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

Report Nos.: 50-269/88-12, 50-270/88-12, 50-287/88-12

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

Docket Nos.: 50-269, 50-270, 50-287 License Nos.: DPR-38, DPR-47, DPR-55

Facility Name: Oconee Nuclear Station

Inspection Conducted: April 19 - May 16, 1988

Inspectors: LDWert (for) 1 June 1988
P. H. Skinner, Senior Resident Inspector Date Signed

LDWert 1 June 1988
L. D. Wert, Resident Inspector Date Signed

Approved by: TAPeebles 6-1-88
T. A. Peebles, Section Chief Date Signed
Division of Reactor Projects

SUMMARY

Scope: This routine inspection involved resident inspection on-site in the areas of operations, surveillance, maintenance, physical security, radiation protection, engineered safeguards features lineups, nonroutine reporting, and B&W Owners Group Plant Reassessment Program.

Results: Of the eight areas inspected, no violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*M. Tuckman, Station Manager
J. Davis, Technical Services Superintendent
W. Foster, Maintenance Superintendent
T. Glenn, Instrument and Electrical Support Engineer
*C. Harlin, Compliance Engineer
D. Hubbard, Performance Engineer
J. McIntosh, Administrative Services Superintendent
*B. Millsaps, Maintenance Service Engineer
*F. Owens, Assistant Engineer, Compliance
P. Street, Mechanical Technical Support Engineer
*R. Sweigart, Operations Superintendent
L. Wilkie, Integrated Scheduling Superintendent

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

NRC Resident Inspectors

*P. H. Skinner
L. D. Wert

*Attended exit interview.

2. Exit Interview

The inspection scope and findings were summarized on May 16, 1988, with those persons indicated in paragraph 1 above.

The inspectors described the areas inspected and discussed in detail the inspection findings listed below. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

Item Number	Status	Description/Reference Paragraph
269/85-21-01	Closed	Violation for Failure to Follow Procedure
269,270,287/85-21-03	Closed	Violation for Failure to Provide an Adequate Procedure

269,270,287/88-12-01	Closed	Licensee Identified Violation Potential Loss of All AC Power Due to Switchyard Modification
269,270,287/88-12-02	Open	Inspector Followup Item: Corrective Actions to Preclude Late Submittal of Reports
270/88-12-03	Open	Inspector Followup Item: Management review of Communications Interface Between Performance and Operations During Testing
LER 269/87-02	Closed	Appendix R Review With Respect to Valve Operability
LER 270/82-10	Closed	Stuck Suction Relief Valve on Main Feedwater Pump After a Reactor Trip
LER 270/87-06	Closed	TS 3.3.6 Violation Due to Management Deficiency

3. Licensee Action on Previous Enforcement Matters

   a. (Closed) Violation (50-269/85-21-01): Failure to Follow Procedure on Classification of Work Requests. The licensee responded to this violation in correspondence dated October 11, 1985. The inspector has reviewed this information and the corrective actions addressed and based on this review, this item is closed.

   b. (Closed) Violation (50-269,270,287/85-21-03): Inadequacies in Development and Implementation of Procedure MP/0/A/2001/4, CRD Breaker Inspection and Maintenance. The licensee addressed this violation in correspondence dated October 11, 1985. Based on this action, this item is closed.

4. Plant Operations (71707)

   a. 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, Unit 2 refueling 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 during the day, night shifts, 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
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, 2, and 3 Penetration Rooms
Unit 2 Containment
Condenser Circulating Water Intake Structure

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

Unit 1 - Unit 1 has continuously operated during this reporting period at 100% power. As of May 16, the unit has operated continuously for 185 days without a shutdown.

Unit 2 - Unit 2 commenced this reporting period at approximately 30% power recovering from a generator runback caused by a faulty temperature sensing device. The device was repaired and the unit reached 100% on April 19 and has remained there except for a 5 hour period on April 26 to correct a feedwater heater tube leak on 2A2 heater, for the remainder of the reporting period.

Unit 3 - Unit 3 commenced the report period in an outage caused by a steam generator tube leak. Steam generator tube leakage repairs were completed May 2 and return to power operations commenced. On May 4, a primary leak occurred which forced the plant to return to a cold condition to make repairs (see paragraph 4.c.). The plant returned to normal operating pressure and temperature on May 8, but experienced problems with the electrical system on the main generator. On May 10, the plant had been returned to 100% power.

b. Unusual Event On Unit 3 Due To SG Tube Leak

On April 17, 1988, at approximately 3:15 p.m., the condenser air ejector exhaust radiation monitor (RIA-40) began increasing steadily from about 280,000 cpm. Investigation identified that a primary to

secondary leak of approximately 1.3 gpm in the steam generators had developed. By 10:00 p.m., RIA-40 had increased to 900,000 cpm and operators began shutting down the unit. At 1:15 a.m. on April 18, an Unusual Event was declared and a cooldown of the unit to cold shutdown conditions was commenced to isolate the leak and perform effective repairs. The leak was localized to the 'A' steam generator and the cooldown was conducted using the 'B' steam generator. Upon obtaining cold shutdown conditions at 4:40 p.m. the Unusual Event was terminated. The licensee performed an extensive inspection of the steam generator tubes in both steam generators as discussed in TS 4.17.4.d. A total of 3974 tubes were inspected in the 'A' SG and 3740 tubes inspected in the 'B' SG. Two leaking tubes were identified in the 'A' SG and none in the 'B' SG. As a result of the eddy current testing, a total of 27 tubes in the 'A' steam generator were plugged and 23 tubes plugged in the 'B' generator. Steam generator work was completed on May 2 and the unit commenced recovery from the outage.

c. Unusual Event On Unit 3 Due To Seal Injection Leak

On May 4, with the plant at 2200 psig and 480 degrees F, the licensee was conducting PT/0/A/200/46, Reactor Coolant System Leak Test. During the visual inspection a leak was reported on the seal injection piping to the mechanical seal on reactor coolant pump 3B1. After further investigation, the leak appeared to be on the seal 'C' (1st stage) which is in an unisolable section of piping. Based on this observation an Unusual Event was declared on May 5 at 0008 and the required notifications were made. Rough calculations performed during the cooldown to cold conditions indicated a leak on the order of 0.1 gpm. The licensee decided to attempt to stop the leak using the weld overlay method developed by NUTECH and used in early 1987 on Units 2 and 3 to repair leaks in the reactor vessel level indicating system. This method was attempted but did not work due to the pressure build up in the system piping in the area of the weld repair. When the personnel went into the area to make the repair, they identified that the leak was actually on the line associated with the 2nd stage seal. The initial investigation had identified the incorrect pipe due to the large quantity of pipes in this area. Had the location initially been correctly identified, the plant would probably not have declared a Unusual Event. As a result of the inability to stop the leak using the overlay method with pressure in the piping, the unit was cooled down, depressurized and placed in decay heat removal cooling mode. The Unusual Event was terminated on May 6 at 0745. The leak was repaired on May 6 at 0300 and the unit returned to critical operation on May 8 at 3:20 p.m.

d. A recent review by the licensee identified that 10 of the last 17 reports required by TS 4.17.6.a and 4.17.6.b were not submitted within the time requirements specified by TS. In addition the report required by TS 4.4.2 concerning tendon surveillance dated March 29, 1988, was also submitted after the required due date specified. The

licensee has identified both of these problems in problem investigation reports 4-088-0009 and 3-088-0083 respectively. The licensee has investigated this area and developed corrective action to correct this problem. The inspector is identifying this as an Inspector Followup Item 269,270,287/88-12-02: Corrective Actions to Preclude Late Submittal of Required TS Reports, pending implementation and subsequent review of future submittals.

No violations or deviations were identified.

5. Surveillance Testing (61726)

a. 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/or witnessed in whole or in part:

PT/3/A/0600/12	Turbine Driven Emergency Feedwater Pump Performance Test
PT/0/A/0400/11	Safe Shutdown Facility (SSF) Diesel Generator Performance Test
PT/0/A/600/23	SSF Fuel Oil Inventory

b. Condenser Discharge Valve (2CCW-21)

During the most recent refueling outage on Unit 2, the inspectors observed portions of PT/2/A/0261/006 (Condenser Circulating Water (CCW) System Gravity and Recirculation Flow Test). During the test one of the condenser discharge valves (2CCW-21) failed to shut automatically as required by the test. Additionally, an operator was unable to shut the valve from a remote station above the valve. Testing was stopped, a work request written (WR 14246C) and the valve was repaired. Subsequently the CCW gravity flow test was satisfactorily completed and 2CCW-21 functioned as required. A review of the completed work request indicated that components were replaced only in the "open" circuit of the valve and these components would have no effect on the valves ability to shut. 2CCW-21 is a air operated, 78 inch diameter butterfly valve located in the condenser discharge piping between the condenser outlet and the concrete floor of the turbine building. At certain lake elevations (greater than approximately 791 feet) the failure of this valve to shut on a CCW piping rupture could cause flooding of the turbine building through backflow of the lakewater. Although various modifications have been

completed to lessen the severity of this casualty should it occur, (for example; a drain out of the turbine building basement and watertight doors between the auxiliary building and the basement) the Oconee Probabilistic Risk Assessment still considers flooding of the turbine building from CCW system a very significant contribution to core melt frequency.

After the inspector discussed his finding an initial investigation by Instrument and Electrical (I&E) Engineers supported the inspectors concerns that the maintenance performed on the valve as detailed in the work request would not address the valve's failure to automatically shut. Automatic and remote cycling of the valve is accomplished by operation of dual solenoid valves which act to port air to/from the piston of the valve. At the CCW valve itself, the air system can be manually operated to shut the valve but in the case of a ruptured CCW pipe this option may not be available. The inspectors requested that the licensee look into the repairs of 2CCW-21 and also examine the history of all of the condenser discharge valves for other instances of failure to automatically shut.

Additional investigation by I&E personnel identified that the limit switch replaced was the "open" limit switch which is in the close circuit rather than the limit switch in the open circuit. Further review by I&E indicated no history of failure of this valve and other condenser discharge valves.

c. Operator and Performance Engineer Interface During Conduct of Test

During observation of portions of PT/3/A/0600/12 (Turbine Driven Emergency Feedwater Pump (TDEFWP) Performance Testing) the inspector observed that the testing was not completed with strict adherence to the procedure. Specifically, a precaution which stated that a Nuclear Equipment Operator (NEO) should be stationed at the pump to "continuously monitor the TDEFWP while it is running and ensure adequate suction pressure is maintained to the pump at all times" was not followed. While the NEO did continuously monitor the TDEFWP while it was operating, he was not aware of the requirement to monitor suction pressure. He did not know the location of the suction pressure gage and was unsure what suction pressure values were "adequate". The NEO stated he had not reviewed the performance procedure. There is no indication of pump suction pressure in the control room. The inspector informed the NEO of the suction pressure gage location and the requirement to monitor suction pressure. A specific requirement for a minimum suction pressure is provided in the procedure. A performance engineer, responsible for the test coordination, was aware of the gage location and the pressure specified in the procedure since he maintained the controlled copy of the test. However, the engineer was not in the immediate vicinity of the pump as it was operated. The operating requirements of the performance test was not communicated to the NEO by the performance

engineer nor by the onshift reactor operator. The unit supervisor was made aware of this problem and also this problem was discussed with other licensee management. The licensee is going to review this interface area to determine if a communication problem exists and if NEO's are being provided adequate guidance when performing equipment operation in support of the performance engineering effort. Pending completion of this review and action taken, if required, this item is identified as an Inspector Followup Item (IFI) 269,270,287/88-12-03: Management Review of Communications Interface Between Performance Engineering and Operation During Performance of Testing.

No violations or deviations were identified.

6. Maintenance Activities (62703)

a. 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/or witnessed in whole or in part:

WR 15094C Investigate Torque Switch Setting LP-20
WR 14246C 2CCW-21 Repairs
WR 51629G 2CF-1 Limitorque Repairs

b. Emergency Power Switching Logic Malfunctions

In late 1987, Duke Power Company decided that due to increases in present generation capacity and for future increases due to projects in progress, modifications to the 230kv switchyard were required. Nuclear Station Modification (NSM) ON-22637, 230kv Switchyard Circuit Breaker Replacement, was developed to replace the power circuit breakers (PCB) and various associated relaying with larger capacity PCB's. This NSM is in the process of being performed at this time. Since the PCB's have a higher interrupting capability, larger capacitance is provided to suppress the voltage gradient across the contacts during breaker operation. On March 28, 1988, while performing a surveillance test on the Keowee Emergency Start System per PT/2/A/0610/01J, the unit experienced a CT-2 (Startup Transformer) lock-out from a transformer differential phase relay. The cause of the lockout could not be determined and an investigation was performed with the assistance of the design engineering group. On April 4, the design engineering group met with the operations staff and identified that due to the higher value of capacitance on the new PCBs an induced resonance circuit had developed on the CT-2 circuit which under certain breaker alignments could result in a CT-2

lockout condition. The design personnel also provided recommendations for operations under these specific circumstances if they occurred. Design was requested at this time to do further studies on this problem. On April 26, design engineering as a result of additional studies, identified that Unit 2 could experience a failure where emergency power would not be automatically provided to the Unit 2 loads as described in the FSAR. The licensee immediately took action to place Unit 2 on Unit 3's startup transformer since Unit 3 was already shut down to cold conditions, and placed Unit 3 power on the Lee Station 100kv power source. The licensee also made notifications as required by 10 CFR 50.72. At approximately 1:30 p.m. on April 27, a conference call was held between NRR (Helen Pastis, Carl Shulton, Dave Matthews), Region II (Brian Bonser), DPC Corporate Engineering (Bob Dobson, Jim Stoner, Paul Guill), Oconee station Management and the resident inspector to discuss facts associated with this event. Duke provided NRC a draft memo detailing the information discussed in this conference call dated April 28, 1988. The licensee identified that as a result of the resonance problem the voltage induced on the low voltage side of the startup transformer is of a sufficient magnitude to exceed the pickup setting of the Emergency Power Switching Logic (EPSL) voltage sensing relay. This would result in the EPSL system falsely sensing that the transformer is available for use and would prevent the automatic transfer to the standby power source which would be available for use if an emergency were to occur. The only situations in which this condition would exist would be if the PCB's are open and all disconnect switches associated with the startup transformer and the PCB's are closed or when a transformer differential lockout existed that was not a sustained fault to ground or was spurious in nature coincident with a loss of off-site power to that unit. This item is being identified as a Licensee Identified Violation (LIV) 270/88-12-01: Potential Complete Loss of All AC Power Due to 230kv Switchyard Modifications. This is identified as a LIV as discussed in 10 CFR 2, Appendix C due to the facts that it meets all the following criteria:

(1) it was identified by the licensee

(2) it fits a Severity Level IV or V violation category because of the low probability of all conditions occurring simultaneously

(3) it was reported, as required

(4) it has been corrected and measures to prevent recurrence are being taken

(5) it was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action to a previous violation.

No violations or deviations were identified.

7. Resident Inspector Safeguards Inspection (71881)

In the course of the monthly activities, the Resident Inspectors included review of portions of the licensee's physical security activities. The performance of various shifts of the security force was observed in the conduct of daily activities which included; protected and vital areas access controls, searching of personnel, packages and vehicles, badge issuance and retrieval, escorting of visitors, patrols and compensatory posts. In addition, the inspectors observed protected area lighting and protected and vital areas barrier integrity, and verified interfaces between the security organization and operations or maintenance.

No violations or deviations were identified.

8. Inspection of Open Items (92701)

The following open items are being closed based on review of licensee reports, inspection, record review, and discussions with licensee personnel, as appropriate:

(Closed) LER 269/87-02: Appendix R Review With Respect to Valve Operability. The licensee has completed all corrective actions specified in this report. The inspector verified the action to be complete and that it met the commitment identified in the report. Based on this review, this item is closed.

(Closed) LER 270/82-10: Stuck Suction Valve On The 2B MFP After A Reactor Trip. Nuclear Station Modification 1584 has been completed on all Units. Based on this action, this item is closed.

(Closed) LER 270/87-06: TS 3.3.6 Violation Due To A Management Deficiency. The licensee's program in response to IE Bulletin (IEB) 85-03 covers the problem areas addressed in this LER. The program for IEB 85-03 is implemented and has not identified similar problems of this nature. Based on this review this item is closed.

9. Babcock and Wilcox Owners Group Plant Reassessment Program

In January 1986, NRR requested the Babcock and Wilcox Owners Group (BWOG) to assume a leadership role in accomplishing key aspects of the overall effort required for the reassessment of all B&W plants. The BWOG committed to take the lead in a planned effort to define concerns relative to reducing the frequency of reactor trips and the complexity of post-trip response in B&W plants. The BWOG issued BAW-1919, "Trip Reduction and Transient Response Improvements Program" including 5 revisions as of July 1987. The NRC has reviewed BAW-1919 and its revisions and has issued a Safety Evaluation Report (SER) (NUREG-1231) and Supplement 1 to NUREG-1231. Table 12.1 of the NUREG list 207 recommendations that were developed by the BWOG for implementation considerations at each of the B&W

utilities. These recommendations comprise the BWOG Safety and Performance Improvement Program (SPIP) which has goals by the end of 1990, to reduce the average trip frequency per plant to less than two per year and also that the number of complex transients will be reduced to 0.1 per plant per year based on a moving 3-year average. Attachment 1 to this report shows the actions taken on various of these recommendations. See inspection report 269,270,287/87-55 for additional actions taken to date.

Attachment:
Safety and Performance Improvement
Program Recommendations

ATTACHMENT

SAFETY AND PERFORMANCE IMPROVEMENT PROGRAM RECOMMENDATIONS

Recommendation Number	Subject	Remarks
TR-009-ICS	Improvements in ICS tune control circuit	Complete
TR-040-ADM	Use the TA Committee's Trip Investigation Root Cause Determination Program	Complete
TR-112-PES	Review Switchyard maintenance procedures to ensure there is no mechanism for loss of offsite power	Complete
TR-113-PES	Review breaker control power distribution to determine effects of a loss of battery bus	Complete
TR-116-PES	Review DC charging system and ensure the charging voltage does not exceed plant equipment voltage ratings	Complete
TR-117-PES	Modify inverter overcurrent protection to ensure the breakers/fuses open on overcurrent before inverter fail	Complete
TR-118-PES	Evaluate loadings on AC and DC vital buses to ensure adequate margins exist without trip of equipment	Complete
TR-184-ICS	Provide separate fuses for hand stations that use AC power	*Not Applicable
TR-185-ICS	Power feedwater flow recorders directly from NNI	*Not Applicable
TR-188-ICS	Maintain DC power supply current balance and perform a periodic full load test for each power supply	*Not Applicable
TR-189-ICS	Set selector switches to select maximum NNI dependence	*Not Applicable

TR-190-ICS	Develop backup controls for pressurizer level and pressure control	*Not Applicable
TR-193-ICS	Review/test pressurizer heater low - low level interlock logic	*Not Applicable
TR-194-ICS	Buffer hand powered indicators and recorder inputs from automatic power signals	Rejected
TR-195-ICS	Supply hand and automatic powered circuit from separate panels	Rejected
TR-196-ICS	Set pressurizer level signal select relays to automatic powered transmitters	Rejected
TR-197-ICS	Provide automatic power transfer for the modulating pressurizer heater converters	Rejected
TR-198-ICS	Automatic selection of auto powered sensor on loss of hand power	Rejected
TR-203-PES	Establish preventive maintenance to increase reliability of inverters	Complete
TR-204-ICS	Eliminate or reduce automatic ICS runback rate on asymmetric rod conditions	Rejected

*per DPC analysis