



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

Report Nos. 50-413/85-46 and 50-414/85-51

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

Facility Name: Catawba 1 and 2

Docket Nos. 50-413 and 50-414

License Nos. NPF-35 and CPPR-117

Inspection Conducted: November 4-8, 1985

Inspector: P. T. Burnett

12-9-85
Date Signed

Approved by: Frank Jape
F. Jape, Section Chief
Engineering Branch
Division of Reactor Safety

12/9/85
Date Signed

SUMMARY

Scope: This routine unannounced inspection involved 32 inspector-hours on site in the review of completed surveillance tests (Unit 1) and proposed startup tests (Unit 2).

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *H. B. Barron, Superintendent of Operations
- G. G. Barrett, Training Department
- *A. S. Bhatnagar, Performance Test Engineer
- *J. W. Cox, Superintendent of Technical Services
- *M. W. Hawes, Associate Engineer
- *C. L. Hartzell, Compliance Engineer
- P. G. LeRoy, Licensing Engineer
- D. M. Robinson, Reactor Engineer
- *F. P. Schiffley, Licensing Engineer
- J. Wise, Training Department

NRC Resident Inspector

- *P. K. VanDoorn, Senior Resident Inspector

2. Exit Interview

The inspection scope and findings were summarized on November 8, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed the findings and the inspector followup items listed below:

Inspector Followup Item 413/85-46-01: Increase the documentation for computer program RPECALIB to include an echo check of input data and a comparison of results with a goodness of fit criterion (paragraph 5.d). The licensee made a commitment to complete this work by May 31, 1986.

Inspector Followup Item 413/85-46-02: Cross-reference the incore nuclear instrument calibration to the flux map used to support the calibration (paragraph 5.c). The licensee committed to make an appropriate procedure change in 90 day.

Inspector Followup Item 414/85-51-01: Determine the need for a controlling procedure for precritical startup tests (paragraph 5.d).

Proprietary information was reviewed during the course of the inspection and returned to the licensee. That information is not included in this report.

3. Licensee Action on Previous Enforcement Matters

Not inspected.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Unit 1 Surveillance Tests (61707, 61711, 61702, 61705)

a. Reactivity Anomalies

To meet the surveillance requirements of Technical Specification 4.1.1.1.2 to compute the overall core reactivity balance and compare it with predicted values every 31 effective full power days (EFPD), the licensee chose to use as a reference the all-rods-out (ARO), hot-zero-power (HZIP), reactivity as a function of burnup. A curve of excess reactivity as a function of burnup was not provided by the fuel vendor. The plant staff created a curve by making adjustments to the vendor-supplied curve of critical boron concentration (for ARO, hot full power (HFP) and equilibrium xenon and samarium) as a function of burnup.

Early in the cycle, the licensee's nuclear design department pointed out that the excess reactivity curve was inherently in error because of errors in the vendor-supplied power defect curve used in its generation. However, the plant staff continued to use the excess reactivity curve for the surveillance.

The specification (4.1.1.1.2) allows normalization of the predicted curve to observation at 60 EFPD. Over the first 108 EFPD, the unnormalized differences ranged from -488 pcm to -718 pcm. Normalization at 60 EFPD could reduce the differences by about 600 pcm. The resulting differences would be small compared with the 1000 pcm post-normalization difference allowed by the specification. However, the licensee determined that the inherent error in the excess reactivity curve would increase with increasing burnup and could lead to violation of the 1000 pcm limit. Hence, the licensee has opted to change the procedure to use the ARO, HFP, equilibrium xenon, boron concentration versus burnup as the surveillance basis. For consistency and trending, the earlier observations will be reanalyzed using the revised procedure.

A review of the station records confirmed that the procedure, PT/1/A/4150/04, had been properly performed within the required 30 EFPD frequency throughout the cycle.

- b. PT/1/A/4150/08, Target Flux Difference Calculation, was performed at 38, 68, 92, 120, 130, 132, and 137 EFPD, which satisfied the surveillance requirement of Technical Specification 4.2.1.4.
- c. PT/1/A/4150/05, Core Power Distribution, was reviewed for the period July to October 1985. Within that period, the frequency of test satisfied the requirement of Technical Specification 4.2.2.2. In all cases, at least 75% of the flux-mapping incore instrument tubes were in use, and there were at least two thimbles per core quadrant. The limits on hotspot factor and hot channel factor, Technical Specifications 3.2.2 and 3.2.3, were satisfied in all measurements. Review of completed surveillance test PT/1/A/4600/06A, Incore Instrumentation Detector Calibration, confirmed that the incore nuclear instruments had been properly calibrated prior to each flux map. However, confirming

that correlation was sometimes difficult since not all of the procedure records referenced the flux map for which they were performed. At the exit interview, the licensee made the following commitment: (Inspector Followup Item 413/85-46-02) Cross-reference the incore nuclear instrument calibration to the flux map used to support the calibration. The procedure change will be accomplished within 90 days.

- d. PT/1/A/4600/05A, Incore and Nuclear Instrument System Correlation Check, was performed as part of the startup test program, at 74% power, on April 1-4, 1985, and at 90% power on July 19-23, 1985. The surveillance frequency requirement of Technical Specification 4.3.1.1 was satisfied. To analyze the data from the test, the licensee uses the computer program RPECALIB. The output of the program does not indicate (echo check) the input to facilitate confirmation of proper data entry. Neither does the program provide an indication of the quality of the least-squares fit used to generate the relationship between chamber current and axial offset. Following discussion of the issue, the licensee made the following commitment at the exit interview: (Inspector Followup Item 413/85-46-01) Increase the documentation for computer program RPECALIB to include an echo check of input data and a comparison of results with a goodness of fit criterion. The licensee made a commitment to complete this work by May 31, 1986.

No violations or deviations were identified in the inspection of these surveillance tests.

6. Unit 2 Startup Tests

The following documents and startup test procedures were reviewed:

- a. WCAP-10932, Nuclear Parameter and Operations Package for Catawba Unit 2, Cycle 1 (September 1985). This is the reference document for most of the numerical acceptance criteria to be applied to the core-performance-related startup tests.
- b. TP/2/A/2100/02 (Draft), Controlling Procedure for Zero Power Physics Testing.
- c. TP/2/A/2150/04 (Draft), Doppler Only Power Coefficient Verification.
- d. PT/2/A/4150/11B (Draft), Control Worth Measurement by Rod Swap.
- c. PT/2/A/4150/19 (Draft), 1/M Approach to Criticality.
- d. TP/2/A/2650/01 (Draft), Initial Fuel Loading.
- e. PT/2/A/4150/12A (Draft), Isothermal Temperature Coefficient of Reactivity Measurement.

The licensee's computerized list of the status of startup test procedures was compared with FSAR Table 14.2.12-2 (Page 1). Except for tests which will be deleted, if a recently proposed amendment to the test program described in the FSAR is approved, specific tests were identified for all other tests, either as independent procedures or as parts of larger procedures. However, it was not clear for the tests to be performed prior to criticality just how those test would be initiated and controlled. Inspector Followup Item 414/85-51-01: Determine the need for a controlling procedure for precritical startup tests. This item will be discussed further during a future inspection.

Following discussion of the test procedures reviewed with licensee personnel, the inspector had no further questions on the draft procedures.