



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

Report Nos.: 50-269/91-11, 50-270/91-11, 50-287/91-11

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: April 28 - May 25, 1991

Inspector:	<u>W. K. Poertner</u>	<u>6/6/91</u>
	W. K. Poertner, Acting Senior Resident Inspector	Date Signed
	<u>B. B. Desai</u>	<u>6/6/91</u>
	B. B. Desai, Resident Inspector	Date Signed
	<u>S. Q. Ninh</u>	<u>6/6/91</u>
	S. Q. Ninh, Project Engineer	Date Signed
Approved by:	<u>G. A. Belisle</u>	<u>6/6/91</u>
	G. A. Belisle, 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, and review of open items.

Results: No violations or deviations were observed. One inspector followup was identified related to appropriate acceptance criteria on the "A" Low Pressure Injection (LPI) pumps, paragraph 3.b.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *H. Barron, Station Manager.
- *M. Carter, Design Site Office
 - 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:

- *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 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. These practices were acceptable.

b. Plant Status

Unit 1 operated at power until May 16 when it automatically tripped due to actuation of the Flux/Flow/Imbalance bistables. The unit was returned to power on May 17.

Unit 2 operated at power for the entire reporting period.

Unit 3 operated at 100 percent power until May 24, when power was decreased to 20 percent to work on the 3B1 RCP vibration probes. The unit returned to 100 percent power on May 25.

c. Improper Switchyard Relay Settings

The Unit 1 startup transformer CT-1 was declared inoperable at 6:00 p.m. on May 6, 1991, when technicians discovered an improperly adjusted zone fault relay setting. The relay setting could have initiated fault isolation of the transformer if a fault had occurred on the non-vital 230 KV red bus. The potential interaction of the vital startup transformer due to failures on the non-vital electrical distribution system caused operations personnel to declare the transformer inoperable. This placed Unit 1 in a 72 hour LCO per TS 3.7.2(i)(2).

The improper setting of the fault relay was caused by engineering personnel mis-reading a manufacturer's relay setting curve. The curve is actually a combined curve for two different relay types. One axis on the curve has two separate scales, depending on the relay type. The engineer selected the scale for one type and applied the setting determined from that scale to the other type.

As a result, the controlled relay setting document required adjustment of the applicable zone relay such that faults outside the protective zone could cause a trip and lockout of the transformer.

The relay setting verification program that identified this problem was part of a licensee-initiated program to assess the design and operability of the Oconee vital power distribution system. The effort began in August 1990, and is scheduled for completion in November 1991.

After finding the improper relay setting on the CT-1 transformer, the licensee decided to check relay settings for other 230 KV vital relays. At 1:57 p.m., on May 7, 1991, the entire 230 KV vital (yellow) bus was declared inoperable when another fault relay was found improperly adjusted. This relay and its setting were identical to the type for the CT-1 transformer. With the 230 KV vital yellow bus being declared inoperable, the licensee entered TS LCO 3.7.2(a)(1), a 72 hour LCO for Units 1, 2 and 3.

The corrective actions for the two improperly set relays included an intent change to the controlled document governing relay settings to allow the relays to be reset to the proper values. The controlled documents were revised and the relays reset to their proper values on May 7 and the respective LCOs exited at 5:40 p.m., May 7, 1991.

A Licensee Event Report (LER) has been initiated and the licensee is continuing the investigation of all safety-related relay settings. Followup on this issue will be accomplished via the licensee's LER.

d. Unit 1 Reactor Trip

At 3:07 p.m., on May 16, 1991, Unit 1 experienced an automatic reactor trip from 100 percent power. The automatic actuation of the four channels of the Reactor Protection System (RPS) and the subsequent reactor trip were caused when the RPS Flux/Flow/Imbalance bistables sensed low flow on the "B" Reactor Coolant System (RCS) loop. I&E personnel had completed Instrument Procedure IP/O/B/200/11, Reactor Coolant Flow Instrument Calibration, and were valving in the "E" Integrated Control System flow transmitter following calibration. During this process a pressure perturbation occurred within the flow instrument header which affected all four RPS channels. Post trip response was normal with the following exceptions:

- The Unit 1 events recorder was lost approximately ten seconds prior to the trip due to an apparent problem with the internal power supply.
- It appeared that the time required for the transfer from the normal to the startup transformer was longer than expected; however, no evidence of the slow transfer has been found.

Work requests to investigate the apparent slow transfer from the normal to the startup transformer as well as to investigate the failure of the events recorder were issued.

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. The licensee notified the NRC as required by 10 CFR 50.72(b)(2)(ii).

Unit 1 was returned to power operation on May 17, 1991.

No violations or deviations were identified.

3. 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 system restoration was completed.

Surveillances reviewed and witnessed in whole or in part:

PT/3/A/0203/06A	Low Pressure Injection Pump Test - Recirculation
PT/1/A/0150/22A	Operational Valve Stroke Test (Valves observed - 1LPSW-252, 1CCW-10, 1PR-59 and 1PR-60)
IP/0/A/0301/003S	Source Range and Instrument Range Channel Test - Unit 3
PT/2/A/0204/07	Reactor Building Spray Pump Test (Pump 2A)
IP/0/A/0310/014B	ES Analog On Line
IP/0/A/204/1B	RB Spray System Flow Instrument Calibration

b. Low Pressure Injection (LPI) Pump Testing

During observation of the performance of PT/3/A/0203/06A, LPI Pump Test - Recirculation, the inspector questioned the adequacy of the pump testing performed on the 3A LPI pump. The acceptance criteria specified an acceptable flow value of 800 to 2300 gpm with a pump developed head of 170 psig. ASME section XI requires an acceptance criteria of .93 to 1.02 times the reference value. Discussions with the licensee determined that the licensee's Inservice Test (IST) Program for testing the Units 1, 2, and 3 "A" LPI pumps only requires that the pumps be tested per section XI during cold shutdowns. During normal operation the IST program only requires that the pump flow and delta P be within plus or minus 10 percent of a point on

the pump head curve. The values recorded in the procedure met this acceptance criteria and were consistent with previous pump tests; however, the inspector expressed concern that the procedure, as written, would not detect pump degradation due to the excessive tolerance with respect to flow values. The licensee agreed to review the acceptance criteria specified in the performance test procedure to determine if tighter limits could be utilized. Review of the licensee's actions with regard to acceptance criteria on the "A" LPI pumps is identified as Inspector Follow-up Item 50-269, 270, 287/91-11-01.

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 51327K	Monitor 3B1 RCP Vibration Points 2 and 4
WR 99504C	Disconnect the Automatic Closing Function on the Auxiliary Power System 4160 V Switchgear normal Supply Breakers Per Engineering Instruction OE-3831
WR 32714C	Inspect and Repair Unit 3 Reactor Building Video Camera Which Will Not Focus
WR 52738	Ground on DID Breaker 27 Which Feeds B2T
WR 32779	1A2 RCP Seal DP Indication Problems

No violations or deviations were identified.

5. Flow Orifice Related Problems

As part of the corrective actions following discovery of an improperly installed flow orifice on the High Pressure Injection (HPI) System on Unit 2, the licensee decided to inspect all flow orifices in safety-related systems on all three units to ensure correct installation.

On May 6, 1991, during an inspection of orifices on the Unit 2 Emergency Feedwater (EFW) system, a flow measuring orifice on the injection piping to "B" steam generator was found to be installed backward, in that, the beveled side of the orifice plate was facing the upstream direction. With the orifice installed in this configuration, the indicated flow rate would be lower than actual flow rate. The operability of the EFW loop was not affected by this mispositioned orifice since the instrument is not essential for any automatic control action to mitigate accidents, nor was its indication essential for manual operator action following an accident.

On May 9 the licensee discovered that the flow orifice associated with the Unit 1 "B" Reactor Building Spray (RBS) loop was also installed backward. On May 15 the licensee determined that both RBS orifices on all three units were calibrated incorrectly, in that, wrong span values were used to calibrate the RBS flow instruments. The RBS orifices use eccentric flow orifices and the instrument calibration span values used were that for concentric orifices. The effect of the improper calibration of the RBS flow instruments would be that the indicated flow rate would be lower than the actual flow rate. On May 16 at 9:00 a.m., during a visual inspection, it was discovered that the Unit 2 RBS train "B" orifice was incorrectly installed, in that, it was rotated 90 degrees from its proper position. A work request was written to reposition the orifice and that train of RBS on Unit 2 was declared inoperable.

On May 16 at 4:45 p.m., the licensee determined that all flow orifices associated with the Low Pressure Injection (LPI) system were possibly installed incorrectly as well as improperly calibrated due to use of the wrong span values. The LPI flow orifices are eccentric flow orifices. The flow orifices on the LPI system were thought to be installed incorrectly based on visual observation of the orifice tabs that were at the three o'clock orientation instead of the nine o'clock orientation as shown on the drawings. The orifice tabs have a manufacturer's stamp marking that indicates the relative position of the orifice's drain hole. The orifice drain hole has no significance in this particular application. However, the main bore that permits flow, as well as creates the required differential pressure, is required to be in the correct location such that any particle buildup that would influence the differential pressure is precluded. With the LPI system drawing suction from the Reactor Building Emergency Sump, during the post LOCA ECCS recirculation phase, a possibility existed for the orifice main bore to be influenced by particles from the sump. This would lead to LPI flow rate indication lower than actual flow rate. By virtue of LPI system design, the affect on the LPI system was minimal. However, since the RBS system pumps take suction upstream of the LPI pumps, with the LPI pumps pumping more flow than indicated, the RBS pumps could be deprived of the required Net Positive Suction Head. This condition rendered both RBS trains on Units 2 and 3 potentially inoperable. Based on both RBS trains being potentially inoperable, Units 2 and 3 entered a 12 hour action statement pursuant to TS 3.0. Unit 1 had tripped earlier and visual inspections indicated that the LPI flow orifices were installed in the proper orientation; however, LPI flow instruments on Unit 1 were not correctly calibrated.

The licensee pursued disassembly of the orifice flange connections and proper positioning the LPI flow orifices on at least one train on each unit. The licensee determined there was a possibility of not completing the work within the time allowed by the action statement and with a Unit 2 and 3 shutdown pending, the licensee requested a Regional Temporary Waiver of Compliance. The Region granted the waiver and extended the action statement by an additional eight hours. At 1:30 a.m., on May 17 when the orifice plates on LPI trains 2A and 3A were physically removed, the

orifices were found to be properly installed; however, the tab had been removed and reoriented to the nine o'clock position due to space limitations. This repositioning of the tab made the manufacturer's stamp orientation incorrect. Apparently craft personnel had etched the new information over the manufacturer's stamp making the information on the tab difficult to read. LPI train 2B and 3B had similar markings. Based on this, both RBS trains were declared to be operable and the 12 hour action statement was exited. The licensee did not have to utilize the additional time granted by the Regional Waiver of Compliance.

By May 20 all the LPI and RBS flow instruments were recalibrated based on correct span values and the Unit 2 RBS "train B" orifice was placed in its proper position. In addition, the licensee completed inspecting orifices on other safety systems on May 22. No additional orifice related problems were identified.

An enforcement conference was held with the licensee on May 22 to discuss the HPI system flow instrumentation installation deficiencies discussed in a previous inspection report. During this meeting, the licensee also discussed problems pertaining to orifices on the LPI and RBS systems. Results of the enforcement conference pertaining to the HPI system will be conveyed to the licensee in a separate letter. As of the end of this reporting period, the licensee had not completed the past operability evaluation on the RBS systems. The inspectors will follow this issue via the licensee's LER.

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:

- a. (Closed) Violation 50-269, 270, 287/88-13-04: Failure to Follow Procedural Requirements of Station Directives Relating to Maintenance Work Requests and Cleanliness Contracts. The licensee responded to this violation in a letter dated September 2, 1988. The inspector verified that all of the licensee's corrective actions were implemented.
- b. (Closed) Unresolved Item 50-269, 270, 287/88-17-07: Pre-job Planning ALARA Procedures. During the Maintenance Team Inspection conducted on July 11 - 29, 1988, the team noted deficiencies in the implementation of the ALARA Program. The licensee had responded to this item and the inspector verified that procedure HP/O/B/1000/73, Radiation Protection/CMD ALARA Planning, was revised to comply with radiation protection ALARA unit planning criteria set forth in Station Directive 3.3.5 to further clarify this subject. Maintenance Manual Directive 7.5.7, Maintenance ALARA Planning, was also developed to provide guidance to the planners in ALARA planning. These actions appeared to resolve the deficiencies.

- c. (Closed) Violation 50-287/88-32-01: Failure to Follow Station Directive 3.2.1 Resulting in Overpressurization of a Feedwater Sampling Line and Containment Penetration. The licensee responded to this violation in a letter dated December 2, 1988. This incident was reviewed with all the planners and the craft personnel and supervisors were cautioned against applying pressure to any lines without engineering knowledge and instructions.
- d. (Closed) Unresolved Item 50-269, 270, 287/89-25-01: Apparent Failure to Provide Personnel Licensed Pursuant to 10 CFR 55 at the Controls at All Times During Operation of the Facility. On July 26, 1989, the licensee notified the inspectors that five licensed operators had not received the biennial medical examinations required by 10 CFR 55.21. Upon further investigation the licensee identified that this problem had existed since 1987, when the licensee renewal requirements were changed from two years to six years. Additional review by the licensee identified a total of 55 operators that had exceeded the two year requirement. Subsequently, a management meeting was held in the NRC Region II office on August 29, 1989, to discuss an apparent failure of the licensee to meet the licensed operator medical examination two year requirements. The licensee identified the root cause of the problem as an apparent misunderstanding of the meaning of "every two years". The concept of bracketing license applications between a six month and six week window was considered acceptable. The licensee felt that this scheduling philosophy was acceptable, even after the April 9 - 10, 1987, meeting with NRC which explained the impact of the 10 CFR 55 rule change. NRC management stated that biennial should be considered as meaning every two years, date-to-date. As a result of this incident, the licensee took immediate corrective actions. On August 21, 1989, the Corporate Medical Director provided guidance to the medical staff that NRC physicals are not to exceed 24 months. Also effective September 1, 1989, Production Support Department in conjunction with the medical staff is issuing a monthly status report to the operations group on the qualification of licensed operators. The inspector held discussions with the training support supervisor and determined that no licensed operator has exceeded the two year requirement since 1990. These corrective actions appeared to resolve the problem.
- e. (Closed) Inspector Followup Item 50-269, 270, 287/89-25-04: Resolution of PIR-2-089-0114. The licensee identified two areas of concern associated with returning a system to operation following a modification. These areas included training provided to operations personnel and interim drawings potentially needed by operations upon restart of a system. Subsequently, the PIR was issued on July 14, 1989, to address the concern. The inspector reviewed the PIR and verified that corrective actions were completed. Project Services Manual Directive 4.12 was revised to require that a training package be sent to Document Control prior to beginning implementation. This training package includes a drawing list which Document Control will use to begin processing interim as-built drawings in advance of

their required issue. Project Services Directive 4.10 was also revised to require the accountable engineer to send a copy of the variation notices to Document Control for interim as-built drawing release. Station Directive 2.3.4 was revised to change the ONS-535 form to require Document Control verification that all appropriate groups have received their interim as-built drawings. These corrective actions appeared to resolve the concern.

- f. (Closed) Violation 50-269, 270, 287/90-16-01: Failure to Follow Procedures Resulting in Overflow of Spent Fuel Pool, Cutting Out a Drain Valve on the Wrong Unit, and Labeling a Valve on the Wrong Unit. The licensee responded to this violation in a letter dated July 18, 1990. The inspector verified that procedures OP/1, 2, 3/A/1102/15, Filling and Draining Fuel Transfer Canal, were revised to provide notes and/or cautions to prevent this event from recurring; that a training package relating to the spent fuel pool overflow incident was reviewed by all the operations personnel; and that procedure OMP 1-9, Use of Procedures, was revised to require that deviations from the sequence of steps in an approved procedure be approved by the shift supervisor or operations manager. The responsible individuals were counseled concerning these errors and "please listen" training was given to all employees to increase communication skills as well as develop attentiveness to detail.
- g. (Closed) Violation 50-270/90-30-04: Three Examples of Failure to Follow Procedures Resulting in a Failure To Maintain Configuration Control. The licensee responded to this violation in a letter dated December 19, 1990. The inspector reviewed the corrective actions and determined that all corrective actions were completed with the exception of revising procedure OP/1/B/1502/08, Block Tagout Procedure. The licensee has committed to revise this procedure, to add a new enclosure to control the position of system vent and drain valves, prior to August 11, 1991.

6. Exit Interview (30703)

The inspection scope and findings were summarized on May 29, 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>
269, 270, 287/91-11-01	IFI - LPI Testing Criteria (paragraph 3.b)