



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

Report Nos: 50-269/86-10, 50-270/86-10, and 50-287/86-10

Licensee: Duke Power Company  
 422 South Church Street  
 Charlotte, N.C. 28242

Facility Name: Oconee Nuclear Station

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

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

Inspection Conducted: March 11 - April 14, 1986

Inspectors:	<u>C. W. Burger, for</u>	<u>6/5/86</u>
	J.C. Bryant	Date Signed
	<u>C. W. Burger, for</u>	<u>6/5/86</u>
	M.K. Sasser	Date Signed
	<u>C. W. Burger, for</u>	<u>6/5/86</u>
	J.E. Tedrow	Date Signed
Approved by:	<u>V. L. Brownlee</u>	<u>6/5/86</u>
	V. L. Brownlee, Section Chief, (Acting)	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine, announced inspection was conducted on site in the areas of operations, surveillance, maintenance, verification of engineered safety features lineups, refueling activities, and an annual emergency drill.

Results: Of the six areas inspected, no items of noncompliance or deviations were identified.

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## REPORT DETAILS

### 1. Licensee Employees Contacted

\*M.S. Tuckman, Station Manager  
J.N. Pope, Superintendent of Operations  
T.B. Owen, Superintendent of Maintenance  
\*D.S. Compton, Technical Specialist

Other licensee employees contacted included technicians, operators, mechanics, security force members, and staff engineers.

#### Resident Inspectors

\*J.C. Bryant  
\*M.K. Sasser  
J.E. Tedrow

\*Attended exit interview.

### 2. Exit Interview

The inspection scope and findings were summarized on April 15, 1986 with those persons indicated in paragraph 1 above.

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

### 3. Licensee Action on Previous Enforcement Matters

Not inspected.

### 4. Unresolved Items

Unresolved items were not identified on this inspection.

### 5. Plant Operations

The inspectors reviewed plant operations throughout the reporting period to verify conformance with regulatory requirements, technical specifications (TS), and administrative controls. Control room logs, shift turnover records, and equipment removal and restoration records were reviewed routinely. Interviews were conducted with plant operations, maintenance, chemistry, health physics and performance personnel.

Activities within the control rooms were monitored on an almost daily basis. Inspections were conducted on day and on night shifts, during week days and on weekends. Some inspections were made during shift change in order to evaluate shift turnover performance. Actions observed were conducted as required by Operations Management Procedure 2-1. The complement of

licensed personnel on each shift inspected met or exceeded the requirements of TS. Operators were responsive to plant annunciator alarms and were cognizant of plant conditions.

Plant tours were taken throughout the reporting period on a routine basis. The areas toured included the following:

- Turbine Building
- Auxiliary Building
- Unit 1 Reactor Building
- Units 1 and 3 Penetration Rooms
- Units 1,2, and 3 Electrical Equipment Rooms
- Units 1,2, and 3 Cable Spreading Rooms
- Station Yard Zone within the Protected Area
- Standby Shutdown Facility
- Units 1 and 2 Spent Fuel Pool

During the plant tours, ongoing activities, housekeeping, security, equipment status, and radiation control practices were observed.

Unit 1 remained in cold shutdown throughout the report period. The unit was shutdown on February 13 for the cycle 9 refueling outage. Initial startup date was April 10, 1986, however maintenance on the low pressure turbine has delayed startup, currently scheduled for April 28.

Unit 2 operated at essentially full power throughout the report period.

Unit 3 began the report period at 100% power. On March 29 power was reduced to 90% due to high bearing temperature on 3D2 heater drain pump. Following repair of the heater drain pump, the unit was returned to power on March 31. ✓

No violations or deviations were identified.

#### 6. Surveillance Testing

The surveillance tests listed below were reviewed and/or witnessed by the inspectors to verify procedural and performance adequacy.

The completed tests reviewed were examined for necessary test prerequisites, instructions, acceptance criteria, technical content, authorization to begin work, data collection, independent verification where required, handling of deficiencies noted, and review of completed work.

The tests witnessed, in whole or in part, were inspected to determine that approved procedures were available, test equipment was calibrated, prerequisites were met, tests were conducted according to procedure, test results were acceptable and systems restoration was completed.

Surveillances witnessed in whole or in part are as follows:

PT/1/A/0150/06	Mechanical Penetration Leak Rate Test, Penetration #22
IP/2/A/305/3D	RPS Channel $\pm$ D' Calibration and Functional Test
PT/1/A/600/10	Reactor Coolant System Leakage
PT/1/A/261/06	Condenser Circulating Water System Gravity Flow Test
PT/1/A/610/01J	Emergency Power Switching Logic Engineered Safeguards Actuation Keowee Emergency Start Test
PT/1/A/203/06	Low Pressure Injection System Performance Test, LPI $\pm$ 1A' Pump

Completed surveillances reviewed are as follows:

PT/1/A/0150/06	Mechanical Penetration Leak Rate Test
PT/0/A/0150/05	Electrical Penetration Leak Rate Test, Unit 1
IP/1/B/125/1	Strong Motion Accelerograph Monthly Verification, 01/06/86
IP/1/B/125/4	Strong Motion Accelerograph Semi Annual Functional Test, 10/21/85
IP/1/B/125/5	Strong Motion Accelerograph Annual Calibration, 10/21/85
IP/1/B/125/2A	2G Peak Accelerometer Quarterly Calibration, 10/21/85
IP/1/B/125/2B	2G Peak Accelerometer Refueling Calibration
IP/1/B/125	Seismic Trigger Quarterly Calibration and Test, 01/10/86
PT/1/A/0202/12	High Pressure Injection System Engineered Safeguards Test
TT/1/A/0600/03	Motor Driven Emergency Feedwater Flow Test

No violations or deviations were identified.

#### 7. Maintenance Activities

Maintenance activities were observed and/or reviewed during the reporting period to verify that work was performed by qualified personnel and that approved procedures in use adequately described work that was not within the skill of the trade. Activities, procedures and work requests were examined to verify proper authorization to begin work, provisions for fire, cleanliness, and exposure control, proper return of equipment to service, and that limiting conditions for operation were met.

Maintenance witnessed in whole or in part:

MP/0/A/1200/2A	Reassembly of Vent Valve 1LWD-369
WR 29006B	Hinge Pin on LPI Pump A Discharge Check Valve, 1LP-31
WR 29009B	Repair of Valve LP-9
WR 29010B	Repair of Valve LP-12

Maintenance work requests reviewed in detail:

- WR 24397B Replace ±2A' Seal Supply Filter
- WR 90716C Repair Equalizing Valve on RB Personnel Hatch Outer Door, Unit 3
- WR 24250B Troubleshoot, Repair Unit 1 Core Flood Tank Level Instrument Discrepancy
- WR 56196 Preventative Maintenance on Unit 3 Personnel Hatch
- WR 24140B Repair Unit 3 Reactor Building Post Accident Water Level Indication
- WR 24474B Repair 3LP-17. Valve will not fully open electrically.

No violations or deviations were identified.

#### 8. Oconee Seismic Instrumentation

On February 13, 1986, a minor seismic event occurred near the Oconee Nuclear Station (see report 80-04, paragraph 8). Additionally, IE correspondence dated February 19 reviewed the potential failure of seismic instruments, recommending that the NRC regions factor maintenance and testing of seismic instruments into routine inspection programs.

The resident inspectors conducted an inspection of the seismic instrumentation at the site along with associated surveillance tests. Several types of instruments are in use. A strong motion acceleration system records acceleration data in three planes and has a lower sensitivity of 0.01 g acceleration. Peak recording accelerometers are installed at various locations within the Unit 1 reactor building, with sensitivity range from 0.01 to 2.0 g. A third type of instrument is the seismic trigger, or actuating pendulum, calibrated to provide a control room alarm when the design basis seismic condition (0.05 g) occurs.

The surveillance history of the instruments was reviewed to verify maintenance and testing on the required frequency. Surveillance procedures for each type of instrument were reviewed in detail for procedural conformance. Inspection of the location of seismic instruments will continue during the next report period.

No violations or deviations were identified.

#### 9. Required Instrumentation Not In Service During Refueling Operations

During refueling of Unit 1, on two occasions instrumentation required by technical specifications (TS) for fuel movement was found to be out of service, as described below.

- a. Core Geometry Changes Made Without Core Subcritical Neutron Flux Monitor (NI) Being Operable (Personnel Error)

T.S. 3.8.2 requires continuous monitoring of core subcritical neutron flux by at least two neutron flux monitors whenever core geometry is being changed. On March 12, 1986, while fuel was being reloaded into the Unit 1 core, one of two nuclear instruments (NI-1) in service was deenergized for 2 1/2 hours as a result of a power interruption, before the loss was discovered. When the loss of NI-1 was noted, fuel movement was immediately terminated.

During the period of NI-1 inoperability, NI-2 was completely operational and provided chart, scaler and audible (clicker) monitoring of neutron flux. Also, NI-2 detector was in the more favorable position to monitor the reactor area being fueled.

The strip recorder showing the count rate of NI-1 and NI-2 was located behind the refueling RO and he did not notice that NI-1 had dropped down scale. He was relying on the scaler connected to NI-2 and the audible clicker of both NIs. Also, he relied on being informed by the nuclear control operator who would receive an audible and visual alarm in the event of loss of an NI. Unfortunately, loss of NI-1 coincided with a loss of power to a number of control room indications, due to a modification being installed. The nuclear operator was very busy recovering power and did not notify the refueling RO.

The refueling SRO detected the loss of NI-1 and immediately stopped refueling operations. The SRO had NI-1 placed on line and had the refueling booth rearranged so that all instruments could be seen more easily. The SRO terminated construction activity which was in progress nearby and erected a barrier to stop local traffic, since the noise level might have influenced the refueling operator's failure to detect loss of the NI-1 clicker. The SRO counselled all operators involved (all experienced personnel) and then resumed refueling operations.

b. Vent Gaseous Radiation Monitor Removed From Service During Refueling Operations Because of Personnel Error.

On March 14 Radiation Instrument Alarm (RIA)-45, the vent gaseous radiation monitor, was removed from service for periods of 4 minutes and 70 minutes while refueling was in progress. RIA-45 provides automatic reactor building purge isolation in the event of an accident.

The first event occurred when maintenance personnel, with the unit supervisor's permission, were making a routine maintenance check of RIAs. The mechanics found RIA-43 to have a low flow rate and cut the air pump off for 4 minutes while they determined the cause. The RIA-45 sample is also furnished by the same pump. The mechanics obtained from the unit supervisor a priority request to repair RIA-43. The unit supervisor did not recognize that this would also remove RIA-45 from service, nor did he obtain the shift supervisor's permission, as required by the shift supervisor.

After repairs began, a health physics technician who came to the work area to provide compensatory sampling for RIA-43, recognized that RIA-45 was also out of service and notified the shift supervisor one hour after the pump was shut down for maintenance. Refueling operations were terminated immediately and were not resumed until repairs were completed and instrument performance verified.

The licensee's data base search to determine if these were recurring events found only one incident report involving nuclear instruments which was caused by a personnel error. That event occurred in 1975, eleven years ago. Similarly, a data base search revealed that RIA-45 has not previously been out of service during refueling activities.

Though the two events are violations of technical specifications they will not be cited since they meet the conditions as stated in 10 CFR 2, Appendix C, the NRC's program to encourage and support licensee initiative for self identification and correction of problems in that:

- a. The problems were identified by the licensee.
- b. They fit into Severity Level IV or V.
- c. They were reported as required.
- d. They were corrected immediately and measures were taken to prevent recurrence.
- e. They were not violations that could reasonably be expected to have been prevented by corrective action taken on a previous violation.

#### 10. Refueling Activities (60710)

The inspectors completed an inspection of Unit 1 refueling outage activities during the report period. Refueling activities were observed in the Unit 1 control room, the reactor building, and the Unit 1 and 2 spent fuel pool. These activities were witnessed to verify compliance with Technical Specification required conditions for fuel movement.

No violations or deviations were identified.

#### 11. Measurement of End of Cycle Moderator Temperature Coefficient

On April 10 the NRC was notified by the licensee that the Oconee units may have been operated in a condition outside that defined by the final safety analysis report (FSAR). Based on recent analyses it appears that the end of cycle (EOC) moderator temperature coefficient (MTC) has been more negative (less conservative) than that assumed in the FSAR for the steam line break accident. The condition may have existed on all three units towards the end of their last eighteen month cycles. No Oconee unit is presently in this condition.

Concerns that higher burnup fuel cycles could cause the EOC MTCs to be less conservative led to the licensee's desire to verify the capability of the design codes to accurately calculate EOC MTC. Additional MTC measurements near the EOC were necessary for comparison with EOC values extrapolated from beginning of cycle (BOC) data taken during startup physics tests.

Results of EOC measurements on Unit 1 just prior to the cycle 9 refueling outage indicated an MTC more negative than assumed in the FSAR. However these results were suspect due to heat balance discrepancies during the test which could have affected the results. In order to resolve these discrepancies, the licensee repeated the test for Unit 2 on March 11, collecting data at 274 effective full power days (EFPD). Results of the Unit 2 test indicate that the earlier results were valid, therefore the indication of EOC MTC being more negative than the FSAR assumption was considered correct. Based on this information the licensee notified the NRC.

The following corrective actions have been completed or are planned by the licensee. New safety analyses have verified the acceptability of the more negative MTC. The revised analyses assume Hot Zero Power, All Rods In (HZIP,ARI) rather than Hot Full Power, All Rods Out (HFP,ARO) as used in the current FSAR calculations. This assumption is acceptable based on a reactor trip which would occur during a steam break accident. The current operating cores are within the bounds of the new analyses. A revision to the FSAR will be necessary to document the new analyses.

Another contributing factor is a positive MTC bias, historically added to the licensee's code predictions, which was initially justified and documented by Babcock and Wilcox. The MTC positive bias is no longer considered justified and will not be used in the future.

The licensee has indicated plans to perform HZIP, ARI measurements of MTC near the EOC of Units 2 or 3. These measurements are required to verify the revised calculations based on HZIP, ARI. The residents will continue to follow this until additional measurements are complete. This will be listed as inspector followup item 269,270,287/86-10-01; end of cycle moderator temperature coefficient measurements.

## 12. Licensee Event Reports

The inspectors reviewed nonroutine event reports to verify the report details met license requirements, identified the cause of the event, described corrective actions appropriate for the identified cause, and adequately addressed the event and any generic implications. In addition, as appropriate, the inspectors examined operating and maintenance logs, and records and internal investigation reports.

Personnel were interviewed to verify that the report accurately reflected the circumstances of the event, that the corrective action had been taken or responsibility assigned to assure completion, and that the event was reviewed by the licensee, as stipulated in the Technical Specifications. The following event reports were reviewed:



(Closed) LER 269/85-04, Gaseous Waste Disposal Tank Emptied Without a Redundant Sample Analysis

(Closed) LER 269/85-09, Inoperability of Several Radioactive Effluent Monitors

(Closed) LER 269/85-11, Interim Radwaste Building Gaseous Effluent Flow Rate Monitor Inoperable

(Closed) LER 269/85-12, Reactor Building Tendon Inspection and Reporting Intervals Exceeded

(Closed) LER 270/85-01, Both Unit 2 Reactor Building Spray Systems Made Unavailable During Testing

(Closed) LER 270/85-08, Reactor Shut Down Because of Reactor Coolant System Leakage Greater Than 1 GPM

(Closed) LER 270/85-09, Unit Vent Radiation Monitor Inoperable Without Establishing Manual Sampling

(Closed) LER 287/85-03, Unsuccessful Attempt to Open an Electric Motor Operated Valve From the Control Room

(Closed) LER 287/85-04, Missed Hydrogen Concentration Sampling of Isolated Gaseous Waste Decay Tank

### 13. Annual Emergency Drill

The annual emergency drill exercise was held on April 2 and 3, 1986, with Federal, State and County participation. The drill appeared to be well conducted and no violations or deviations were identified. The drill and NRC participation will be discussed in Report No. 86-12.