



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

Report Nos.: 50-269/91-18, 50-270/91-18 and 50-287/91-18

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: July 28 - August 24, 1991

Inspector:	<u>W. H. Miller, Jr.</u>	<u>9-17-91</u>
	P. E. Harmon, Senior Resident Inspector	Date Signed
	<u>W. H. Miller, Jr.</u>	<u>9-17-91</u>
	B. B. Desai, Resident Inspector	Date Signed
	<u>W. H. Miller, Jr.</u>	<u>9-17-91</u>
	W. K. Poertner, Resident Inspector	Date Signed
Approved by:	<u>Alan R. Hertz</u>	<u>9-17-91</u>
	G. A. Bellisle, Section Chief	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine, resident inspection was conducted on-site in the areas of operations, surveillance testing, maintenance activities, refueling activities, and review of Licensee Event Reports.

Results: Two violations were identified. The first violation involved a failure to follow procedure resulting in a spent fuel assembly being mispositioned in the spent fuel pool and is considered a repeat violation, paragraph 2.d. The second violation involved a failure to follow procedure resulting in the loss of both source range nuclear instruments for a period of approximately five minutes while the unit was in cold shutdown, paragraph 4.b.

One unresolved item was identified involving the control of outage activities, paragraph 2.c.

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
- Unit 1 Containment
- 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.

b. Plant Status

Unit 1 operated at power until the generator was taken off line for a scheduled End of Cycle (EOC) 13 refueling outage on August 1, 1991, at 10:16 a.m. The outage is currently scheduled to last 55 days.

Unit 2 operated at power for the entire reporting period.

Unit 3 operated at power for the entire reporting period.

c. Unit 1 Mid-loop Operations

The inspectors reviewed the licensee's actions with regard to reducing RCS level to mid-loop operations. The licensee's requirements for mid-loop operation are contained in Operating Procedure (OP) 1/A/1103/11, Draining and Nitrogen Purging of the RC System.

The procedure requires, in part, that the following items be implemented prior to reducing RCS level below fifty inches as indicated on reactor vessel level indicator LT-5:

- A containment closure survey to: identify containment penetrations that would need to be closed in the event of a loss of decay heat removal capability; and to ensure that containment closure can be achieved within 2.5 hours.
- Two independent RCS temperature indicators and alarms.
- Reactor vessel level indicator LT-5 operable and calibrated.
- Ultrasonic level instruments operable.
- Two LPI pumps operable.
- Both main feeder buses energized with two sources of electrical power are required to be available to supply the main feeder buses.
- Two means available of adding inventory to the RCS.
- Both steam generator upper primary side handhole covers removed to provide a vent path.
- Review of maintenance and testing activities to ensure no adverse effects on systems and components required for decay heat removal.

The inspectors reviewed and witnessed the performance of portions of procedure OP/1/A/1103/11. During the RCS draindown to 14 inches on LT-5, a hydrostatic test (hydro) was commenced on a portion of the high pressure injection letdown line. The isolation boundary for the hydro resulted in only one isolation valve between the portion of the system being hydroed and the low pressure injection system which was in the decay heat removal mode of operation. The hydro was commenced at approximately 9:30 p.m. and at 10:30 p.m. the pump was stopped and a replacement pump installed because the hydro crew thought the pump was broken. The hydro was recommenced at approximately 11:00 p.m. and at approximately 1:15 a.m. the hydro was secured a second time because no pressure increase could be observed. Operations checked the hydro boundary valves and found HP-42 approximately 6 turns open. The valve was shut and an RCS boron sample was obtained. The boron sample indicated an RCS boron concentration of 2499 ppm boron. The operations shift initially believed that a boron reduction of 68 ppm had occurred during the hydro evolution; however, subsequent evaluation determined that only an 18 ppm dilution had occurred. The

licensee experienced a similar event during the last Unit 3 refueling outage and had revised the hydro procedure to require operations personnel permission prior to commencing a hydro. Operations personnel were aware that the hydro was in progress and that the possibility of deborating the RCS existed. The inspectors had questioned the licensee as to the good engineering practice of performing the evolutions in parallel prior to the RCS draindown and had been told that the hydro would have no effect on the draindown. As a result of this event, the licensee plans to: change the hydro procedure to require double verification of boundary valves; provide guidance on when pressure should begin increasing during a hydro; prohibit changing level in the RCS if the system being hydroed could deborate the RCS; and to add an enclosure that records pump run times along with the capacity of the pump so that volumetric calculations can be made.

This issue will be reviewed during a subsequent NRC inspection and is identified as Unresolved Item 269/91-18-03, Control of Outage Activities.

d. Unit 1 Refueling Activities

During the defueling of Unit 1, a spent fuel assembly was mispositioned in the spent fuel storage racks. Fuel assembly serial number 4MC was placed in rack location 65E instead of designated location 67E. After the licensee discovered the error, the assembly was placed in the proper location. The event occurred on August 12 at approximately 6:30 p.m. while operations personnel were transferring spent assemblies into the spent fuel pool using Refueling Procedure OP/1/A/1502/07. This procedure has detailed step by step instructions for loading each assembly into the designated storage position. Discovery of the misplaced assembly occurred when operators attempted to insert the assembly designated to be placed into position 65E and found that position already occupied by assembly 4MC. A separate spotter, used to ensure that the rack location is empty prior to the bridge operator lowering a fuel assembly into the rack, alerted the operator that the rack location was not empty.

This event is similar to an October 4, 1990, event described in NRC Inspection Report No. 50-269,270,287/90-30, during the refueling of Unit 2. In this instance a new fuel assembly was moved from the fuel storage area into the core and placed in the wrong core location. Again, the error was discovered when the assembly designated for the position could not be inserted. This event was identified as example A of Violation 270/90-30-04, Failure to Follow Procedures Results in Failure to Maintain Configuration Control.

Since this August 12 incident is essentially identical to the previously cited October 4, 1990, violation, certain aspects of the licensee's root cause determination and corrective action for the

first violation need to be addressed. Additionally, other factors under consideration to evaluate the similar violation are listed below:

- Pervasiveness of the problem - Several instances of failure to follow procedures recently, but not considered a pervasive problem at Oconee.
- Similarities in the violations - The two events are essentially identical.
- Adequacy of the past corrective actions, including implementation - Corrective actions applied for the first violation included hardware fixes to the bridge indexing system and improved lighting. These were not effective, primarily because the true root cause of the first violation was missed.
- Time since the past violation - Approximately nine months separated the two events. One intervening refueling outage on Unit 3 was accomplished without incident.
- Extent of prior notice given - Other than the NRC violation issued, no other similar findings were identified.
- Significance of the violations - Neither event had high safety significance. Separate processes prevent core loading with assemblies in the wrong position, and interlocks in the fuel handling equipment prevent damage to assemblies loaded on top of each other. The only significance of note is the fact that procedural steps were violated, and corrective actions were not effective to prevent recurrence.
- Whether past violations were included in escalated enforcement action - The previous violation was determined to be a severity level IV violation (Multiple examples).
- Adequacy of the corrective actions after the repeat violation was identified - The licensee has initiated an investigation with root cause determination, and has committed to implementing corrective actions prior to reload of Unit 1.

Failure to follow the specific requirements of operating procedure OP/1/A/1502/07 is identified as Violation 50-269/91-18-01: Failure to follow procedure. Based on the factors discussed above this violation is not being considered for escalated enforcement action.

e. Recirculating Cooling Water Cooler Leak

On August 16, 1991, at 2:00 a.m., it was determined by operations personnel that a Recirculating Cooling Water (RCW) cooler tube leak had occurred, and Calgon CS corrosion inhibitor containing sodium nitrite was being released to Lake Keowee via the Condenser Cooling Water (CCW) system that supplies cooling water to the RCW coolers. Chemistry personnel were notified and it was estimated that approximately 893 pounds of sodium nitrite was released. At the time of the event the D RCW cooler could not be secured because the Unit 1 CCW system was dewatered. This removed cooling water from the A and B RCW coolers and in this configuration the RCW system could not have removed the heat load with the D RCW cooler secured. The RCW system is not a technical specification required system; however, the system is required for operation of the units and supplies cooling water to the spent fuel pool coolers. A temporary modification was initiated to install temporary chilled water lines to the CCW side of the B RCW cooler to allow the B cooler to be returned to service. The D RCW cooler was secured and the tube leak repaired on August 17. The D RCW cooler was returned to service and the licensee plans to operate with chilled water supplied to the B RCW cooler until the Unit 1 CCW system is rewatered. Appropriate state and local agencies including the Department of Health and Human Services (DHEC) were contacted. The NRC was also notified pursuant to the requirements of 10 CFR 50.72.b.2.vi.

Within the areas inspected, one violation was identified as discussed in paragraph 2.d.

3. Surveillance Testing (61726)

a. General

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/1/A/400/13	I&C Battery Bank 1 Daily Surveillance.
TT/1/A/251/008	HPI Full Flow Check Valve Test.
IP/0/B/280/16	Turbine Overspeed Test.

b. HPI Full Flow Check Valve Test.

The inspectors reviewed and witnessed the performance of procedure TT/1/A/251/008, HPI Full Flow Check Valve Test. The purpose of this test procedure was to verify the proper operation of specific high pressure injection (HPI) and low pressure injection (LPI) check valves and to obtain flow, pressure, and temperature data for design engineering concerning operation of the HPI system in the injection and piggyback modes of operation. The test was complex and required increased operator attention and coordination. The operators performance during the test was exemplary and the test was completed without incident.

No violations or deviations were identified.

4. 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 witnessed in whole or in part:

WR 57107C	MP/0/A/2001/3C/AE Procedure for Checking Bus Bar Connections for ITE
WR 52090	Packing Replacement on 1FWD-84
WR 54010	Replace Handwheel on FWD 316, MP/0/A/1210/017 Operator Disassembly and Repair
WR 99628	Install Cabling and Control Cabinet for RBCU Performance Monitoring Instruments
WR 57666	PM on 1FWD-316
WR 57629	Perform PM on Breaker B2T-13
WR 50672	Disassemble, Inspect and Rebuild IMS-6

b. Loss of Source Range Nuclear Instrumentation

On August 6, 1991, during simultaneous performance of IP/0/A/0075/003, Bailey Meter Cabinet Module Inspection and Cleaning, and IP/0/A/305/3E, Calibration of Power Range Instrumentation on Unit 1, both source range nuclear instruments, NI-1 and NI-2, were inadvertently deenergized resulting in no excore neutron monitoring instrumentation for a period of approximately five minutes. During this time, Unit 1 was in cold shutdown with fuel in the core enroute to reactor vessel head detensioning.

To prevent saturation of source range detectors NI-1 and NI-2, the logic is designed such that at 10 percent power on either NI-5 and NI-8, or NI-6 and NI-7 power range instrumentation, the associated bistables trip and thereby cut off one power supply to both the source range NIs.

An investigation of the circumstances that led to the event revealed that calibration of RPS channel A by two I&E technicians was in progress per IP/O/A/305/3E. Performance of IP/O/A/0075/003 on RPS channel D was then initiated despite the prohibition in the Limits and Precautions of the procedure which stated that only one RPS channel be removed from service at a time. The first step in the procedure required a verification sign-off that only one RPS channel be removed from service at a time. This step was signed off and independently verified by another technician. Upon removal of RPS channel D from service, the source range bistable contacts associated with power range NI-8 opened. As part of the calibration procedure on channel A, power range NI-5 was simulated as seeing a neutron flux greater than 10 percent power. This resulted in the source range bistables associated with NI-5 opening. The requirements for isolating power to both NI-1 and NI-2 were met and Unit 1 was in a condition without excore nuclear monitoring instrumentation. A statalarm was received in the control room, the cause of the problem was recognized, and power was restored to the source range detectors within five minutes.

The inspectors learned about this incident during routine review of the Unit Supervisor's Logs. This incident was discussed with maintenance personnel, including the I&E Manager. The inspectors determined that the possibility of simultaneous performance of the above discussed maintenance activities was brought up during a planning meeting held that morning. The planners did not recognize the prohibitions imposed by the procedure nor did the planners recognize the possible consequences. In addition, the technicians performing IP/O/0075/003 had also discussed whether the requirement to verify that no other RPS channel was out of service was applicable in this particular case. The technicians knew that work was ongoing in RPS cabinet A which is located within a few feet of RPS cabinet D. At this point, instead of stopping their work and consulting a qualified supervisor as required by Station Directive 2.2.1, Station Procedures, the technicians signed off the step and proceeded with the procedure. The inspectors believe that the independent verification process should have prevented this from happening, in that, the independent verifier should have questioned the judgement of the other technician and not signed off in a perfunctory manner. The failure to meet the procedural requirements of IP/O/A/0075/003 during maintenance of RPS channels is identified as Violation 50-269/91-18-02: Failure to follow procedure resulting in the loss of both source range nuclear instruments.

Following the event, a Maintenance Incident Report (MIR) was written. An MIR is a lower tier mechanism in place to initiate investigation and corrective action to prevent reoccurrence of unacceptable maintenance related activities. The corrective actions taken through the MIR process included counseling of the technicians as well as discussion of the event with all crew members. The inspectors questioned whether a Problem Investigation Report (PIR), which is a higher tier mechanism to initiate investigation and corrective action pertaining to all plant activities, should have been initiated. The inspectors believe that the root cause analysis associated with this event, as well as the corrective actions performed via the MIR were shallow in nature. Following discussion with the licensee, the licensee initiated a formal indepth root cause analysis of this event.

Within this area, one violation was identified and is discussed in paragraph 4.b.

5. Inspection of Licensee Event Reports (92700)

The following licensee event report was reviewed to determine if the information provided met the NRC requirements:

(Closed) LA 269/91-06: Unit Trip for Unknown Reason, Possible Inappropriate Action. This item was addressed in NRC Inspection Report Nos. 50-269,270,287/91-11. The inspectors reviewed the licensee's response dated June 17, 1991. Based on this review, this item is closed.

6. Exit Interview (30703)

The inspection scope and findings were summarized on August 22, 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>
50-269/91-18-01	Violation - Failure to follow procedure - paragraph 2.d.
50-269/91-18-02	Violation - Failure to follow procedure resulting in the loss of both source range nuclear instruments - paragraph 4.b.
50-269/91-18-03	Unresolved Item - Control of outage activities - paragraph 2.c.