



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

Report Nos.: 50-269/91-12, 50-270/91-12 and 50-287/91-12

Licensee: Duke Power Company  
 P. O. Box 1007  
 Charlotte, NC 28201-1007

Docket Nos.: 50-269, 50-270, 50-287, 72-4

License Nos.: DPR-38, DPR-47, DPR-55, SNM-2503

Facility Name: Oconee Nuclear Station

Inspection Conducted: May 26 - June 29, 1991

Inspector: W. K. Poertner, Acting Senior Resident Inspector 7-12-91  
 Date Signed

B. B. Desai, Resident Inspector 7-12-91  
 Date Signed

Approved by: G. A. Belisle, Section Chief 7/16/91  
 Division of Reactor Projects Date Signed

SUMMARY

Scope: This routine, announced inspection involved inspection on-site in the areas of operations, surveillance testing, maintenance activities, spent fuel transfer cask inspection and inspection of open items.

Results: Two violations were identified. The first violation involved the loss of configuration control of flow instrumentation (paragraph 2.d). The second violation involved the operation of safety-related systems without procedural guidance (paragraph 2.e).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*H. Barron, Station Manager
- D. Couch, Keowee Hydrostation Manager
- \*T. Curtis, Compliance Manager
- J. Davis, Technical Services Superintendent
- D. Deatherage, Operations Support Manager
- B. Dolan, Design Engineering Manager, Oconee Site Office
- \*W. Foster, Maintenance Superintendent
- T. Glenn, Engineering Supervisor
- \*O. Kohler, Compliance Engineer
- \*C. Little, Instrument and Electrical Manager
- H. Lowery, Chairman, Oconee Safety Review Group
- \*B. Millsap, Maintenance Engineer
- M. Patrick, Performance Engineer
- D. Powell, Station Services Superintendent
- \*G. Rothenberger, Integrated Scheduling Superintendent
- \*R. Sweigart, Operations Superintendent

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

#### NRC Resident Inspectors:

- \*P. Harmon
- \*W. Poertner
- \*B. Desai

\*Attended exit interview.

### 2. Plant Operations (71707)

#### a. General

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, temporary modification log and equipment removal and restoration records were reviewed routinely. Discussions were conducted with plant operations, maintenance, chemistry, health physics, instrument & electrical (I&E), 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 weekdays and on weekends. Some inspections were made during shift change in order to evaluate shift turnover performance. Actions

observed were conducted as required by the licensee's Administrative Procedures. 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
- CCW Intake Structure
- Independent Spent Fuel Storage Facility
- Units 1, 2 and 3 Electrical Equipment Rooms
- Units 1, 2 and 3 Cable Spreading Rooms
- Units 1, 2 and 3 Penetration Rooms
- Units 1, 2 and 3 Spent Fuel Pool Rooms
- Station Yard Zone within the Protected Area
- Standby Shutdown Facility
- Keowee Hydro Station

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

Within the areas reviewed, licensee activities were satisfactory.

b. Plant Status

Unit 1 operated at power for the entire reporting period.

Unit 2 operated at power for the entire reporting period.

Unit 3 operated at power until June 9, 1991, when it automatically tripped on low pressure/temperature due to the Group 5 control rods dropping into the core. The Unit was returned to service on June 10, 1991.

c. Unit 3 Reactor Trip.

At 3:06 p.m., on June 9, 1991, Unit 3 experienced an automatic reactor trip from 100 percent power. The automatic actuation of three of the four channels of the Reactor Protection System (RPS) on Low Pressure/Temperature and the subsequent reactor trip was caused by the Group 5 control rods dropping into the core during movement of Rod 12 in Group 5. A blown fuse in the absolute position indication instrumentation required Instrumentation and Electrical (I&E) personnel to enter the Control Rod Patch Panel. Following the replacement of the blown fuse, operations performed OP/O/A/1105/09,

Patch Panel Verification at Power, as required by Technical Specification (TS) 4.7.2.1. Rod 12 of Group 5 was transferred to the auxiliary power supply to make adjustments to its position. When the rod was moved, the entire Group 5 bank dropped into the core and subsequently the reactor tripped on Low Pressure/Temperature. Further investigation by the licensee determined that the transfer from the regulating to the auxiliary power supply was not complete, leaving both power supplies connected to the control rod drives. This resulted in four phases of the rod contactors being energized instead of two phases. The magnetic fields produced by the rod contactors were 180 degrees out of phase, effectively cancelling each other. As a result, the contactors opened and the rods in Group 5 dropped into the core. The failure to fully transfer to the Auxiliary power supply was due to the transfer switch for Rod 12 of Group 5 failing in the mid-position. The switch was replaced prior to startup. Maintenance engineering personnel are investigating possible ways to change the transfer logic to alert the operator that the transfer has not fully occurred. The possibility of replacing the transfer switch with an improved version is also being investigated.

The post trip response was normal; however, the following exceptions were noted:

- RPS channel "A" did not trip. The trip setpoints for all four channels were checked and found to be within tolerance. The "A" channel was found to be calibrated towards the lower tolerance limit, while the other three channels were calibrated toward the upper limit. Therefore, the plant had already tripped before the setpoint was reached for the "A" channel.
- Following the trip, MS-19 (Turbine Bypass Control Valve A) was continuously cycling even though steam pressure remained constant. The valve was found to be cycling about 4.5 inches, and sticking about 1 inch from the closed position. Adjustments were made and the cycling of the valve was terminated. As a result of MS-19 opening and closing, MS-5 (Main Steam Relief Valve) seated, then re-lifted following the trip. In addition, the line from MS-19 to the condenser experienced large swings due to a water hammer. One axial support and one spring support bed plate were damaged and two elbows were slightly distorted. The licensee attributed the water hammer to a temporary modification which installed a condensate/feedwater recirculation line to the turbine bypass line. This source of water, in addition to leakage by the turbine bypass valves, was postulated to be more than the drain line capacity. Consequently, water accumulated at the bypass line low point. The licensee has rerouted the recirculating line to the turbine building drains. In addition, the licensee has plans to replace the turbine bypass lines during the next refueling outage.

The licensee conducted an investigation of the trip and events that occurred as part of this trip. The inspectors witnessed actions taken by the operators as well as participated in the post trip meeting. No problems were identified. The licensee notified the NRC as required by 10 CFR 50.72 (b)(2)(ii).

Unit 3 was returned to power operation on June 10, 1991.

d. Low Pressure Injection (LPI) Flow Instrument 2FT-4A Inoperable.

On May 30, 1991, during performance of PT/2/A/0203/6A, LPI Pump Performance Test, the 2B LPI header flow instrument 2FT-4A on the Unit 2 control panel did not indicate flow when the 2B LPI pump was started. Subsequent investigation by the licensee determined that the instrument was valved out of service. The instrument was returned to service and an investigation was initiated to determine how configuration control of the flow instrument was lost. The LPI flow instruments had been calibrated less than a week prior to the pump performance test due to problems identified with the span values used to calibrate the instruments. Flow instrument 2FT-4A had been independently verified at that time as being returned to service in the controlling procedure. The licensee was unable to conclusively determine that the flow instrument had been left valved out of service after the instrument was calibrated; however, the most probable cause was determined to be oversight on the technicians part when the work control copy of the procedure was combined with the official copy of the procedure in the control room. The failure to maintain configuration control on flow instrument 2FT-4A is identified as Violation 50-270/91-12-01: Inoperable Flow Instrument.

The operators did not declare train "B" of the low pressure injection system inoperable when the flow instrument failed to indicate flow. When questioned by the inspector the control room SRO stated that the system was still operable because flow indication was available on the plant computer. The LPI flow instruments on the Unit 2 control board are non-seismic, non-class 1E, air operated instrumentation and are scheduled to be replaced during the next refueling outage with instrumentation that meets the requirements of Regulatory Guide 1.97. The computer point flow indication is also a non-class 1E indication. The licensee's position is that use of the computer point for operability of the LPI system is acceptable until the flow instrumentation is upgraded to meet the requirements of Regulatory Guide 1.97. The inspectors have expressed concerns in previous inspections about the adequacy of the ECCS flow instrumentation and the amount of time that has elapsed without upgrading the instrumentation. The instrumentation on Unit 3 was replaced during the last refueling outage and Units 1 and 2 are scheduled to have the instrumentation replaced during the next scheduled refueling outage.

Within this area, one violation was identified.

e. Core Flood Tank (CFT) Level Problems.

On May 25, 1991, during calibration of the Unit 3 "B" CFT channel 2 level instrument, the indicated level changed from 12.76 feet to 12.54 feet after the channel was calibrated. Channel 1 indicated 13.04 feet. The channel 2 level instrument had been calibrated due to the mismatch in indicated level between the two level instruments. The Technical Specification (TS) lower limit for CFT level is 12.56 feet. Based on the channel 2 level instrument being less than the TS limit the operators decided to add water to the "B" CFT. The operators attempted to makeup to the CFT per OP/3/A/1104/01, Core Flooding System; however, the boric acid mix tank pump would not pump. The operators decided to crossconnect the "A" and "B" CFTs through the 1 inch sample lines to sluice water from the "A" CFT to the "B" CFT. The valves were opened and water level increased to 12.59 inches in the "B" CFT. OP/3/A/1104/01 did not contain procedural guidance for sluicing CFTs and a procedure change to incorporate this method of increasing CFT level into the procedure was not initiated. The procedure for sampling the CFTs specifically requires that the non sampled CFTs sample valve be verified shut. The failure to meet the procedural requirements of OP/3/A/1104/01 for makeup to the "B" CFT is identified as Violation 50-287/91-12-02: Failure to Follow Procedure.

The inspector also questioned the acceptability of crossconnecting CFTs during normal power operation. TSs require that both CFTs be operable when the unit is at power. If the break location during a loss of coolant accident was on a core flood tank injection line the unaffected CFT would be crossconnected to the faulted CFT through the 1 inch sample line. Based on the inspectors concern, the licensee performed an engineering evaluation and determined that 25 percent of the water volume in the non-faulted CFT would not be injected into the core, however the core would remain covered under this condition. The inspectors still question the acceptability of crossconnecting the CFTs at power since 25 percent of the non-faulted CFT would not inject into the core and the sample valves do not receive power from a safety related power supply and by design could not be shut during a design basis accident. The licensee is evaluating whether a procedure change to allow sluicing the CFTs should be included in the controlling procedure.

Within this area, one violation was identified

f. Failure of Keowee Unit 1 to Start during Performance Test.

During the performance of PT/0/A/620/09, Keowee Unit 1 failed to start due to failure of the generator breaker to close. The unit was declared inoperable, a 72 hour action statement was entered, and an investigation into the cause was initiated by the licensee. The failure of the generator breaker to close was attributed to the X-relay contacts not closing at set turbine speed. A pivoting

mechanical finger within the X-relay was found not reset causing the X-relay contacts to remain open upon energization of the coil. The mechanical finger was physically reset and the performance test was successfully run. The licensee in conjunction with the manufacturer is investigating the cause of the failure. Pending further evaluation, the licensee is visually verifying that the X-relay is reset following each shutdown of the Keowee units and logging that the relay is reset in the Keowee operators log. The inspectors will continue to monitor the licensee's actions regarding this issue.

g. Motor Control Center (MCC) Breaker Coordination Problems.

On May 29, 1991, the licensee determined that a breaker coordination problem existed on MCCs 1, 2, and 3XS2. If an overcurrent condition occurred on non-safety panelboards 1, 2, or 3KM during an accident the feeder breaker to the respective XS2 MCC could trip open prior to the supply breaker to the non-safety panelboard tripping. The licensee found this problem as a result of an ongoing design review of breaker and relay trip settings to address previously identified problems in this area. The panelboard supply was removed from the safety-related MCC and transferred to a non-safety-related MCC. The inspectors followed the licensee's immediate corrective actions to resolve the breaker coordination problem and will followup on this item via the licensee's LER.

3. Surveillance Testing (61726)

Surveillance tests were reviewed 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 reviewed and witnessed in whole or in part:

IP/0/A/0400/11	Keowee 125V DC Control Battery Test
PT/3/A/0251/01	LPSW Pump Performance Test
PT/0/A/600/19	Surveillance of 4160 and 600 Volt Breakers
PT/3/A/0150/22L	Functional Test for HPSW Supply to TDEFW Pump
PT/3/A/600/01	Periodic Instrument Surveillance
PT/2/A/600/01	Periodic Instrument Surveillance
PT/1/A/600/01	Periodic Instrument Surveillance
PT/2A/0/600/13A	MDEFW Pump Performance Test
PT/1/A/251/01	LPSW Pump performance Test

Within the areas reviewed, licensee activities were satisfactory.

No violations or deviations were identified.

## 4. Maintenance Activities (62703)

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 reviewed and witnessed in whole or in part:

WR 52049J	Replace CRD Breaker CB-2
WR 99938	Exempt Change to Route KM from 1XS2 to 1X0
WR 33203	Replace Transfer Switch between Auxiliary and Normal Power Supply
WR 33485	Troubleshoot Sullair Primary Instrument Air Compressor

Within the areas reviewed, licensee activities were satisfactory.

No violations or deviations were identified.

## 5. Spent Fuel Transfer Cask Inspection (55050)

On May 29, 1991, the inspector met with licensee representatives to review the status of a spent fuel canister which was rejected by the licensee. It was rejected during receipt inspection due to code rejectable lack of fusion (LOF) indications depicted in vendor supplied radiographs. The canister in question (DSC-1) had been fabricated by Equipos Nucleares SA (ENSA), of Spain in accordance with ASME Code Section III, NC (83W85), see NRC Inspection Report Nos. 50-269,270,287/90-21, paragraph 5, for further details. Since the close of the inspection discussed in the referenced Inspection Report, the licensee met and discussed the problem with the vendor, re-radiographed the weld in question repeatedly in order to duplicate shooting techniques and film sensitivity and attempt to locate the rejectable indication. When none of these attempted was successful in locating the indication, the licensee performed a detailed review of the fabrication records and discovered that the weld in question, (LW-205-1), had been ground/dressed following radiography, to prepare it for surface examination. Therefore, on the basis of the on-site radiographs, and the recently discovered grinding records, the licensee concluded that the indications observed in the vendor radiographs were no longer there as they had been removed during the grinding of this weld. By memorandum, the licensee's Level III Examiner indicated the on site radiographs meet code requirements and do not show rejectable indications. The inspector reviewed the vendor and licensee produced radiographs, reviewed the vendor documents presented and concurred with the licensee's decision that the subject canister meets applicable code standards and is therefore acceptable for the application.

No violations or deviations were identified.

## 6. Inspection of Open Items (92700)(92701)(92702)

The following open items were reviewed using licensee reports, inspection, record review, and discussions with licensee personnel, as appropriate:

(Closed) Violation 50-269,270,287/89-05-02: Failure to follow Procedures Due to Inadequacies in CMD Training and Qualifications. The inspector reviewed the licensee response dated April 13, 1989, and supplemental response dated October 2, 1990. The licensee is scheduled to complete the training and qualification of Construction Maintenance Division personnel performing Nuclear Modification Work in December 1992. Based on the scheduled completion date, this item is closed.

## 7. Exit Interview (30703)

The inspection scope and findings were summarized on July 3, 1991, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection.

<u>Item Number</u>	<u>Description/Reference Paragraph</u>
50-270/91-12-01	Violation - Inoperable Flow Instrument, paragraph 2.d.
50-287/91-12-02	Violation - Failure to Follow Procedure, paragraph 2.e.