



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

Report Nos.: 50-269/85-26, 50-270/85-26, and 50-287/85-26

Licensed: 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: August 13 - September 9, 1985

Inspectors: <u>HC Dance / fr</u>	<u>9/13/85</u>
J. C. Bryant	Date Signed
<u>HC Dance / fr</u>	<u>9/13/85</u>
M. K. Sasser	Date Signed
<u>HC Dance / fr</u>	<u>9/13/85</u>
L. P. King	Date Signed
Approved by: <u>HC Dance</u>	<u>9/13/85</u>
H. C. Dance, Section Chief	Date Signed
Division of Reactor Projects	

SUMMARY

Scope: This routine, announced inspection entailed 195 inspector hours on site in the areas of operations, surveillance, maintenance, refueling activities, followup of events, chemistry, and station modifications.

Results: Of the seven areas inspected, no items of noncompliance or deviations were identified in six areas; one area of noncompliance was found in one area (Violation: Failure to follow procedure for E-bar determination).

## REPORT DETAILS

### 1. Licensee Employees

#### Persons Contacted

- \*M. S. Tuckman, Station Manager
- J. N. Pope, Superintendent of Operations
- \*T. Barr, Superintendent of Technical Services
- T. Owen, Superintendent of Maintenance
- \*R. Bond, Compliance Engineer
- \*T. C. Matthews, Technical Specialist

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

#### Resident Inspectors

- \*J. C. Bryant
- M. K. Sasser
- L. P. King

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on September, 1985, with those persons indicated in paragraph 1 above. The licensee had no specific comment about the proposed violation. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

### 3. Unresolved Items

Unresolved items were not identified on this inspection.

### 4. 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
- Units 1, 2, and 3 Electrical Equipment Rooms
- Units 1, 2, and 3 Cable Spreading Rooms
- Station Yard Zone within the Protected Area
- Unit 3 Reactor Building

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

Unit 1 operated at essentially full power throughout the reporting period.

Unit 2 operated at 95% power throughout the reporting period, with power reduced due to high water levels in "B" steam generator.

Unit 3 remained in the End of Cycle 8 refueling outage throughout the reporting period. The shutdown is discussed in paragraphs 10 and 11.

No violations or deviations were identified.

#### 5. Surveillance Activities

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, tests were acceptable and systems restoration was completed.

Surveillances witnessed in whole or in part:

- PT/1/A/600/12 Turbine Driven Emergency Feedwater Pump Performance

- Test Calibration Check of BWST Level Transmitter, Unit 3

Completed Surveillances reviewed:

- WR 56842 Perform Keowee underground breaker, interlock test on ACB3 and ACB4

- WR 55012A RPS Channel on line test required by Technical Specification (TS) 4.1-1
- WR 55049A Perform RPS Channel B reactor building pressure instrument calibration required by TS 4.1-1
- WR 55009A Perform source range intermediate range channel test required by TS 4.1-1
- WR 90607C Calibrate P-432 (Flow) gauge and forward calibration data sheets to performance

No violations or deviations were identified.

#### 6. Maintenance Activities

Maintenance activities, including station design modifications, 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. Observation of the Unit 3 outage related design modifications will continue into the next reporting period.

Maintenance work witnessed in whole or in part:

- WR 51800C Disassembly, Maintenance, and Reassembly of RCP 3A2
- WR 24427B Troubleshoot and find cause of CT-3 transformer lockout, repair

Station Design Modifications reviewed or witnessed in whole or in part:

- NSM 2159 Modify HPI pump emergency cooling water supply
- NSM 1282 Hydrogen recombiner Auxiliary Building piping and hangers
- NSM 2288 Automatic RPS actuation of shunt trip on CRD circuit breakers
- NSM 2432 Replace SSF Reactor Building transmitters with environmentally qualified transmitters.
- NSM 2422 Replace RIA-56

Completed maintenance work requests reviewed:

WR 90612C Investigate and repair HVAC system due to low flow and high discharge pressure.

WR 22818B Repair/replace CB1 DC CRD.

WR 90544C U-2 SSF - RC makeup pump L.O. temperature reaches trip set point (180F) during performance test.

WR 20966B Repack inboard and outboard stuffing boxes on LPSW pump

No violations or deviations were identified.

#### 7. Unit 3 Unusual Event

At 3:40 a.m. on August 28, 1985, with Unit 3 in refueling shutdown, the unit startup transformer, CT-3, became deenergized when the fault pressure relay sensed an internal transformer fault. The startup transformer provides offsite AC power to Unit 3 during shutdown conditions. When CT-3 deenergized, both Keowee hydro units auto started on undervoltage to the 4160 volt main feeder buses. The Keowee units provided power to the main feeder buses through standby transformer CT-4. At the time of the event, the reactor core was defueled to the spent fuel pool (SFP). SFP cooling was lost during the initial loss of CT-3, but was restored by Operations personnel within 10 minutes with only a one degree temperature rise recorded for the SFP.

In accordance with station emergency procedures, an Unusual Event was declared at 4:30 a.m., based on deenergization of the main feeder buses and auto start of the Keowee units. At 5:05 a.m., the AC power from offsite was restored through transformer CT-5 from the 100 kV Central transmission line. The Unusual Event was terminated at 5:43 a.m. following restoration of AC power.

During the Unusual Event the licensee's staff was unable to make the required notification to the State of South Carolina as there was no response when called. The State officials were contacted later during normal office hours and steps were taken to resolve this problem for the future.

Troubleshooting on the CT-3 transformer indicated a fault in the internal windings. Because of the unavailability of a spare transformer, the licensee is continuing to evaluate the feasibility of repairing the installed transformer or temporary replacement with transformers of a different design. At the end of the report period it appeared that the maintenance efforts might have been effective in returning the transformer to serviceability.

At 8:55 p.m. on September 7, 1985, a mechanic collapsed from heat exhaustion in the change room after working on a valve in containment. He had been wearing anti C's, rain gear, and a mask. The medical emergency team was activated and the victim treated and surveyed. After the victim was placed in an ambulance, contamination of 220 counts per minute was discovered on one knee. Background levels in the change room masked the contamination.

The local hospital was notified that a contaminated victim was in transport. An Unusual Event was declared at 9:25 p.m. in accordance with station emergency procedures and all required notifications were made. At 9:55 p.m. the Unusual Event was terminated. At last report the victim's condition was satisfactory.

#### 8. Unit 2 - Unusual Event

An unusual event on Unit 2 was declared at 2:02 a.m. on September 4, 1985 due to indicated primary system leakage into containment of approximately two gallons per minute (gpm). Personnel entry into containment at 4:50 a.m. determined that the leak was into a funnel from a collection line which received miscellaneous root valve packing leakoffs. The specific root valve with the packing leak could not be determined at the time. Leakage was determined to be 1.7 gpm. A safety evaluation determined that continued reactor operation for the present was justified since the root valve packing did not constitute a strength boundary of the reactor coolant system. The unusual event was terminated at 9:55 a.m.

First indication of the leak was at 12:15 a.m. on September 4, when control operators noted increases in the reactor building normal sump filling rate and in the let down storage tank decrease rate. Reactor building radiation instrument alarms (RIA's) showed increasing levels of iodine and particulates. Analysis of the reactor building sump showed short lived activity and a boron concentration of 1170 ppm. At the end of the report period, Unit 2 is operating and reactor building activity is not increasing. A decision on a planned shutdown for repairs has not been reached.

#### 9. Determination of Reactor Coolant E-bar

The inspectors reviewed the licensee's procedures for the determination of E-bar, the average beta-gamma energy per disintegration in the reactor coolant system (RCS), which is used to determine the maximum allowable RCS radioactivity levels per Technical Specification 3.1.4. The Chemistry Department performs the semi-annual determination of E-bar using procedure CP/O/A/2005/6A. Only those nuclides with a half life greater than 30 minutes are used in the calculation. The referenced procedure requires liquid and gas samples to be counted 2 to 4 hours after the initial RCS sample has been collected, with a recount of the same samples 5 days later to obtain the activities of any nuclides which did not show up on the first count.



The inspectors initial review of the licensee's records found the following apparent discrepancies. For Units 1 and 2 E-bar procedures, dated 1/4/85 and 5/21/85 respectively, the documentation did not show a 5 day sample recount. For Unit 3, dated 6/25/85, the recount was performed 4 days after initial sampling rather than 5 days as required. Also, the Unit 2 E-bar calculation was based on the initial sample count with only a 45 minute elapsed time.

At the inspectors request, the licensee staff further researched these discrepancies. For Units 1 and 2, the 5 day recount was performed but the documentation was not retained as no new nuclides were found. The Unit 3 recount was mistakenly performed with 4 days elapsed time rather than 5 days as required. For the Unit 2 initial sample count, the licensee determined that E-bar was incorrectly calculated. The time that the initial sample was collected was incorrectly entered into the computer, resulting in calculations based on 45 minutes elapsed time rather than an actual elapsed time of 3 hours 15 minutes. The licensee agreed to correct the Unit 2 E-bar results.

In summary, the above discrepancies resulted from the licensee's failure to adhere to procedure requirements and, also, from improper documentation. Failure to follow procedures is an apparent violation of Technical Specifications and Station Directives; Violation - Failure to follow procedures for E-bar determination (50-269,270,287/85-26-01).

10. Unit 3 Broken Cap Screws On Reactor Coolant Pump Bearing Housing

During scheduled overhaul of a reactor coolant pump, manufactured by Bingham-Williamett Company, 21 of 32 cap screws in a bearing housing were found to have the heads broken off from the shank. The heads had disintegrated into small pieces due to having moved around in the bearing cavity over an extended period. The RCP had been in service about 11 years. At Oconee, one RCP is overhauled during each refueling shutdown. However, the impeller is not removed during these routine overhauls and the bearing housing cannot be seen with the impeller in place. There had been no increased vibration or runout detected to indicate a problem.

An evaluation by Bingham stated that the pump should continue to operate satisfactorily for the life of the plant; that any further degradation would be indicated by increased vibration and shaft runout which would occur over a period of time; and that seal performance would not be affected rapidly. Bingham added that any change in performance would occur over a period of time adequate to allow a normal shut down for planned maintenance.

Unit 3 has four Bingham RCP's as has Unit 2. Unit 1 has Westinghouse pumps. The licensee is preparing an engineering evaluation to justify continued operation of Unit 2 and startup of Unit 3.

The bearing is held in place, not only by cap screws, but also by the thermal barrier and is held in centered position by four radial keys. Vertical movement is limited in both directions. The bearing and housing

did not rotate but there was some wear due to vibration on the housing and the surface of the pump stuffing box. The bearing housing was returned to Bingham to be built up and machined slightly oversized. Duke planned to rebores the stuffing box slightly over sized, but found that Duke was not equipped to perform the job with the required precision. Subsequently, a spare stuffing box was purchased from another site and has been received on site. The sellers QA program has been examined by Duke.

The licensee will develop a program for examination of the remaining pumps during scheduled shutdowns. Problems with the RCP have been examined by a Regional inspector and will be reported in more detail in Report No. 50-287/85-27.

No violations or deviations were identified.

#### 11. Unit 3 Refueling Shutdown

The Unit 3 end of cycle 8 refueling outage has remained essentially on schedule; the major problems encountered are discussed in paragraphs 7 and 10. The reactor coolant pump problem is not expected to delay startup. The control transformer remains a question. Refueling was completed on September 6.

The steam generators were eddy current tested and sludge lanced during the shutdown. In steam generator A, 2192 tubes were tested and 4 were plugged. Steam generator B had 3699 tested and 10 plugged. One of the 10 was plugged due to a bubble test performed prior to the eddy current test. Sludge lancing removed 84 pounds total from the 2 generators. The licensee estimates 90% of the sludge on the lower tube sheet was removed.

No violations or deviations were identified.