



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

Report Nos.: 50-269/93-21, 50-270/93-21 and 50-287/93-21

Licensee: Duke Power Company  
 422 South Church Street  
 Charlotte, NC 28242-0001

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: June 27 - July 24, 1993

Inspector: RAW  
 for P. E. Harmon, Senior Resident Inspector

August 17, '93  
 Date Signed

for RAW  
 for B. B. Desai, Resident Inspector

August 17, '93  
 Date Signed

for RAW  
 for W. K. Poertner, Resident Inspector

August 17, '93  
 Date Signed

Approved by: M. S. Lesser  
 M. S. Lesser, Section Chief

8/17/93  
 Date Signed

SUMMARY

Scope: This resident inspection was conducted in the areas of plant operations, surveillance testing, maintenance activities, Keowee issues, inspection of open items, and review of licensee event reports.

Results: One violation was identified involving an inadequate modification procedure. The installation instructions and post modification testing were inadequate and allowed valve 2RC-4 to be rewired with the open indication light in the safe shutdown facility disconnected. The modification was implemented in 1990.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*H. Barron, Station Manager
- S. Benesole, Safety Review Manager
- \*K. Chea, Instrument and Electrical Section Manager
- D. Coyle, Systems Engineering Manager
- \*J. Davis, Safety Assurance Manager
- T. Coutu, Operations Support Manager
- B. Dolan, Manager, Mechanical/Nuclear Engineering
- W. Foster, Superintendent, Mechanical Maintenance
- J. Hampton, Vice President, Oconee Site
- D. Hubbard, Component Engineering Manager
- \*H. Lefkowitz, System Engineer
- C. Little, Superintendent, Instrument and Electrical (I&E)
- M. Patrick, Regulatory Compliance Manager
- B. Peele, Engineering Manager
- \*S. Perry, Regulatory Compliance
- \*G. Ridgeway, Operations
- \*K. Rohde, Electrical Engineer
- G. Rothenberger, Operations Superintendent
- R. Sweigart, Work Control Superintendent

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

#### NRC Resident Inspectors

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

#### NRC Personnel

- W. Miller

\*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, the 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 engineering personnel.

Activities within the control rooms were monitored on an almost daily basis. Inspections were conducted on day and night shifts, during weekdays and on weekends. Inspectors attended some shift changes to evaluate shift turnover performance. Actions observed were conducted as required by the licensee's Administrative Procedures. The number of licensed personnel on each shift inspected met or surpassed 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. During the plant tours, ongoing activities, housekeeping, security, equipment status, and radiation control practices were observed

b. Plant Status

Unit 1 operated at power during the entire reporting period.

Unit 2 commenced the reporting period in a power escalation from a scheduled refueling outage and operated at power during the remainder of the reporting period.

Unit 3 operated at power during the entire reporting period.

c. Unit 2 Loss of Seal Injection

On June 30, 1993, at approximately 10:30 a.m., the Unit 2 control room operator received a call from maintenance personnel indicating that the packing gland stud for valve 2HP-64, reactor coolant pump 2A1 seal injection throttle valve, had broken during maintenance activities to adjust the packing gland. Approximately two minutes later the packing blew out of the valve, resulting in a contaminated seal injection system leak of approximately 25 gpm into the auxiliary building and a subsequent contamination of two workers in the area. The operators in the control room entered abnormal operating procedure AP/2/1700/14, Loss of Normal Makeup or Letdown. The operators isolated seal injection to all four reactor coolant pumps and secured and isolated high pressure injection (HPI) pump 2B to terminate the leakage. The RCS leak was effectively terminated at approximately 11:00 a.m. The licensee determined that approximately 550 gallons of water had spilled into the auxiliary building due to the packing leak from 2HP-64.

During the event the operators increased component cooling water flow to the reactor coolant pump seals and stationed an operator to monitor seal temperatures and flows until seal injection could be reestablished. Seal temperatures increased approximately 30 degrees and stabilized. The licensee replaced the broken packing gland stud and established normal reactor coolant pump seal injection at approximately 10:38 p.m.

The licensee made a four-hour nonemergency event notification to the NRC operations center at 12:58 p.m. The notification was made because the licensee started the 2A HPI pump prior to securing and isolating the 2B HPI pump. The licensee's initial interpretation was that a manual engineered safety features actuation had occurred when the second HPI pump was started. The licensee later determined that the event was not reportable and retracted the notification on July 20, 1993, after discussions with the NRC. The licensee plans to submit a special report describing the event and subsequent actions.

The licensee sent the failed studs to the materials lab for a failure analysis. Preliminary results indicate that the stud failure was induced by hydrogen embrittlement possibly caused by an inadequately heat-treated cadmium-plated stud. Additionally, there are indications that misalignment may result when the packing is tightened. The licensee is still reviewing this item and has initiated the problem investigation process to resolve and document the problem.

d. Unit 3 Low Pressure Service Water Pump Failure

On June 30, 1993, at 4:11 a.m., low pressure service water (LPSW) pump 3A tripped during normal operation while energized and supplying flow to the Unit 3 LPSW system. LPSW pump 3B was available for operation during this event. Concurrent with the trip at 4:11 a.m. several alarms were received in the Unit 3 control room and a momentary dimming of the control room lighting occurred. The control room operators observed that the LPSW header pressure low alarm was illuminated and that the 3A LPSW pump had tripped. The operators immediately started the 3B LPSW pump to restore flow and dispatched a non-licensed operator (NLO) to the turbine building to investigate the 3A LPSW pump trip. The NLO found the 3A LPSW pump motor discolored and the power leads separated from the motor. The NLO also found the pump motor breaker tripped from an instantaneous overcurrent on the X phase.

The licensee declared the 3A LPSW pump inoperable and commenced preparations to replace the pump motor with a spare motor. With the 3A LPSW pump inoperable the licensee entered a 24 hour limiting condition for operation (LCO). The licensee replaced the 3A LPSW pump motor and returned the pump to service at 11:46 p.m. the same day.

The licensee determined that the 3A LPSW pump failed because of pump motor winding insulation breakdown, which caused a short on the X phase motor winding. The 3A LPSW motor had been installed during initial plant construction and had not shown signs of excessive degradation or wear prior to failing.

e. Pressurizer Block Valve Open Indication not Available in the Safe Shutdown Facility.

On June 30, the licensee determined that valve 2RC-4, pressurizer relief block valve, had not been stroked from the safe shutdown facility (SSF) before Unit 2 was returned to operation from the scheduled refueling outage. PT/2/A/600/24, SSF Valve Control Transfer Verification, was performed prior to restart of the unit; however, the procedure step requiring that 2RC-4 be cycled from the SSF control room contains a caution statement that the step should not be performed if the pressurizer PORV is being utilized as the low temperature overpressure requirement. Based on this statement 2RC-4 was not cycled from the SSF control room. There was nothing in the procedure to ensure that valve 2RC-4 is stroked prior to startup.

While performing the PT on June 30 the operators noted that the open indication light for 2RC-4 was not illuminated when power was transferred to the SSF. 2RC-4 valve position indication at the SSF is available only when the valve is powered through the SSF control room. A work request was written to investigate why the valve open indication light was not illuminated. Subsequent to the restart of the unit the licensee determined that the valve open light was not wired. The valve had been rewired in 1990 for a torque switch bypass modification and the open indication had been inadvertently deleted.

The inspectors reviewed the modification package for the torque switch bypass modification and held discussions with design engineering. Procedure TN/2/A/2622/01/CL5, Torque Switch Bypass Modification for Valves 2HP-115, 2AS-102, 2MS-47, and 2RC-4, implemented the design modification that deleted the valve open indication in the SSF. The procedure was inadequate because the modification rewired valve 2RC-4 and deleted the valve open limit switch contacts without instruction to install the required jumper to provide indication in the safe shutdown facility. The engineering department was aware that jumper installation was required and the jumper was indicated on the wiring diagrams. However, the modification package did not contain instructions to install the jumper. The modification was implemented and tested in October 1990 and the post modification testing did not reveal that the valve was wired incorrectly. The inspectors concluded that multiple opportunities existed to either prevent or detect the modification error. The failure to provide adequate instructions to perform the torque switch bypass modification on valve 2RC-4 is identified as Violation 270/93-21-01: Inadequate Modification Procedure.

The licensee evaluated the operability of valve 2RC-4 with the open indication light not wired and determined that the valve could still perform its intended function. The licensee is developing a procedure for installing the required electrical jumper and cycling the valve from the SSF control room. The licensee has initiated the problem investigation process and plans

to revise PT/2/600/24 to require that valve 2RC-4 be operated from the SSF control room every refueling outage.

One violation was identified.

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 if required, handling of deficiencies noted, and review of completed work. The inspectors witnessed the tests, in whole or in part, to verify 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.

- a. MP/1/A/2000/33, Unit 1 Electro Mechanical Relay ACB Trip test. This procedure prescribes a quarterly test on the electro mechanical trip circuitry for Keowee Unit 1 air circuit breakers (ACBs) 1 and 3. The inspectors reviewed the completed procedure and verified that the acceptance criteria were met.
- b. PT/0/A/0400/05, SSF Auxiliary Service Water Pump Test. This quarterly pump test is required by ASME Section XI and Technical Specification 4.20.1. The inspectors witnessed the test performance and verified that the acceptance criteria were met and were in accordance with the licensee's inservice inspection program.

No violations or deviations were identified.

4. Maintenance Activities (62703)

Maintenance activities were observed and/or reviewed during the reporting period to verify that (1) work was performed by qualified personnel, and (2) approved procedures adequately described work that was not within the skill of the trade. Activities, procedures, and work requests were examined to verify that proper authorization to begin work was given, provisions for fire were made, cleanliness was maintained, exposure was controlled, equipment was properly returned to service, and limiting conditions for operation were met.

WR 38915C, Replace 3A LPSW Pump Motor. The inspectors monitored work activities in progress and reviewed the post maintenance testing performed prior to returning the pump to service. The work activities were conducted proficiently and expeditiously.

No violations or deviations were identified.

5. Keowee Issues

The inspector verified that procedural guidance was available for operators at the Keowee Hydro Station covering emergency and off-normal situations. Written procedures for abnormal station operations were not available during the loss of offsite power event of October 19, 1992.

Abnormal Procedure AP/O/A/2000/001, Keowee Station Natural Disasters, issued January 30, 1990, covers tornados and flooding. This procedure was the only emergency or abnormal procedure available at the time of the event.

Abnormal Procedure AP/O/2000/002, Keowee Station Emergency Start, issued February 23, 1993, covers emergency starts, abnormal alignments, and failures of the Keowee station to provide emergency power as designed. This guidance includes verification of proper operation and alignments, actions to manually align and start equipment, and notification to the Oconee control room and Keowee technicians if actions taken are unsuccessful. Included in this procedure are instructions for the Oconee control room to dispatch an Oconee operator to the Keowee station to align the "Local-Remote" switch on the Keowee panel to "Remote" if the Keowee operator is unable to start the Keowee units during emergency situations. Transferring the controls to Remote allows operators to manually start the Keowee units from the Oconee control room.

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

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

- a. (Closed) Violation 269/92-23-01: Containment Isolation Valve Found Open. The licensee responded to this violation by letter dated November 18, 1992. Licensee Event Report (LER) 269/92-13 was also submitted to the NRC. The inspector reviewed the corrective actions stated in the LER as well as the violation response. Based on the inspector's review of the actions pertaining to LER 269/92-13 as described in paragraph 7.a of this report, this item is closed.
- b. (Closed) Unresolved Item 269,270,287/92-23-02: Keowee Single Failure Criteria. This item addressed single failure requirements for the Keowee emergency power sources and power paths. The electrical distribution system functional inspection (EDSFI) reviewed the operation and single failure requirements for the Keowee units and emergency power paths. Based on the EDSFI review the inspectors consider this item closed.

7. Review of Licensee Event Reports (92700)

The Licensee Event Reports (LERs) listed in this section were reviewed to determine if the information provided met NRC requirements. The inspector considered the adequacy of description, compliance with Technical Specification and regulatory requirements, corrective actions

taken, existence of potential generic problems, reporting requirements satisfied, and the relative safety significance of each event. The following LERs were reviewed:

- a. (Closed) LER 269/92-13, Technical Specification Violation Due to Lack of Containment Integrity Resulting From A Defective Procedure. Containment isolation valve 1N-107 was discovered in the open position on September 8, 1992. The valve was immediately returned to its closed position as required. The valve had been in the open position since June 1992. A defective procedure was identified as the root cause of the valve being in an abnormal position. The inspectors verified that the following corrective actions were taken to prevent recurrence:
- OP/1/A/1103/02, RCS Filling and Venting, was revised to require the valve to be verified closed.
  - OP/1/A/1102/01, Controlling Procedure for Unit Startup, was revised to prescribe the performance of the containment integrity checklist after procedures that affect manual containment isolation valves have been completed.
- b. (Closed) LER 269/92-04, Reactor Trip Results From Low Main Feedwater Pump Discharge Pressure Due to Management Deficiency. The reactor trip that occurred on May 8, 1992, was caused by less-than-adequate training and lack of a task specific procedure. The inspectors verified the following corrective actions to prevent recurrence:
- OP/1/A/1106/02, Condensate and Feedwater System, was revised to include guidance on reducing Hotwell level.
  - The Alarm response Manual for Hotwell Level Emergency High Statalarm (ISA6/C-12) was revised to refer to OP/1/A/1106/02.
  - The lesson plan for the condensate and feedwater system was revised to include training on hotwell oscillations.
- c. (Closed) LER 269/92-08, Equipment Failure and Inappropriate Action Result in the Concurrent Inoperability of Both Onsite Emergency Power Sources and a Technical Specification Violation. This event occurred on July 17, 1992. Keowee Unit 1 was out of service for planned maintenance and Keowee Unit 2 was deemed to be inoperable when a blown fuse associated with ACB 8 was discovered. Following the discovery of the inoperability of both Keowee units the Standby buses were not energized by Lee Gas Turbines within 1 hour as required by TS.

The blown fuse was eventually replaced and Keowee Unit 2 was declared operable. The root causes associated with this event were classified as Equipment Failure and Inappropriate Action.



The inspectors verified the following corrective actions associated with this event.

- Keowee's breaker status checklist was revised to include additional breaker and indicator status for each breaker.
- OP/O/A/1107/03 was revised to include notification to Lee Steam Station of the time the gas turbines are required to be in service; a notification step also was included earlier in the procedure.
- Training was given to Lee Steam Station personnel concerning initiating a start of the second gas turbine if the primary turbine does not start or trips after initial start.
- A rounds and turnover procedure was initiated to enhance monitoring of Keowee Hydro equipment.
- Training was given to Keowee personnel on the new Keowee procedures, checklists, and the time constraints of Technical Specifications.
- A root cause analysis was performed on the failed fuse. Though the results were not conclusive, the licensee decided to phase out this type of fuse. No target date has been established.
- The inspectors reviewed PIP 92-293, which is investigating the possibility of modifying the circuit associated with breaker indication.

#### 8. Exit Interview

The inspection scope and findings were summarized on July 27, 1993, 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>
Violation 270/93-21-01	Inadequate Modification Procedure (Paragraph 2.e).