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

Report Nos.: 50-250/92-32 and 50-251/92-32

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: November 28 to December 3, 1992

Inspector: P. T. Burnett — 12/22/92 Date Signed

Inspector: C. W. Rapp (signed P. T. Burnett for C W Rapp) — 12/22/92 Date Signed

Approved by: R. V. Crlenjak, Chief — 12/22/92 Date Signed
Operational Programs Section
Operations Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of witnessing and review of Unit 3 cycle 13 startup tests and review of Unit 4 core performance surveillance tests.

Results:

Unit 3 startup tests, through the end of low power testing, were performed successfully, with all test results satisfying the appropriate acceptance criteria.

Unit 4 power distribution surveillances have been performed with acceptable frequency and results throughout cycle 13.

No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   *T. V. Abbatiello, Site Quality Manager
   *M. J. Bowskill, Reactor Engineering Supervisor, Designate
   A. O. Costa, Reactor Engineer
   S. J. Garcia, Nuclear Engineer, Corporate Nuclear Fuel Resources
   L. P. Elizondo, Nuclear Engineer, Corporate Nuclear Fuel Resources
   J. P. Hendrickson, Reactor Engineer
   *D. E. Jernigan, Technical Manager
   V. A. Kaminskas, Operations Manager
   *J. E. Knorr, Licensing Engineer
   *G. L. Marsh, Reactor Engineering Supervisor
   *L. W. Pearce, Plant General Manager

   Other licensee employees contacted included engineers, shift technical advisors, operators, and office personnel.

   NRC Resident Inspectors

   *R. C. Butcher, Senior Resident Inspector
   G. A. Schnebli, Resident Inspector
   L. Trocine, Resident Inspector

   *Attended the exit interview on December 3, 1992.

   Acronyms and initialisms used throughout this report are defined in the final paragraph.

2. Unit 3 Startup for Cycle 13 (72700, 61705, 61708, 61710)

   a. Documents Reviewed

      Prior to the start of the activities described in later sections of this paragraph, the inspector reviewed the documents and procedures listed below.

      (1) Reload Safety Evaluation Checklist (Letter 92-FP-G-0060, dated July 13, 1992)

      (2) Turkey Point Unit 3 Cycle 13 Reload Safety Evaluation

      (3) WCAP-13472, The Nuclear Design and Core Management of the Turkey Point Unit 3 Nuclear Power Plant, Cycle 13, provided, among other information, the predictions for the startup test measurements.

(4) 3-PMI-028.3, RPI Hot Calibration, CRDM Stepping Test, and Rod Drop Test.

(5) Fuel Assembly Shuffle Table and Refueling K-effective for Turkey Point 3 Cycle 13 (Letter FP-F-0057, dated June 26, 1992) contained rankings of fuel assemblies by reactivity capability. The rankings ranged from 1 to 21. A rank N assembly could be inserted in a rank N or higher core location. This reference could be used to select fuel assemblies for boxing-in activities without compromising the limiting shutdown k-effective for refueling. The reference is responsive to the concerns raised in NRC Bulletin No. 89-03: POTENTIAL LOSS OF REQUIRED SHUTDOWN MARGIN DURING REFUELING OPERATIONS.

(6) OP 0204.3, Initial Criticality after Refueling.

(7) OP 0204.5, Nuclear Design Check Tests during Startup Sequence after Refueling.

(8) 3-PMI-028.3, RPI Hot Calibration, CRDM Stepping Test, and Rod Drop Test.

b. Precritical Activities

The inspector witnessed portions of 3-PMI-028.3, when it was conducted on November 29, 1992, including activities in the motor control center and the control room, and confirmed that all control rod drop times satisfied TS 3.1.3.4. The inspector also confirmed that the test temperature and pressure were maintained above 541 °F and 2200 psig, respectively. All three RCP were operating through the test.

The inspector also confirmed independently that both SRNIs performed satisfactorily by performing a χ^2 statistical reliability test on each.

c. Initial Criticality

OP 204.3 was performed over the evening of November 29 - 30, 1992. Before control rod withdrawal began, the licensee completed the χ^2 test from Appendix D using 30 observations from each SRNI. Acceptable results by the licensee were confirmed by the inspector. The licensee also completed the Checklist for Infrequently Performed Tests or Evolutions. ICRR was plotted every 50 steps of rod withdrawal, starting with shutdown bank A. When D bank reached 160 steps, ICRR was 0.87 and 0.83 on the SRNI.

Prior to changing reactivity by dilution, an OTSC was completed to ensure charging flow was maintained greater than dilution flow, and 3-FCV-114B was closed by operator action. These steps were taken to assure the actions implied by a note in the procedure, which addressed preventing over-dilution of the VCT, were accomplished unambiguously. The subject of controlling VCT dilution was also discussed in inspection reports 50-250/91-42 (paragraph 7.d) and 50-251/91-46 (paragraph 7.a).

ICRR was renormalized and plotted against dilution water for every 500 gallons added. Continuous dilution was stopped at 14000 gal with ICRR at 0.22 and 0.25 on the two SRNI. Subsequently, criticality was achieved at 0417 December 1, 1992, after adding a total of 14076 gal and withdrawing control bank D to 201 steps. This configuration was acceptably close to the predicted configuration of 160 steps and 15000 gal of dilution water.

The final steps of the procedure addressed determining the point of adding sensible heat and checkout of the reactivity computer. Heating was determined to occur at 3.86 E-7 amps on the picoammeter, and the upper level for low power testing was set at 1 E-7 amps. The reactivity computer checkout yielded agreement with stopwatch-period-derived reactivity within ± 1 % for reactivities ranging from -34 pcm to + 41 pcm.

d. Zero Power Physics Tests

The inspectors witnessed portions of the tests discussed below and reviewed the completed test procedures. All were appendices of OP 0204.5, Nuclear Design Check Tests during Startup Sequence after Refueling.

Appendix A, Boron Endpoint Measurement, yielded an ARO RCS C_B of 1519 ppmB, which satisfied the acceptance criterion of 1540 ± 50 ppm B. The measured C_B with the reference bank inserted was 1394 ppm B, which agreed well with the predicted value of 1405 ppm B.

Appendix B, Isothermal Moderator Temperature Coefficient, was performed for a heatup and a cooldown of the reactor near ARO. The corresponding ITCs agreed within 1 pcm/°F of each other. The average measured ITC of -3.77 pcm/°F and the calculated DTC of -1.93 pcm/°F yielded a MTC of -1.84 pcm/°F, which agreed acceptably with the predicted value of -0.78 pcm/°F. Conformance to TS 3.1.1.3.a, b, and c was assured at all power levels.

Appendix D, Rod Worth Verification by Rod Swap Method, was performed with shutdown bank B as the reference bank. The differential and integral reactivity worth of the reference bank was determined during deboration of the RCS at a constant rate. The reference bank was then periodically inserted to compensate

for the deboration. For each increment of bank insertion, the reactivity inserted by the bank was measured using the DRC. The inspector independently analyzed a sample of the DRC recorder traces and obtained differential worths consistent with those reported by the licensee. The following acceptance criteria were satisfied: All rod bank worths, which determined by swapping with the reference bank, satisfied the acceptance criterion of agreement with predicted values within the larger of ±15% or ±100 pcm. The measured reference bank worth satisfied the acceptance criterion of agreement with prediction within ±10%. The total rod worth satisfied the acceptance criterion of agreement with predictions within ±7%. The latter criterion is consistent with the licensee's practice of reducing total rod worth by only 7% for SDM calculations. The measured and predicted rod worths are given in the table below.

UNIT 3 CYCLE 13 ROD WORTHS AT STARTUP

Bank	Integral Worth (pcm) Measured	Predicted	Difference(%)
SA	1002	1041	-3.8
SB	1127	1130	-0.3
A	1069	1033	+3.5
B	491	480	+2.3
C	1033	1116	-7.4
D	719	701	+2.6
Total	5441	5501	-1.1

Data Sheet 10, Differential Boron Worth, used data collected in the test appendices to calculate a differential boron worth. A change in C_B was calculated from two boron endpoint measurements performed at ARO and with the reference bank in. The corresponding reactivity change was obtained from the integral worth of the reference bank. The result (-9.02 pcm/ppm B) was in acceptable agreement with the predicted value (-8.35 pcm/ppm B).

All predicted values were obtained from WCAP-13472 for comparison with measurement. The inspector noted that predicted values calculated by the licensee, although not identical to those from Westinghouse, were, in most cases, as good as or better than the official predictions.

e. Power Escalation Tests

The checklists and prerequisite tests for power escalation were in progress at the end of this inspection, but power escalation had not started.

f. Summary and Observations

Pretest briefings and communications between test and operations personnel were thorough and effective.

Test activities conducted in the control room were well controlled and carefully performed. RCS boron concentrations reported to the control room by chemistry personnel were sometimes inconsistent with the trends and activates underway. No test was completed until the inconsistencies were resolved by a sequence of consistent results.

Collectively, the cycle design documents addressed the changes in plant parameters affecting SDM and reactivity increases during cooldown. However, the administrative path by which a change in plant parameter would result in revision of an affected procedure was not obvious to the inspector. One procedure of concern is 3/4-EOP-ES-0.1, Reactor Trip Response, which specifies the temperature to initiate emergency boration during a cooldown. The licensee is reviewing this concern.

The licensee's startup test program corresponds to that described in ANSI/ANS-19.6.1.

3. Unit 4 Cycle 13 Core Power Distribution Monitoring (61702)

OP-12404.1, Normal Operation of Incore Movable Detector System and Power Distribution Surveillance, has been performed 14 times during the current operating cycle. The first flux map was obtained at a nominal 30% RTP and the balance were performed at power levels above 99% RTP. The inspector's review of the completed tests confirmed that all flux maps had been obtained with a sufficient number of thimbles (38 or more), sufficient frequency (interval of 31 EFPD), and with acceptable hot channel factors (F_Q and F_{dH}).

4. Exit Interview

The inspection scope and findings were summarized on December 3, 1992, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings, particularly those discussed in paragraph 2.f. No dissenting comments were received from the licensee. Proprietary material information was reviewed in the course of the inspection, but is not included in this report.

5. Acronyms and Initialisms Used throughout This Report

ANS	American Nuclear Society
ANSI	American National Standards Institute
ARO	all rods out
C_B	critical boron concentration
cps	counts per second
CRDM	control rod drive mechanism(s)
DRC	digital reactivity computer
EFPD	effective full power days
EOP	emergency operating procedure
FCV	flow control valve
F_{dH}	enthalpy rise hot channel factor
F_Q	heat flux hot channel factor
FSAR	Final Safety Analysis Report
gpm	gallons per minute
HZP	hot zero power
ICRR	inverse countrate ratio
ITC	isothermal temperature coefficient
MTC	moderator temperature coefficient
OP	operating procedure
OTSC	on-the-spot change (to procedure)
pcm	percent millirho, a unit of reactivity
PMI	preventive maintenance instruction
ppm B	parts per million boron
RCP	reactor coolant pump(s)
RCS	reactor coolant system
RPI	rod position indication
SRNI	source range nuclear instrument(s)
TS	Technical Specification
VCT	volume control tank