



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

Report Nos.: 50-269/85-35, 50-270/85-35, and 50-287/85-35

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

Docket Nos.: 50-269, 50-270, and 50-287

License Nos.: DPR-38, DPR-47, and
DPR-55

Facility Name: Oconee 1, 2, and 3

Inspection Conducted: October 7-11, 1985

Inspector:

for J. L. Mathis

Frank Jape

10/28/85
Date Signed

Approved by:

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

10/28/85
Date Signed

SUMMARY

Scope: This routine, unannounced inspection involved 40 inspector-hours on site in the areas of reviewing and witnessing pre- and post-criticality tests following the refueling outage, IEN followup and followup on inspector identified item.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. Barns, Licensing Engineer
J. Collier, Reactor Engineer
C. Parson, Engineer Specialist
R. T. Repko, Jr., Engineer
D. N. Poland, Jr., Engineer
R. Emory, Maintenance Service
B. Carney, Maintenance Service Support Engineer

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, mechanics, security force members, and office personnel.

NRC Resident Inspectors

J. Bryant
K. Sasser
*L. King

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on October 11, 1985, 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. The inspector identified one followup item which reflects commitment made by the licensee on August 5, 1985, regarding CRDM Leaf Spring inspection. This will be identified as Inspector Followup Item (IFI) 50-269/85-35-01, CRDM Leaf Spring Inspection - paragraph 8.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Zero Power Physics Tests Review (72700, 61702)

Completed test procedure TT/3/A/0711/09, Unit 3, Cycle 9, Zero Power Physics Test (ZPPT), was reviewed. Initial criticality for cycle 9 was achieved at

2130 on October 6, 1985. The all-rods-out critical boron concentration was determined to be within a ± 50 ppmB of the predicted value of 1607 ppmB.

The inspector reviewed portions of Enclosures 13.1 through 13.9 associated with ZPPT.

Enclosure 13.1 - addressed inverse multiplication plots. The licensee performed x^2 evaluation before beginning each of the sets of 1/M data listed in the procedure and repeated every four (4) hours. In conjunction with Enclosure 13.1, the inspector reviewed IP/O/A/330/3A, CRD Trip Time Test, to verify that the trip time was within the acceptance criteria of 1.20 second.

Enclosure 13.2 - Determination of NI Overlap and Sensible Heat was reviewed without comment.

Enclosure 13.3 - Reactimeter Checkout was reviewed without comment.

Enclosure 13.4 - All Rod Out Boron Concentration. The licensee measured the Hot Zero Power critical boron concentration with rod groups 1-7 at 100% wd and rod group 8 at 25.0% wd. The measured ARO critical boron concentration was within ± 50 ppmB of the predicted value of 1607 ppmB.

Enclosure 13.5 - Temperature Coefficient Measurements at ARO Zero Power was performed as part of the startup test program. Review of Attachment 1 of Enclosure 13.5 confirms that the measured moderator temperature coefficient $.153 \times 10^{-4} \Delta K/K/F^\circ$ is not in excess of the acceptance criteria of $+0.5 \times 10^{-4} \Delta K/K/F^\circ$. This assures that the moderator coefficient, when extrapolated to above 95% full power per Technical Specification 3.1.7, will not be positive. Also, the temperature and moderator coefficients agrees with their predicted values within $\pm 0.3 \times 10^{-4} \Delta K/K/F^\circ$.

Enclosure 13-6 - Control Rod Group Worth and Differential Boron Worth Measurement. The inspector verified that the measured control rod worths for group 5-7 were within $\pm 15\%$ deviation of the predicted values. The results are below:

	<u>Predicted Group Worth</u>	<u>Measured Group Worth</u>
Gp5	1.469 % $\Delta K/K$	1.4105 % $\Delta K/K$
Gp6	0.944 % $\Delta K/K$	0.8995 % $\Delta K/K$
Gp7	1.165 % $\Delta K/K$	1.145 % $\Delta K/K$

In addition to the above, the inspector verified that the measured differential boron worth was not in excess of $1.33\% \Delta K/K/100$ ppmB. This limits differential boron worth to the value assumed in the Moderator Dilution Accident analysis in the FSAR Section 15. The differential boron worth was within $\pm 15\%$ deviation of the predicted value. The result of the measured and predicted differential boron worth are as follows:

Predicted differential boron worth = $.882\% \Delta K/K/100$ ppmB

Calculated differential boron worth = .889 % $\Delta K/K/100$ ppmB

$$\begin{aligned}\text{Therefore, the \% deviation} &= \frac{(\text{Pred-meas})}{(.899)} \times 100 \\ &= \frac{(.882) - (.899)}{(.899)} \times 100 \\ &= 0.8\%\end{aligned}$$

Enclosure 13.7 - Boron sample records were reviewed without comments.

Enclosure 13.8 - RCS flow measurements were averaged over a fifteen minute time period for verification against each other and expected values. The measured design flow of 114.204% was above the specified design flow in Technical Specification.

Within the areas inspected, no violations or deviations were identified.

6. Power Escalation Test Witnessing (72700, 61709)

The following portions of power escalation test were witnessed in whole or in part:

a. Low Power Testing (LPT)

Low power testing plateau was achieved at 1230 on October 9, 1985. After steady conditions were established at LPT plateau, the plant computer was used to average heat balance data over a 15 minutes period. This data was then used to perform heat balance calculations with off-line programs. These results were then compared to the plant computer on-line heat balance calculations. The results of the heat balance calculation indicated that the measured design flow at LPT was above 106.5% design flow.

Subsequently, the inspector witnessed the power imbalance detector correlation. Once the desired LPT level had been achieved, incore and outcore imbalance data over a wide range of imbalances were gathered. The imbalance was changed by normal startup axial redistribution of power due to changing xenon concentrations and control rod repositioning. After an acceptable imbalance swing was completed, the data was reduced in such a manner that each set of incore and appropriate out-of-core imbalance data points correspond to approximately the same core power distribution conditions. All the measured correlation slopes were greater than the acceptance criteria, 0.95.

Core Power distribution test was the last portion of LPT performed. The licensee verified that reactor power imbalance, Quadrant Power Tilt, Minimum Departure from Nucleate Boiling Ratio (MDNBRs), Maximum Linear Heat Rates (MLHR), and Radial and Total Power Peaking Factors do not exceed their respective specified limits. The extrapolated maximum linear heat rate at each incore detector level was less than the error

adjusted LOCA limit specified. The extrapolated "worst case" MLHR determined by the licensee was below the Technical Specification limit of 20.15 KW/ft. The extrapolated worst case minimum DNBR, as determined by the licensee was above the Technical Specification limit of 1.30.

On October 10, 1985 at 1140, all LPT was completed. The licensee escalated and stabilize power into the Full Power Testing plateau. The licensee was at 97.7% power at the time of the exit meeting. Only portions of FPT had been performed. The inspector will review the results of FPT during future inspections.

No violations or deviations were identified during the witnessing of Low Power Testing.

7. Review of Periodic and Special Reports (90713)

The licensee Start-up Test Reports for Oconee 1, Cycle 9, and Oconee 2, Cycle 8 were reviewed in the Region II office. Both reports were composed of two parts. Part 1 addressed Zero Power Physics Testing and Part 2 address Power Escalation Testing.

The inspector verified the following:

- a. That the report included the information required by appropriate NRC requirements.
- b. That test results and supporting information discussed in the report are consistent with design predictions and performance.
- c. Whether planned corrective action is adequate for resolution of identified problems.
- d. Whether any information contained in the report should be classified as an abnormal occurrence.

On April 21, 1985 at 1340, ZPPT was declared complete for Unit 2, Cycle 8. All acceptance criteria with the exception of the ARD Boron Measurement, were met. The resultant all-rods-out boron concentration was calculated to be 63 ppm higher than the predicted value. This concentration failed the acceptance criteria of ± 50 ppm, but was within the Technical Specification limit of ± 1.00 % $\Delta K/K$. On November 28, 1985 at 2145, ZPPT was declared complete for Unit 1, Cycle 9. All acceptance criteria were met.

The Oconee 2, Cycle 8 Power Escalation Test was performed per Station Procedure TT/2/A/0811/08. Unit 2 achieved criticality at 1054 on July 9, 1985, and reached 95% FP at 0400 on July 11, 1985. All acceptance criteria were met.

The Oconee 1, Cycle 9 Power Escalation Test was performed per Station Procedure TT/1/A/0811/09. As of February 4, 1985, the Oconee 1, Cycle 9

Power Escalation Test was complete with all acceptance criteria met except for the tilt calculation from the backup incore detectors. The regional base inspector will followup on this during a future inspection.

8. Followup on IEN 85-38 (92703)

IE Information Notice No. 85-38 dated May 21, 1985, was provided to all utilities with pressurized water reactor nuclear power facilities designed by Babcock and Wilcox (B&W) to alert recipients of a potentially significant problem pertaining to loose parts that can obstruct and prevent motion inside of control rod drive mechanisms.

Duke Power made a verbal commitment to NRC during a conference call on August 5, 1985, regarding CRDM Leaf Spring Inspection. The inspector reviewed the results of Unit 2 and 3 CRDM Spring Leaf Inspection. The CRDM Spring Leaf Inspections were performed in accordance with the procedure MP/3/A/1140/01. All sixty-nine CRDM spring leaf inspection were acceptable for Unit 2, likewise the spring leaf inspection on Unit 3 were acceptable. Unit 1 CRDM Spring Leaf inspection is scheduled to be performed during the upcoming 1986 refueling outage. This will be identified as IFI 50-287/85-35-01, CRDM Leaf Spring Inspection.

9. Followup of Inspector Identified Item (92701)

(Closed) IFI 50-269/83-24-01. Duke Power agreed to submit to the NRC Regional Office by September 15, 1983, a detail report of corrective actions taken to isolate potentially excessive leakage path during the type A test. The inspector verified that the corrective action specified were adequately covered in the revised Type A procedure. This closes IFI 269/83-24-01.