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

Report Nos.: 50-369/84-12 and 50-370/84-10

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Docket Nos.: 50-369 and 50-370

License Nos.: NPF-9 and NPF-17

Facility Name: McGuire 1 and 2

Inspection at McGuire site near Cornelius, North Carolina

Inspector: P. A Taylor for P. T. Burnett — 5/16/84 Date Signed

Approved by: P. A. Taylor for F. Jape, Section Chief, Engineering Branch, Division of Reactor Safety — 5/16/84 Date Signed

SUMMARY

Inspection on May 1-4, 1984

Area Inspected

This routine unannounced inspection involved 32 inspector-hours on site in the area of post-refueling startup tests.

Results

No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

*G. W. Cage, Operations Superintendent
*T. L. McConnell, Technical Services Superintendent
*J. W. Boyle, Performance Engineer
*W. H. McDowell, Licensing Technical Associate
*D. Mendezoff, Licensing Engineer
W. M. Sample, Projects and Licensing Engineer
D. S. Marquis, Reactor Engineer
M. S. Kitlan, Associate Engineer-Reactor

Other licensee employees contacted included six test engineers and three office personnel.

Other Orginization

Westinghouse

J. Duryea,
W. Miller
F. Baskerville

NRC Resident Inspector

W. T. Orders, Senior Resident Inspector

*Attended exit interview

2. The inspection scope and findings were summarized on May 4, 1984, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspection findings.

3. Licensee Action on Previous Enforcement Matters

Not inspected.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Post-Refueling Startup Tests: Unit 1 (72700)

a. Pre-Critical Tests

Completed procedure IP/O/A/3012/03, Procedure for Full Length Rod Cluster Assembly Drop Timing (approved April 12, 1984 plus change 2) was reviewed. The procedure performed the surveillance test of comparing the digital rod position indicators (DRPI) against the bank

step counters over the full stroke of the rods to satisfy the requirements of Technical Specification 4.1.3.3. The licensee had reported failure of one DRPI on April 26, 1984. Review of enclosure 11.8 of this procedure confirmed that, after maintenance, all DRPIs worked properly on that date. The one failure was described by licensee personnel as the random failure of an electrical component.

All recorded rod-drop times were reviewed and compared against the maximum time (3.3 seconds to dashpot entry) allowed by Technical Specification 3.1.3.4. All drop times were well within the limit. The longest recorded time was 1.47 seconds. The recorder traces for the five fastest and five slowest rods were selected for independent analysis and review. Information recorded on each trace confirmed that each measurement of drop time had been performed with the average reactor coolant systems (RCS) temperature greater than 551°F and system pressure greater than 2000 psig. The inspector's evaluations of the traces yielded drop times consistently longer than those recorded by the licensee by 20-60 milliseconds. In review of the considerable margin to the limit, these differences were not considered important. The surveillance requirements of Technical Specification 4.1.3.4 were satisfied.

b. Zero Power Physics Tests (72700, 61708, 61710)

Completed test procedures PT/O/A/4150/28, Criticality Following a Change in Core Nuclear Characteristics, was reviewed. Initial criticality for cycle 2 was achieved at 0130 on April 28, 1984. Subsequently, the all-rods-out critical boron concentration was determined to be 1346 ppmB, which was in acceptable agreement with the predicted concentration of 1409 ppmb.

PT/O/B/4600/55, Reactivity Computer Periodic Test, was performed twice. Review showed the results to be acceptable. Portions of the following test were witnessed and the procedures reviewed while in progress:

(1) PT/O/A/4150/21, Post Refueling Controlling Procedure for Criticality, Zero Power Physics, and Power Escalation (approved April 26, 1984).

(2) PT/O/A/4600/04, Incore Instrument Detector Calibration (approved September 7, 1983). All detectors checked out successfully.

(3) PT/O/A/4150/10, All Rods Out Boron Endpoint Measurement (approved April 26, 1984).

(4) PT/O/A/4150/12A, Moderator Temperature Coefficient of Reactivity During Startup Mode (approved April 26, 1984). The measured isothermal temperature coefficient of reactivity was -3.34 pcm/°F, which was within ± 3pcm/°F of the predicted value of -2.52pcm/°F, and hence, was acceptable. The moderator coefficient was determined to be -1.47 pcm/°F. Technical Specification 3.1.1.3

requires that it be less than .5 pcm/°F. The measured value was acceptable, and no rod withdrawal limits had to be imposed.

(5) PT/O/A/4150/11, Control Rod Worth Measurement. Control bank C, which was the bank predicated to have the highest reactivity worth, was measured using the reactivity computer during boron dilution. The numerical acceptance criterion of matching predicted worth within ± 15% of prediction was achieved. Bank C was designated the reference bank.

(6) PT/O/A/4150/11A, Control Rod Worth Measurement: Rod Swap. The numerical acceptance criteria on individual bank worths, the sum of all bank worths, and, hence, shutdown margin were satisfied.

At the end of this testing, the licensee had identified the following anomalies, which are not violations of technical specifications, for further reviewed and resolution:

(1) The all rods out critical boron concentration was 63 ppmB less than predicted.

(2) Flux maps at 1% and 3% power showed consistent differences from predicted, relative, assembly powers, and there was an incore quadrant power tilt of about 7%.

(3) C bank had a measured worth about 10% less than predicted.

Items (2) and (3) were consistent with uncoupled rods in C-bank. Review, by the licensee, of the rod drop traces for the suspect rods revealed no anomalies. The licensee wrote a special test procedure, TT/1/A/9100/82, Dropped Rod Check, to measure individual rod worths on C bank. The results confirmed the suspect rods to be coupled and individual rodlet failure to be unlikely. The licensee is currently reviewing the theoretical factors used to generate the power power distribution from the flux measurements. The licensee also has imposed a more-restrictive-than-planned power escalation program with additional flux mapping requirements until anomaly (2) is resolved. Followup of the licensee's activities, test results, and conclusions will be performed as part of the routine inspection program.

c. Power Escalation (72700, 61711)

Procedure PT/O/A/4600/2E, Incore and Nuclear Instrument System Recalibration: Post Outage (approved March 28, 1984) was reviewed prior to performance. The procedure allows generation of a spectrum of incore-excore axial affect relationships as power is increased from 50-75%. The procedure saves critical path time over the more traditional method of creating an axial xenon transient at 75% power. No conditions contrary to Technical Specification requirements were identified.

6. Followup of Inspector Identified Items (92701)

(Open) 369/83-46-01: Resolve differences in pressurizer mass accounting

(Open) 369/83-46-02: Revise tests 4150/01B to minimize temperature effect

(Open) 369/83-46-03: Review temperature effects on tank levels

All of these items refer to the procedures for measuring reactor coolant system (RCS) leakage. The licensee approved revised procedures (PT/1/A/4150/01B and PT/2/A/4150/01/B) for each unit on February 2, 1984. Although the revisions do reflect improvements in the procedures, review and discussions with licensee personnel revealed that further refinement in pressurizer mass accounting is required. Also, for manual calculation of leakage it appears that present procedures tolerate too much error from changes in RCS average temperatures. The error can be reduced by increasing the test period or reducing the allowed temperature change.