



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

Report Nos.: 50-269/91-30, 50-270/91-30 and 50-287/91-30

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: September 29 - November 2, 1991

Inspectors:	<u><i>W. H. Harmon</i> for</u>	<u>11-25-91</u>
	P. E. Harmon, Senior Resident Inspector	Date Signed
	<u><i>W. H. Desai</i> for</u>	<u>11-25-91</u>
	B. B. Desai, Resident Inspector	Date Signed
	<u><i>W. H. Poertner</i> for</u>	<u>11-25-91</u>
	W. K. Poertner, Resident Inspector	Date Signed
Approved by:	<u><i>G. A. Betisle</i></u>	<u>11/25/91</u>
	G. A. Betisle, Section Chief	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine, resident inspection was conducted in the areas of operations, surveillance testing, maintenance activities, event follow-up, system walkdowns, and inspection of open items.

Results: One violation was identified, concerning the failure to take prompt corrective action to resolve problems associated with a nonconservative pressure/level curve that resulted in the letdown storage tank hydrogen gas potentially being able to expand into the suction of the high pressure injection pumps under certain small break accident scenarios (paragraph 6.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
- Station Yard Zone within the Protected Area
- Standby Shutdown Facility
- Keowee Hydro Station

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

Within the areas reviewed, licensee activities were satisfactory.

b. Plant Status

Unit 1 entered the reporting period in a refueling outage. On September 30, 1991, the generator was tied on the grid ending the refueling outage. On October 2, the unit tripped from 73% power due to a turbine trip/reactor trip. The problem was corrected and the unit was returned to power operation on October 3.

Unit 2 operated at power the entire reporting period. On October 11, 1991, the unit reduced power and secured the 2B1 reactor coolant pump due to a low oil pot level alarm. A Reactor Building entry was made to add oil to the oil pot, the pump was restarted and the unit was returned to 100% power.

Unit 3 operated at power the entire reporting period.

c. Unit 1 Reactor Trip

On October 2, 1991, at 3:55 p.m., Unit 1 tripped from 73 percent power due to a generator lockout signal. The generator lockout signal generated a turbine trip and subsequent anticipatory reactor trip. The Turbine-Generator protective relaying sensed that the generator field breaker had opened and that the generator output breakers were closed, although the generator field breaker had not actually opened.

During the recovery an emergency feedwater start signal was initiated when the "A" main feedwater pump (MFP) tripped after the "B" MFP was secured. The "A" MFP tripped due to high discharge pressure caused by a feedwater swing. The "B" MFP was restarted and the emergency feedwater system was secured. Intermediate Range Nuclear Instrument NI-3 failed to decrease below $10E-10$ amps as expected after the unit trip. The licensee believes that the detector is in the early stages of failure and that the detector will become progressively worse due to saturation at power. The licensee declared NI-3 inoperable and decided not to replace the detector prior to unit restart. The Oconee Technical Specifications do not require that both intermediate range nuclear instruments be operable prior to criticality. The inspectors discussed this item with Operations Management and expressed concern that only one intermediate range nuclear instrument would be operable during the restart of the unit. The detector operated properly when power level increased above $10E-10$ amps.

The generator lockout signal was determined to be caused by loose connectors and terminals that caused a loss of DC power to relay 41 MXA. When 41 MXA deenergized, the protective relaying sensed the generator field breaker open with the generator output breakers closed. The loose connectors and terminals had been disconnected during the refueling outage to allow removal of the Alterex housing. The connectors and terminals were repaired/tightened and the unit was restarted on October 3, 1991.

d. Keowee Unit 2 Failure to Start

On October 4, 1991, Keowee Hydro Unit 2 failed to start when the Keowee hydro operator attempted to load the unit on the grid at the request of the load dispatcher. The Keowee hydro operator contacted the control room and the hydro unit was declared inoperable and Keowee unit 1 was verified operable per the requirements of Technical Specification 3.7.2(a)(1) within one hour. Subsequent investigation by the licensee determined that a set of contacts in the normal start protective circuitry were dirty and prevented the local start signal from initiating a start of the hydro unit. The licensee determined that the hydro unit would still have started from an emergency start signal. The dirty contacts were cleaned and the hydro unit was tested and returned to service.

No violations or deviations were 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 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/1/A/230/1B HPSW to HPI Motor Cooler Flow Test
PT/2/A/600/12 TDEFW Pump Performance Test

Within the areas reviewed, licensee activities were satisfactory. 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 94608C Repair 3PR-34

Within the areas reviewed, licensee activities were satisfactory. No violations or deviations were identified.

- b. Inadequate Post Modification Test

During the Unit 1 refueling outage, valve 1MS-89 was replaced by the station modification process. Valve 1MS-89 is the downstream isolation valve for the main steam pressure control valve to the turbine driven emergency feedwater pump turbine. The weld on the upstream side of the valve is required to be hydrostatically tested (hydroed) to the main steam pressure requirements, 1313 psig and the weld on the downstream side of the valve is required to be hydroed to the auxiliary steam pressure requirements, 720 psig, per the system drawing. While preparing to hydro the downstream side of 1MS-89, operations decided to open 1MS-89 and use the upstream isolation valve for the pressure control valve (1MS-86) as the hydro boundary. Subsequent to the hydro, the post modification testing package associated with 1MS-89 was signed off as being complete based on the valve being hydroed to 720 psig. Subsequent review of the modification package by the licensee after the unit was returned to power identified that the upstream weld on 1MS-89 should have been

hydroed to 1313 psig. Therefore, the post modification test was inadequate. Valve IMS-89 is a normally locked open valve and had remained locked open throughout the unit startup. Subsequent to determining that IMS-89 had not been tested to the proper hydro test pressure, a white tag was placed on the valve to ensure that the valve would remain open until the upstream weld could be properly tested. The inspectors expressed concern that the modification package had been completed and signed off without an adequate post modification hydro test being performed; however, the valve was adequately tested assuming that the valve remained locked open throughout the operating cycle. The licensee identified this item and based on the fact that an adequate post modification test was performed if the valve remained in the open position, no enforcement action will be pursued. The licensee plans to perform the required hydro test the next time the unit is brought to a cold shutdown condition.

No violations or deviations were identified.

5. Low Pressure Service Water (LPSW) System Walkdown (71710)

The inspectors performed a system walkdown on the accessible portions of the Unit 3 LPSW system. The LPSW system provides normal and emergency cooling for components in the Turbine Building, Reactor Building and Auxiliary Building. The Unit 3 LPSW system consists of two LPSW pumps that take a suction off the condenser circulating water system and two supply headers that are crossconnected at the LPSW pump discharge. The LPSW system is designed such that one LPSW pump should be able to provide all the required cooling during accident conditions. The LPSW pumps receive an automatic start signal on an Engineered Safeguards (ES) signal. However, the non-safety portions of the LPSW system outside the Reactor Building do not isolate on an ES signal. The inspectors determined that the Unit 3 LPSW system was aligned correctly, but discrepancies were noted on the system drawing, the operating procedure valve lineup checklist and the operating procedure electrical checklist. The discrepancies were not significant in nature and were discussed with the licensee. The licensee is scheduled to perform a Design Basis Document (DBD) review on the LPSW system as part of the DBD program. This effort had not started as of this inspection period. The licensee has performed a Self Initiated Technical Audit (SITA) on the LPSW system previously. The inspectors did not review the LPSW SITA during the inspection period but plan to review the SITA results during the next inspection period.

No violations or deviations were observed.

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) LER 269/91-02: Licensed Operator Improperly Exempted From Requalification Exam Due to a Management Deficiency, Results in TS Violation. This LER was submitted to the NRC on May 3, 1991. Immediate corrective actions taken involved taking the licensed operator off the active duty roster and notifying the NRC that this license was not considered current. Subsequent corrective actions included the successful completion of a makeup exam by the operator and notification to the other Duke Power nuclear stations to assure proper testing of facility representatives. In addition, ETQS Standard 2306.0 was revised on September 1, 1991. Based on these actions, this item is closed.
- b. (Closed) LER 269/90-09: Inappropriate Operator Actions to Control and Maintain Minimum Level in Emergency Feedwater Inventory Tank Resulted in a TS Violation. As part of the planned corrective actions, training, described in training package 90-12, was given to all licensed operators concerning control of condensate inventory when operating in the feedwater cleanup mode of operation. The licensee reviewed the upper surge tank low level computer alarm setpoint and raised from seven feet decreasing to eight feet decreasing. Also, after review of operating procedures, it was decided not to change the procedure controlling feedwater cleanup activities. Instead, the licensee placed a tag near the controller for the auxiliary steam supply to the 'E' heaters cautioning the operators to monitor UST level while in the feedwater cleanup mode of operation. Based on these actions, this item is closed.
- c. (Closed) Unresolved item 269,270,287/91-26-02: LDST Pressure/Level Curve. This item identified that the existing operating curve defining maximum letdown storage tank (LDST) pressure and level was nonconservative and that the potential existed for hydrogen intrusion into the suction of the high pressure injection pumps under certain small break loss of coolant accidents as level in the borated water storage tank (BWST) decreased. This item was identified as an unresolved item pending further review by the NRC and licensee. The inspectors determined that the licensee was aware that the LDST pressure/level curve was nonconservative as early as the December 1990 timeframe when the High Pressure Injection (HPI) System Design Basis Document was issued. The licensee at that time carried this item as an open item on a design engineering punchlist. The inspectors had also questioned the adequacy of the curve as a result of the routine inspection program around this same timeframe and had been told that Design was reviewing the basis of the curve and would document its adequacy but based on preliminary reviews the curve appeared acceptable. The inspectors continued to question the adequacy of the curve and in April of 1991 when the licensee again

stated that the official calculation had not yet been performed but that the curve was probably acceptable, the inspectors were shown an unofficial calculation performed by Design in January of 1991 that showed there was a 1 psi margin before hydrogen intrusion could occur at the HPI pump suctions. The inspectors questioned the margin available in the calculation and also questioned the assumptions on which the unofficial calculation was based. The licensee stated in the April timeframe that the unofficial calculation was a very rough calculation with overly conservative assumptions and methodology. The inspectors were again assured that Design would perform an official calculation to document the adequacy of the LDST pressure/level curve. However, a timeframe for completion was not given.

Subsequent to these events, the licensee performed the official calculation in September 1991 and determined that the existing LDST pressure/level curve was inadequate and that the HPI system had been operated since initial power operation in a condition that was outside the design basis of the HPI system. This calculation was performed as a result of corrective action for an April 1991 event where the operators exceeded the the original pressure/level curve during hydrogen addition to the LDST. The inspectors are not convinced that the review of the pressure/level curve would have occurred in September for any other reason except for the corrective action as a result of exceeding the original curve. As a result of this review, the licensee determined that hydrogen intrusion into the suction of the HPI pumps would have occurred during a small break LOCA, assuming no operator action if a HPI BWST suction valve failed to open on an ES signal and all three HPI pumps started. The licensee also determined that the HPI system had operated on a routine basis in a condition where hydrogen intrusion into the suction of the HPI pumps could have occurred even if both HPI BWST suction valves opened during a small break LOCA assuming no operator action. The inspectors consider that the licensee actions to resolve this issue were untimely and that the unofficial calculation was inadequate in identifying the operability concern and should have identified to the licensee the importance of completing the review of the pressure/level curve in an expeditious manner. The failure to take prompt corrective action to resolve the LDST pressure/level curve issue is identified as Violation 269,270,287/91-30-01: Inadequate Corrective Action to Resolve Operability Concern.

7. Exit Interview (30703)

The inspection scope and findings were summarized on November 1, 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>
VIO 269,270,287/91-30-01	Inadequate Corrective Action to Resolve Operability Concern (paragraph 6.c).