inspector-hours on site in the areas of reactor coolant system leakage, follow-up of licensee event report, and followup of inspector identified items.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Licensee Employees Contacted

*C. J. Baker, Plant Manager Nuclear
*D. Grandage, Operations Superintendent
*J. W. Kappes, Maintenance Superintendent
*E. A. Suarez, Supervisor Engineering
*D. W. Haase, SEG Chairman
*V. A. Kaminskas, Reactor Supervisor
K. S. Metzger, Nuclear Plant Supervisor
P. R. Lanning, Nuclear Plant Supervisor
J. Crockford, Systems Enhancement Coordinator
W. C. Shimkus, Nuclear Watch Engineer

Other licensee employees contacted included six operators.

NRC Resident Inspectors

*T. A. Peebles
*D. R. Brewer

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on August 17, 1984, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspection findings with no significant comment. The following inspector followup items were identified:

50-250/84-26-01: Address RCS T-AVG and pressurizer level in RCS leak rate procedures.

50-250/84-26-02: Identify all digital data processing system (DDPS) parameters used in safety-related calculations.

50-250/84-26-03: Establish routine calibration of DDPS parameters used in safety-related calculations.

50-251/84-27-01: Address RCS T-AVG and pressurizer level in RCS leakrate procedures.

50-251/84-27-02: Identify all DDPS parameters used in safety-related calculations.

50-251/84-27-03: Establish routine calibration of DDPS parameters used in safety-related calculations.

50-251/84-27-04: Review licensee's program of reporting boron sampling results to contol room.

3. Licensee Action on Previous Enforcement Matters

Not inspected.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Measurement of Reactor Coolant System Leakage (61728)

The licensees program for monitoring RCS leakage was reviewed. Results are as follows:

a. Plant Parameters

Basic plant parameters related to reactor coolant system (RCS) leak rate measurements were obtained and reported, in inspection 250/84-05 and 251/84-05. However, many of the tank slopes (mass per unit of level indication) had been obtained from the tank book, an uncontrolled document. Upon learning that tank curves had been redrawn and placed in the plant curve book, a controlled document, the slopes were recalculated from the new information. As a result, the slope for the pressurizer changed from 168 to 350 pounds (mass) per percent level. There were lesser changes in the slopes for the volume control tank (VCT) and pressurizer relief tank (PRT). The tank curve changes were reviewed with plant personnel, the bases for the new curves confirmed, and the sources of the earlier errors identified.

The corrected plant parameter list is attached to this report. (Attachment 1)

b. Unit Leakage Measurements

Data were collected every half hour for analysis for a four-hour period. The period began at 1612 on August 15, 1984, for Unit 3 and at 1600 on August 16, 1984, for Unit 4. The data were analyzed using the program RCS LK8 on an Osborne 1 portable computer. (RCS LK8 was developed under the NRC Independent Measurements Program.)

Unit 3 exhibited relatively low (0.35 gpm) gross leakage, which is considered unidentified leakage. Extraneous, non-RCS, water sources were leaking into the reactor coolant drain tank (RCDT), and none of the increase in RCDT level could be quantified as identified leakage. The licensee has identified a leakage path, through closed valves, from the accumulators to the RCDT. In the course of the RCS leakage measurement, it was necessary to add water to one accumulator. Since the leakage was from, rather than to the accumulator, the measurement of gross RCS leakage was not affected.

Throughout the course of the RCS leakage measurement on Unit 4, accumulator levels were monitored and no changes in levels were observed. However, an operator added water to the volume control tank (VCT)

during the measurement. The quantity added was recorded through flow integrators and accounted for in the RCS LK8 calculation. Nevertheless, experience at other facilities has indicated that the flow integrators are not quantitatively reliable. Therefore, RCS LK8 calculations were performed for the ninety-minute period preceeding water addition and the two-hour period following the addition. For all three calculations, the gross leakage of Unit 4 was higher than Unit 3, but the identified leakage, collected in the pressurizer relief tank (PRT) from a leaking PORV, led to a small net unidentified leakage.

The computer outputs of all four calculations are attached to this report. All demonstrate that each unit conformed to the Technical Specification limit of less than 1 gpm unidentified leakage. (Attachment 2)

c. Licensee Measurements of RCS Leakage

OP0204.2, Appendix B, provides the daily calculation sheet for operator surveillance of RCS leakage. That procedure does not address RCS average temperature or pressurizer level as parameters of the measurement. It does require that if the gross leakage exceeds 0.5 gpm, the shift technical advisor (STA) perform a more detailed evaluation. Off-normal operating procedure 1008.2, Excessive Reactor Coolant System Leakage, guides the STA in the evaluation. RCS temperatures and pressurizer level are not addressed in that procedure either. In spite of the procedures being mute on these subjects, all licensed personnel interviewed, knew the importance to the measurement for having temperature and level the same at the end as at the beginning of the measure ment. However, none appeared to have any idea of the allowable tolerances, if any.

At the exit interview, the licensee made a commitment to revise the procedures to address RCS temperature and pressurizer level by October 1, 1984. (Inspector follow-up items 250/84-26-01 and 251/84-27-01.)

For the leak rate measurements, the preferred source of data is the digital data processing systems (DDPS). However, except for the parameters for the station heat rate calculation, it appears that other parameters have not been verified for accuracy.

Following discussions with the licensee staff, management made the following two commitments at the exit interview:

(1) All DDPS parameters used in safety-related calculations will be identified by September 1, 1984. (Inspector follow-up items 250/84-26-02 and 251/84-27-02.)

(2) The parameters identified in (1) above will be routinely calibrated. The date of the first calibration was not specified. (Inspector follow-up items 250/84-26-03 and 251/84-27-03.)

No violations or deviations were identified.

6. Followup of Licensee Event Report (92700)

(Closed) LER 251-84-012, Moderator temperature coefficient technical specifications violation.

The inspector held discussions with reactor engineering, chemistry and operations personnel, reviewed operators logs and boron sampling logs, to verify the sequence of events and to ascertain that the corrective action was appropriate to correct the cause of the event.

During Unit 4 cycle 10 zero power physics testing, the Moderator Temperature Coefficient (MTC) was found to be +5.9 pcm/°F. This exceeded the design criterion of +5.0 pcm/°F. An operational curve of boron concentration vs. system temperature was derived from an MTC control algorithm, which used the measured MTC from startup. This curve was used to maintain the MTC within Technical Specifications (TS) limits from 0 to 100% power. On June 11, 1984, the MTC TS limit was exceeded.

Unit 4 was increased to 70% power after approximately 15 hours in the hot shutdown condition. Power was held at this level to verify that boron concentration was within limits. Boron concentration was determined to be 1390 ppm. At this concentration reactor power could be increased to 100%, per the MTC curve. Xenon was diminishing, however, due to the previous Unit shutdown and negative reactivity had to be added. Bank D was not inserted due to limits on the axial flux difference, so boron was added to compensate for the Xenon reduction. The additional boron was in excess of that permitted by the MTC curve and caused a slightly positive MTC.

A Westinghouse analysis of the MTC violation calculated the MTC at +0.3 pcm/°F with Tavg = 548.9°F, Bank D at 175 steps and boron concentration = 1540 ppm. The +0.3 pcm/°F MTC was bounded by the safety analysis which employs a MTC of +5 pcm/°F.

As a result of this event:

(1) Additional operator training was provided on the use of the MTC curve.

(2) Westinghouse was requested to review the MTC parameters to determine if available margin existed to increase operating flexibility. In a letter from Westinghouse to the licensee dated June 18, 1984, a revised MTC curve was calculated which removed some of the original conservatism from 70% to 100% power.

(3) The licensee is seeking a TS change to allow a less restrictive MTC limit. The current TS 3.1-2 states that with reactor power at ≥70% the MTC shall not be more positive than 0 Δk/k/°F. The proposed change would make a linear change in the MTC from +5 pcm/°F to 0 pcm/°F from 70% to 100% power using the previous analysis which supported the positive MTC TS limit in 1981.

(4) A change in design philosophy will be implemented for the next reload (in anticipation of a TS change) using an administrative limit of +4 pcm/°F at hot zero power.

(5) A procedure change to require Reactor Engineering to evaluate and establish plant conditions prior to power ascension to 70% and above.

(6) The Chemistry Department has been reassigned to report to the Reactor Engineering Supervisor.

The inspector noted that the operator's log on June 11, 1984, indicated that knowledge of the possible MTC violation was first determined from boron sampling taken at 9:50 p.m. which was 1540 ppm. A second boron sample was then requested and the results confirmed as concentration of 1550 ppm at 10:30 p.m. The boron sampling log sheet, Procedure NC-91, Appendix I, has recorded a boron concentration of 1470 ppm at 8:35 p.m. and 1546 ppm at 9:30 p.m. Both of these were outside the MTC curve limits for the power levels indicated for those times. (Held power at 540 MW at 6:30 p.m. per operator's log.) Although these are recorded on the Chemistry Boron Test Results Data Sheet, it is not clear that they were reported to the control room.

This item will be identified as inspector followup item 251/84-27-04 pending further review of the licensee's program of reporting boron sampling results to the control room.

A notice of violation of will not be issued due to the five criteria of 10 CFR 2, Appendix C, IV.A being met.

7. Follow-up of Deviations (92702)

(Open) Deviations 250/83-11-03 and 251/83-11-02: Failure to Implement ANSI B30.2-1976. Comments on the July 14, 1983, revision of maintenance procedure 16701.1, which were given in Inspection Report 84-05 are included as part of the current procedure upgrade project. The latest revision is expected to be published in late August 1984.

Attachments:
1. Parameter List
2. Leak Rate Computer Outputs

ATTACHMENT 1

PARAMETER LIST

Unit Identification:	
Plant Name	TURKEY POINT
Unit Number	3
Docket Number	50-250
Nuclear Steam System Supplier	Westinghouse
Vessel and Piping:	
Volume	8013 cubic feet
Pressurizer:	
Level Units	%
Temperature Compensated	No
Calibration Curve	
Slope	350 pounds per %
Upper Level Limit	100 %
Lower level Limit	0 %
Relief	Relief Tank
Volume Control Tank:	
Level Units	%
Calibration Curve	
Slope	125.8 pounds per %
Upper Level Limit	100 %
Lower level limit	0 %
Geometric Method Available	No
Drain Tank:	
Level Units	%
Calibration Curve	
Slope	33.32 pounds per %
Upper Level Limit	40 %
Lower level limit	30 %
Geometric Method Available	No
Relief Tank:	
Level Units	%
Calibration Curve	
Slope	947.75 pounds per %
Upper Level Limit	76.65 %
Lower level limit	20.4 %
Geometric Method Available	No

ATTACHMENT 2

NRC

INDEPENDENT MEASUREMENTS PROGRAM

REACTOR COOLING SYSTEM LEAK RATES

STATION: TURKEY POINT
UNIT : 3
DOCKET : 50-250

TEST DATE : 15AUG84
START TIME: 1612
DURATION : 4 hours

TEST DATA

	Initial	Final
System Parameters:		
Pressure, psia	2257.2	2257.1
T Ave, degrees F	573.42	573.2
Water Levels:		
Pressurizer, %	52.945	52.578
Relief Tank, %	73.5	74.2
Volume Control Tank, %	34.015	30.46
Drain Tank, %	39	40

Water Charged = 0 gal Water Drained = 0 gal

TEST RESULTS

Change in Water Inventory in pounds:

Vessel & Piping	127	Relief Tank (1)	663
Pressurizer	-128	Drain Tank (1)	33
Volume Control Tank (1)	-447		------
Less: Water Charged	0	Collected Leakage	697
Plus: Water Drained	0		

Cooling System	-449		

Leak Rates in gpm (3):

Gross	0.22
Identified	0.35
Unidentified	-0.12

(1) Determined from tank calibration curve.
(2) Determined from tank dimensions.
(3) The density used for converting inventory change to leak rate was 62.31 pounds/cubic foot based on standard conditions.

Attachment 2

NRC

INDEPENDENT MEASUREMENTS PROGRAM

REACTOR COOLING SYSTEM LEAK RATES

STATION: TURKEY POINT
UNIT : 4
DOCKET : 50-251

TEST DATE : 16AUG84
START TIME: 1800
DURATION : 2 hours

TEST DATA

	Initial	Final
System Parameters:		
Pressure, psia	2260.5	2260.3
T Ave, degrees F	572.91	570.15
Water Levels:		
Pressurizer, %	52.484	49.414
Relief Tank, %	82.5	83.5
Volume Control Tank, %	36.554	25.828
Drain Tank, %	20	20

Water Charged = 0 gal Water Drained = 0 gal

TEST RESULTS

Change in Water Inventory in pounds:

Vessel & Piping	1585	Relief Tank (1)	766
Pressurizer	-1075	Drain Tank (1)	0
Volume Control Tank (1)	-1349		
Less: Water Charged	0	Collected Leakage	766
Plus: Water Drained	0		
Cooling System	-838		

Leak Rates in gpm (3):

Gross	0.84
Identified	0.77
Unidentified	0.07

(1) Determined from tank calibration curve.
(2) Determined from tank dimensions.
(3) The density used for converting inventory change to leak rate was 62.31 pounds/cubic foot based on standard conditions.

Attachment 2

NRC

INDEPENDENT MEASUREMENTS PROGRAM

REACTOR COOLING SYSTEM LEAK RATES

STATION: TURKEY POINT
UNIT : 4
DOCKET : 50-251

TEST DATE : 16AUG84
START TIME: 1600
DURATION : 1.5 hours

TEST DATA

	Initial	Final
System Parameters:		
Pressure, psia	2260	2258.9
T Ave, degrees F	573.38	572.38
Water Levels:		
Pressurizer, %	53.054	51.999
Relief Tank, %	82	82.2
Volume Control Tank, %	40.562	35.64
Drain Tank, %	20	20

Water Charged = 0 gal Water Drained = 0 gal

TEST RESULTS

Change in Water Inventory in pounds:

Vessel & Piping	572	Relief Tank (1)	153
Pressurizer	-369	Drain Tank (1)	0
Volume Control Tank (1)	-619		
Less: Water Charged	0	Collected Leakage	153
Plus: Water Drained	0		
Cooling System	-417		

Leak Rates in gpm (3):

Gross	0.56
Identified	0.20
Unidentified	0.35

(1) Determined from tank calibration curve.
(2) Determined from tank dimensions.
(3) The density used for converting inventory change to leak rate was 62.31 pounds/cubic foot based on standard conditions.

Attachment 2

NRC

INDEPENDENT MEASUREMENTS PROGRAM

REACTOR COOLING SYSTEM LEAK RATES

STATION: TURKEY POINT
UNIT : 4
DOCKET : 50-251

TEST DATE : 16AUG84
START TIME: 1600
DURATION : 4 hours

TEST DATA

	Initial	Final
System Parameters:		
Pressure, psia	2260	2260.1
T Ave, degrees F	573.38	570.15
Water Levels:		
Pressurizer, %	53.054	49.414
Relief Tank, %	82	83.5
Volume Control Tank, %	40.562	25.828
Drain Tank, %	20	20

Water Charged = 38 gal Water Drained = 0 gal

TEST RESULTS

Change in Water Inventory in pounds:

Vessel & Piping	1860	Relief Tank (1)	1150
Pressurizer	-1274	Drain Tank (1)	0
Volume Control Tank (1)	-1854		
Less: Water Charged	316	Collected Leakage	1150
Plus: Water Drained	0		
Cooling System	-1584		

Leak Rates in gpm (3):

Gross	0.79
Identified	0.58
Unidentified	0.22

(1) Determined from tank calibration curve.
(2) Determined from tank dimensions.
(3) The density used for converting inventory change to leak rate was 62.31 pounds/cubic foot based on standard conditions.