

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

Report No.: 50-400/86-96

Licensee: Carolina Power and Light Company P. O. Box 1551 Raleigh, NC 27602

Docket No.: 50-400

License No.: NPF-53

Facility Name: Harris 1

Inspection Conducted: December 30, 1986 to January 6, 1987

Inspector: H. F. Whitever for P. T. Burnett

1-29-87 Date Signed

Approved by: H. J. Whitener / for F. Jape, Section Chief Engineering Branch Division of Reactor Safety

1-29-87 Date Signed

SUMMARY

Scope: This routine, announced inspection addressed the following areas: review of completed precritical startup tests, witnessing of initial criticality, and witnessing and review of completed zero power physics tests.

Results: One violation was identified, Inadequate Test and Surveillance Procedures for Determination of Reactor Coolant System Leakage - paragraph 5.c, was identified. No deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *J. L. Wills, Plant General Manager
- *R. T. Biggerstaff, Principal Engineer, On-Site Nuclear Safety
- *J. M. Collins, Manager, Operations
- R. J. Duncan, Test Program Development Engineer, Technical Support
- *G. L. Forehand, Director Quality Assurance/Quality Control
- J. L. Harness, Assistant Plant General Manager, Operations
- *T. Hudson, Senior Engineer, Regulatory Compliance
- W. M. Peavyhouse, Scheduling Coordinator Technical Support
- *D. L. Tibbitts, Director, Regulatory Compliance
- *R. B. Van Metre, Manager, Harris Plant Maintenance
- *W. R. Wilson, Principal Engineer, Technical Support
- R. R. Wojonarowski, Reactor Engineering Leader, Technical Support

Other licensee employees contacted included shift foremen, startup engineers, control room operators, security personnel, and office personnel.

Other Organization

Westinghouse Employees

- F. Baskerville
- J. Duryea
- R. Nodvick
- S. Whaley

NRC Resident Inspectors

G. F. Maxwell, Senior Resident Inspector *S. P. Burris, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on January 6, 1987, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. Proprietary material was reviewed in the course of the inspection, but is not incorporated into this report. One violation was identified: VIO 400/86-96-01: Procedures for the startup test of and surveillance of reactor coolant system leakage were inadequate - paragraph 5.c.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

No unresolved items were identified during this inspection.

5. Review of Completed, Precritical, Startup Test Procedures (72596, 61728)

The following completed, precritical, startup tests were reviewed:

- a. 9101-S-06, Rod Drive Mechanism Timing Test RCS Cold No Flow, was reviewed without comment.
- b. 9102 -S-10 (Revision 1), Rod Drop Time Measurement RCS Hot Full -Flow, was completed on December 29, 1986. No test exceptions were identified, but four control rods had drop times in excess of the average plus two standard deviations. Each of the outlier rods was redropped an additional six times. The internal consistency of each set of drop times was excellent, and the average time for the slowest rod was 1.43 seconds, which is well below the 2.2 second limit of Technical Specification 3.1.3.4. The inspector independently analyzed the strip chart records of ten rods selected at random. In all cases, the resulting drop time was within 0.01 second of that recorded by the licensee.
- 9102-S-02 (revision 1), Reactor Coolant System Leak Rate Test, was C. performed in concert with the corresponding surveillance test procedure, OST-1026 (Revision 1), RCS Leakage Evaluation, for three hours on December 29, 1986. when the test was reviewed by the inspector on January 5, 1987, it was determined that a result of a negative 3.57 gpm (inleakage to the high pressure system) had been accepted. This is an obvious physical impossibility. The licensee's data were used with the microcomputer program RCSLK9 and plant specific data from Farley and Summer, similar three-loop plants, to make an independent evaluation of the reactor coolant system (RCS) leakage. Those calculations gave unidentified leakages of 0.42 and 0.51 gpm, respectively. These results satisfy Technical Specification 3.4.6.2.b. Comparison of the licensee's results with those produced by RCSLK9 indicates that the licensee's correction factors for changes in pressurizer level and RCS average temperature are in error. These inadequate procedures have been identified as potential violation of Technical Specification 6.8.1.c. (VIO 400/86-96-01: Procedures for the startup test of and surveillance of reactor coolant system leakage were inadequate).

- d. The following test procedures were originally scheduled to be completed prior to initial criticality, but were deferred to follow zero power physics testing:
 - (1) 9101-S-09 Incore Moveable Detector System Checkout,
 - (2) 9102-S-04, Reactor Flow Coastdown, and
 - (3) 9102-S-06, Pressurizer Spray and Heater Capability.

The licensee performed a safety evaluation under 10 CFR 50.59 for each of the deferred tests and concluded in each case that no unreviewed safety question resulted from going critical with those tests not performed, and that no Technical Specification was violated by the action. The inspector conferred by telephone with Region II management, who agreed with the assessment that the deferrals were acceptable.

No additional violations or deviations were identified.

6. Initial Criticality Witnessing (72592)

Initial criticality for Harris Unit 1 was approached under the guidance of approved test procedure 9103-S-01 (Revision 2), Initial Criticality. The inspector remained in the control room to witness all control rod withdrawals and the initial and final stages of dilution of the boron absorber in the RCS. During the dilution process, the inspector witnessed the collection and analysis of boron samples from the pressurizer and the RCS. The technicians involved in that process appeared to be fully familiar with the requirements of the procedures in use and the radiation work permit.

One shift turnover and the briefing of the new shift on the test in progress by the test coordinator were witnessed, and judged to be adequate.

Calculation of the inverse count rate ratio (ICRR), the plotting of the points, and extrapolation to criticality were independently verified from time-to-time.

Dilution was stopped when the ICRR approached 0.2, and criticality was attained in a slow, well-controlled manner during mixing of the coolant. The time of initial criticality was 1426 on January 3, 1987.

With control rod bank D 160 steps withdrawn, the predicted critical boron concentration was 1320 ppmB, and the measured concentration was 1348 ppmB, which was within the acceptable range for the prediction.

Other test activities conducted under this procedure included confirmation of acceptable overlap between source-range and intermediate-range nuclear instruments, which the inspector observed to exceed the minimum requirement of one decade. Measurement of sensible heat to establish the acceptable power range for zero power physics test and checkout of the reactivity computer were not observed, but a later review of the results confirmed them to be satisfactory. No violations or deviations were identified in achieving initial criticality.

7. Zero Power Physics Tests (61708, 61710)

Portions of the conduct of the following tests were witnessed and the results of all were reviewed in detail:

- a. 9103-S-05 (Revision 1), Boron Endpoint Measurement-All Rods Out, was performed on January 3-4, 1987. The result of 1353 ppmB was in good agreement with the predicted value of 1328 ppmB.
- b. 9103-S-10 (Revision 1), Isothermal Temperature Coefficient All Rods Out, was performed on January 3-4, 1987. The resulting plot of reactivity against temperature appeared to have some curvature instead of the straight line anticipated. This may have contributed to the evaluation performed by the inspector differing from the licensee's by more than 20%, but in both cases the resultant values of moderator temperature coefficient were significantly less than the limit of 5 pcm/degree F allowed by Technical Specification 3.1.1.3.
- c. 9103-S-26, Reactivity Worth of Control and Shutdown Banks, was performed on January 4-5, 1987. Control Bank B was identified as the reference (maximum worth) bank and its worth was measured during boron dilution from the all-rods-out configuration. The individual integral worths of the remaining banks were inferred by bank swaps with the reference bank. The inspector independently analyzed the reactivity computer traces obtained during the control bank B measurement and compared the result with that reported by the licensee. The comparison is shown graphically in Attachment 1, which was prepared using the SUPERCALC 3 spreadsheet program for microcomputers. The predicted integral worth of control bank B was 1385 pcm, and the licensee's preliminary evaluation was the worth equaled 1317.5 pcm, which was acceptable agreement. All test acceptance criteria on rod worths were satisfied.

Following completion of these test, the reactor was shutdown to perform the deferred precritical startup tests.

No violations or deviations were identified in the performance of the tests at zero power.

Attachment



