UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N.W. SUITE 818
ATLANTA, GEORGIA 30303

Report Nos.: 50-269/78-1, 50-270/78-1 and 50-287/78-1

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

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

Licensee: Duke Power Company
P. O. Box 2178
422 South Church Street
Charlotte, North Carolina 28242

Facility Name: Oconee 1, 2, and 3

Inspection at: Oconee Nuclear Station

Inspection conducted: January 23-27, 1978

Inspectors: F. Jape
P. T. Burnett

Reviewed by: _____ 2/21/78
R. C. Lewis, Chief Date
Reactor Projects Section No. 2
Reactor Operations and Nuclear Support Branch

Inspection Summary

Inspection on January 23-27, 1978 (Report Nos. 50-269/78-1, 50-270/78-1 and 50-287/78-1)
Areas Inspected: Routine, unannounced inspection to review plant operations, startup and physics testing following refueling; followup on licensee event reports, previous items of noncompliance, and unresolved items. The inspection involved about 82 hours on site by two NRC inspectors.
Results: Of the six areas inspected, no items of noncompliance were identified.

DETAILS I

Prepared by: Frank Jape 2/9/78
F. Jape, Reactor Inspector Date
Reactor Projects Section No. 2
Reactor Operations and Nuclear
Support Branch

Dates of Inspection: January 23-27, 1978

Reviewed by: [signature] 2/21/78
R. C. Lewis, Chief Date
Reactor Projects Section No. 2
Reactor Operations and Nuclear
Support Branch

1. Persons Contacted

Duke Power Company (DPC)

J. E. Smith, Station Manager
*R. M. Koehler, Superintendent of Technical Services
*O. S. Bradham, Superintendent of Maintenance
R. C. Adams, I&E Engineer
D. Clardy, I&E Supervisor
D. Hunter, I&E Supervisor
W. Carter, I&E Technician
B. McDaniel, Training Supervisor
*W. M. Harris, Operating Engineer
J. W. Herring, Shift Supervisor
H. W. Morgan, Shift Supervisor
G. L. Mitchell, Assistant Shift Supervisor
J. B. Price, Assistant Shift Supervisor
J. G. Neal, Assistant Shift Supervisor
D. L. Gordon, Assistant Shift Supervisor
O. C. Kohler, Control Operator
W. W. Smith, Control Operator
R. K. Emory, Control Operator
K. Staring, Control Operator
*R. T. Bond, Technical Services Engineer
W. P. Deal, Associate Health Physicist
E. H. Gladden, Superintendent Keowee Hydro Station
*R. J. Brackett, Station Senior QA Engineer
*T. S. Barr, Performance Engineer

*Denotes attendance at Exit Management Meeting.

2. Licensee Action on Previous Inspection Findings

a. Noncompliance Items

(1) (Closed) Inspection Reports Nos. 50-269/76-6, 50-270/76-6 and 50-287/76-6, Item I.A.2. Corrective actions stated in licensee response, dated August 27, 1976, were verified by the inspector. Administrative and management controls have been implemented for maintenance and operational activities on safety-related equipment at Keowee. (Details I, Paragraph 8)

(2) (Closed) Inspection Report Nos. 50-269/77-9, 50-270/77-9 and 50-287/77-9, Notice of Violation, Item B. Actions stated in the licensee's response, dated December 6, 1977, were verified by the inspector. Calibration records of instrumentation used to determine operability or functional acceptability of safety-related equipment are being retained.

b. Unresolved Items

(1) (Closed) Unresolved Item 76-1/1, "Instrument Calibration." Licensee has implemented a program for periodic calibration of non-technical specification instrumentation. (Details I, Paragraph 7)

(2) (Closed) Unresolved Item 77-6/I-2, "Test Equipment Calibration and Evaluation." The licensee's program for re-evaluation of items and processes that were determined acceptable based on measurements made with test equipment that is subsequently found to be out of calibration was reviewed and found acceptable. An evaluation tolerance has been established for each test and measurement item and whenever test equipment is found to be out of tolerance, a re-evaluation is required to be completed within 7 days.

(3) (Closed) Unresolved Item 77-24-07, "Seismic Instrumentation." The strong motion seismic instrumentation was verified to be installed, calibrated and operational. (Details I, Paragraph 6)

3. Unresolved Items

No new unresolved items were identified during this inspection.

4. Management Exit Meeting

The inspectors met with R. M. Koehler, Acting Station Manager, and those denoted in paragraph 1, on January 27, 1978, to discuss the inspection findings. The findings were acknowledged by licensee management without significant comment.

Completion of the at-power moderator temperature coefficient measurements was discussed. The licensee agreed to complete the measurements within fifteen effective full power days following refueling. (Details II, Paragraph 4)

5. Review of Licensee Event Reports

The inspector performed an in-office review of the nonroutine event reports listed below to verify that the report details met license requirements, identified the cause of the event, described corrective actions appropriate for the identified cause, adequately assessed actions appropriate for the identified cause and adequately assessed the event and any generic implications. In addition, for those reports marked with an asterisk, the inspector examined selected operating and maintenance logs and records, and internal incident 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:

RO-269/77-25, Radiation Monitors 1R1A-47, 48 and 49 Inoperable
RO-269/77-26, FDW 108 Failed to Close After Taking OTSG Sample
*RO-269/77-27, Error in Incore Detector Background Signal Processing
*RO-269/77-28, Error in Analysis of Boric Acid Required for Shutdown
*RO-270/77-13, FDW 106 & 108 Failed to Close During Test
RO-270/77-15, Primary Valve Leak of 2.5 gpm
*RO-270/77-16, ES Channel 3 RB Pressure Transmitter and PS Inadvertently Valved Out of Service
RO-287/77-16, Inoperable RPS Pressure Transmitters
*RO-287/77-17, RB Emergency Personnel Hatch Failed Local Leak Test
*RO-287/77-18, LP-28 Not Locked Open

6. Seismic Monitoring Instrumentation

The seismic monitoring instrumentation located in the tendon access gallery of Unit 1 Reactor Building and the control and recorder panels for the strong motion accelerograph, located in the Unit 1

cable room were visually examined. No apparent defects were observed. The tendon access gallery was relatively dry and clear of debris. Also, the results of recent periodic tests performed on all of the seismic instruments were reviewed to determine if the instruments are functioning. The records revealed that all systems are operational except for the peak recorder, vertical accelerometer located on the support for the 1A core flood tank. This unit is scheduled for replacement during the next Unit 1 cold shutdown.

The tests reviewed are summarized below:

1P 125/01, Strong Motion Recorder Calibration

Tests last performed on 12/8/77 and 1/4/78. Functionability was verified and starter trigger was determined to be set at 0.01G.

1P 125/02A, 1/4G Peak Recording Accelerometer Calibration

Test last performed on January 4, 1978. Reading of the magnetic tape revealed no seismic disturbance.

1P 125/02B, 2G Peak Recording Accelerometer Calibration

Tests last performed on September 29 and October 6, 1977, (Note: These instruments are located within the biological shield area of the Reactor building and therefore accessible only during reactor outages).

1P 125/03, Seismic Switch Calibration

Test last performed on November 14, 1977, and verified that the seismic trigger Statalarm was operational and is set at 0.05G.

7. Non-Technical Specification Instrument Calibration

The inspector reviewed the licensee's program for calibrating instrumentation not specified by Technical Specifications, but which are associated with safety-related systems. The review revealed that procedures have been provided and are performed on a periodic schedule. Responsibility for the program is assigned to the I&E Supervisors. Each supervisor is assigned certain plant systems and prepares a calibration schedule for his assigned systems.

The completed procedures are reviewed and approved by the supervisor. The inspector selected eight completed procedures, listed below, for review. The procedures were found to contain detailed step-by-step instuction and specific acceptance criteria. Also, prior to performance of the work, the supervisor determined which steps of the procedure were not required, based on the work request.

The following procedures were reviewed:

1P 1/202/1H	LST Flow Instrument Calibration
1P 1/203/1D	LPI Temperature Instrument Calibration
1P 1/203/1F	LPI Pressure Instrument Calibration
1P 2/203/1F	LPI Pressure Instrument Calibration
1P 1/250/5	Fire Protection - Unit 1
1P 2/250/5	Fire Protection - Unit 2
1P 3/250/4	HPSW System Instrument Calibration
1P 3/240/1A	Surge Tank Level Instrument Calibration

8. Maintenance of Safety-Related Systems at Keowee Hydro Station

The planning, scheduling, reviewing, and approving of maintenance work performed at Keowee Hydro Station was reviewed. The program currently established and being implemented for Keowee is essentially identical to the Oconee Nuclear Station program. These activities are under the management of the Keowee Superintendent of Maintenance and the Oconee Superintendent of Maintenance

The program is described in Station Directive 3.3.11, "Keowee Maintenance Activities." Using this directive as guidance, the inspector reviewed maintenance procedures on file at Keowee, interviewed Keowee personnel and examined several completed work requests. Based on the discussions with personnel and the completed work records, the program appears to be functioning as described. Within these areas, the inspector found no discrepancies, deficiencies or items of noncompliance.

9. Plant Operations

The inspector reviewed plant operations to ascertain conformance with regulatory requirements, technical specifications, and administrative directives. Station logs, such as the unit supervisors log, control room operators log and the removal and restoration of station equipment records were reviewed. Interviews with a number of plant operations personnel were held on the day and night shifts. In addition, a tour was conducted of the auxiliary building, turbine building and the Unit 3 reactor building.

During the period of observation and inspection, Units 1 and 2 were in power operation and Unit 3 was preparing for startup. During a tour of the plant accesible areas, observations were made regarding the plant housekeeping and cleanliness, ongoing activities, radiation control practices and security practices. Housekeeping and cleanliness were found to be satisfactory within the radiation areas and non-radiation areas. Security practices and radiation control practices were adhered to during the tour.

During the tour of Unit 3 reactor building, tools used for repair of a core flood valve, located at the lowest level within the reactor building, were observed to be at the job site even though the job appeared to be complete. When this item was discussed with maintenance personnel, the inspector was informed that all tools are to be removed following a leak check at operating pressure. A site QA inspector verified that the tools had been removed following the leak check.

Supervisor and control room operator actions were observed during the shift and at shift change. The actions and activities were conducted as prescribed in Section 3.0 of the Station Directives. The number of personnel available on each shift met or exceeded the minimum required by Technical Specification 6.1.1.3. Operators were responsive to annunciator alarms and appeared to be cognizant of plant status.

Technical Specifications, listed below, related to safety limits, limiting safety system settings and limiting conditions for operation were reviewed. In all cases, operations were found to be in conformance with the Technical Specifications.

TS 2.1, Reactor Coolant Flow During Power Operation, Figures 2.1-2A, Unit 1 and 2.1-2B, Unit 2
TS 3.1.2.1, Heatup Rate, Figure 3.1.2-1C, Unit 3
TS 3.1.5, Chemistry, All Three Units
TS 3.2.2b, CBAST Volume, All Three Units
TS 3.3.3, Status of Core Flood Tanks, All Three Units

10. Implementation of 10 CFR 21 Requirements

The licensee's policies for implementing 10 CFR 21 requirements were reviewed. The findings were satisfactory and are summarized below:

a. Part 21.6, Posting Requirements

The licensee has posted a notice stating where copies of procedures can be obtained. The notice is located in an access corridor where most employees pass on their way to and from work.

b. Part 21.21(a) and (b), Notification of Failure to Comply or Existence of a Defect

Section 2.8 of the Administrative Policy Manual (APM) prescribes factors to consider for evaluating a reportable deficiency and specifies the report content, scope, format and submittal to NRC.

c. Part 21.31, Procurement Documents

Section 2.4 of the APM requires an appropriate statement to be added to each purchase requisition for materials, parts and components associated with safety-related structures, systems or components.

d. Part 21.51(a) and (b), Maintenance of Records

Section 2.2 of the APM covers management of records including records associated with NRC reporting requirements.

DETAILS II

Prepared by: _____ 2/21/78
P. T. Burnett, Reactor Inspector Date
Nuclear Support Section No. 1
Reactor Operations and Nuclear
Support Branch

Dates of Inspection: January 23-27, 1978

Reviewed by: _____ 2/21/78
R. D. Martin, Chief Date
Nuclear Support Section No. 1
Reactor Operations and Nuclear
Support Branch

1. Persons Contacted

J. E. Smith, Plant Manager
*R. M. Koehler, Technical Services Superintendent
*O. S. Bradham, Maintenance Superintendent
*T. S. Barr, Performance Engineer
*W. M. Harris, Operating Engineer
*R. T. Bond, Technical Services Engineer
W. R. Campbell, Reactor Engineer
D. Vito, Assistant Engineer
W. Newman, Assistant Engineer
T. Curtis, Assistant Engineer
R. C. Adams, Instrument Supervisor
Various Operations Personnel

*Indicates presence at the Exit Interview on January 27, 1978

2. Licensee Action on Previous Inspection Findings

Not addressed.

3. New Unresolved Items

None.

4. Management Interview

A meeting was held with those persons indicated by asterisks in paragraph 1 on January 27, 1978. The scope and findings of this inspection, as reported in the following paragraphs, were summarized for the licensee. There was an agreement that in the future the determination of the at-power moderator-temperature coefficient should be measured much earlier in the fuel cycle then was the case for each of the three units following their most recent refuelings. To that end the licensee made the following commitment:

> Following refueling, the moderator coefficient at power will be measured within the first fifteen effective-full-power days (EFPD) of operation. That measurement will be extrapolated to the power limit specified in Technical Specification 3.1.7. If the measurement is made below the power limit and is not negative the measurement will be repeated at, or above, the limit, and the negative coefficient confirmed directly or by interpolation. The second measurement, if required, will be performed at the earliest practical opportunity after achieving two dimensional xenon equalibrium at the base power level for the measurement. Henceforth, power escalation procedures will reflect this commitment.

5. Startup Testing After Refueling

a. Unit 1

Following the most recent refueling outage, Unit 1 was returned to power operation in October 1977, and to full power in late November 1977. However, the power-escalation-testing program was not complete as of this inspection. The final test, a determination of the reactivity coefficients at power, was performed in the period January 21-22, 1978, but data analysis was not complete nor inspectable. All other zero power and power escalation tests were complete and acceptable.

b. Unit 2

Following the most recent refueling outage, Unit 2 was returned to power operation in August 1977 and to full power in January 1978. The final power-escalation tests, reactivity coefficients at power, was performed in the period January 21-22, 1978. Data reduction was completed during this inspection. Both the test method and results were reviewed and discussed with licensee personnel. The inspector had no further questions in this area.

c. Unit 3

The refueling outage for Unit 3 was completed in December 1977, and full power operation was attained later in the month. The unit remained at full power until January 14, 1978, on which date power was reduced to 70% to take one reactor coolant pump off the line. The unit was later shutdown to repair that pump. Power escalation testing was not complete for this unit, and data had not been obtained for the reactivity coefficients at power measurement.

The procedure for and analyses of results of the zero power physics tests were reviewed and discussed with licensee personnel. No areas of concern or items of noncompliance were identified. With the exception noted above, power-escalation testing was complete. The inspector reviewed the test results and discussed them with licensee personnel. The inspector had no further questions in this area.

d. Summary

The remaining concern at the end of this area of inspection was the long period of time of power operation which preceeded the determination of the reactivity coefficients of power. This was of particular concern from the standpoint of Technical Specification 3.1.7 which requires that the moderator coefficient at 95% power and above be negative. The delay of the reactivity coefficients tests delayed the confirmation that the reconstituted cores met the specification. The moderator temperature coefficients were determined at zero power, and a method for extrapolating zero power measurments to power is discussed in the bases of the technical specifications. However that extrapolation does not give the confidence that an at-power measurement produces. This concern was discussed with the licensee, and the licensee made a commitment to accelerate such testing in the future. This commitment, as agreed to by the licensee, is given in paragraph 4 of these details.

6. Operating Experience (Unit 3)

Power from Unit 3 was reduced to approximately 70% of full power early on the morning of January 14. The reduction was performed to permit taking one reactor coolant pump out of service. Pump 3B1 was tripped at approximately 5 a.m. and about 20 minutes later the power tilt in the XY quadrant began to increase and in about another 20 minutes stabilized at a new, higher level and remained there for about 70 minutes. In the next 20 minutes the quadrant dropped to slightly below the value observed prior to tripping the pump. During this period the tilt in the opposite, WZ, quadrant was changing as a mirror image with the same timing.

This behavior persisted for over a week of operation. Quadrant tilts were observed and recorded every 10 minutes, which is the maximum freuqency at which the plant computer can make the calculation using in-core detector data. A plot of the power tilts for the two affected quadrants gives the appearance of a square pulse with random spacing between pulses and random pulse widths. On a few occasions the positive tilt slightly exceeded the limits of Technical Specification 3.5.2.4, but in each case self-corrected in less than the two-hour action time allowed by that specification.

Indications from the excore detectors, core thermocouples, and loop temperature detectors confirmed the behavior. No corresponding secondary system variations were observed.

The oscillation in quadrant tilt persisted as power was reduced to 20% of full power. At 20% reactor coolant pump 3A2 was tripped. Almost immediately the quadrant tilts started to approach zero and stabilized at smaller absolute values without further oscillation.

In addition to the extra surveillance and testing described above, the licensee stated that the installed noise monitoring system was used extensively, and that no new or unusual mechanical noises were detected. The NSSS vendor performed neutron noise measurements, and, reportedly, the later, off-line data reduction and analysis gave no clues to the source of the oscillation in quadrant tilt.

The licensee stated that a consultant capable of performing on-line and mechanical and neutron noise analyses would perform additional testing in the near future.

In addition to the testing associated with the three-pump quadrant-tilt-oscillation problem, the consultant will also investigate the problem of power oscillation if such can be induced. The problem of power oscillation was addressed in IE Reports 77-14, 77-20 and 77-31. The licensee stated that no remedies to power oscillations had been identified.

7. Procedure Review

The inspector reviewed the following procedures, common to all units:

A. OP/0/A/1103/17, "Core Energy Calculation"

B. OP/0/A/1103/19, "Power Inbalance and Quadrant Power Tilt Calculations Using the Backup Incore Detector System"

C. OP/0/A/1103/17, "Nuclear Steam System Heat Balance"

D. OP/3/A/1103/15, "Reactivity Balance Procedure"

The latter procedure, with the exception of the plant curves, is similar to those in use for the other units. At the end of this review the inspector had no questions on the content and application or frequency of use of these procedures.

8. Items From Earlier Inspection Reports

a. Damaged Fuel Assembly

Report 77-19 discussed the status of a fuel assembly damaged during inspection program for unit 1. The licensee has recently completed a program of removing the damaged fuel pin from the fuel assembly so that the assembly could be installed in a standard spent-fuel rack. The damaged fuel pin was then packaged and shipped offsite. The inspector reviewed the completed procedures used for removing the fuel pin, loading it in its shipping container, and shipping it offsite. He had no questions at the conclusion of the review.

b. Procedure Revisions

In the course of inspection 77-27 the licensee made a commitment to revise IP/305/3A, 3B, 3C, and 3D as applied to all three units. These revisions were to include the data sheets appropriate to each unit. The inspector determined that all procedure revisions had been completed by the commitment date of November 15, 1977, and sampled the data sheets to confirm that they to had been revised.