UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report Nos. 50-269/81-18, and 50-270/81-18, and 50-287/81-18

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

Facility Name: Oconee Nuclear Station

Docket Nos. 50-269, 50-270, and 50-287

License Nos. DPR-38, DPR-47, and DPR-55

Inspection at Oconee site near Seneca, South Carolina

Inspectors: William T. Orders for — 8/19/81
F. Jape — Date Signed

William T. Orders — 8/19/81
W. Orders — Date Signed

William T. Orders for — 8/19/81
D. Myers — Date Signed

Approved by: J. C. Bryant — 8/19/81
J. C. Bryant, Section Chief, Division of Resident and Reactor Project Inspection — Date Signed

SUMMARY

Inspection on July 10 - August 10, 1981

Areas Inspected

This routine announced inspection involved 173 resident inspector-hours on site in the areas of plant operations, surveillance testing, maintenance observations, loose reactor internals, personnel contamination and TMI action items.

Results

Of the six areas inspected, no items of noncompliance or deviations were identified in five areas; one item of noncompliance was found in one area (Failure to follow procedure in the removal and restoration of station equipment (81-18-01).

DETAILS

1. Persons Contacted

   Licensee Employees

   *J. E. Smith, Station Manager
   *J. M. Davis, Superintendent of Maintenance
   *J. N. Pope, Superintendent of Operations
   *T. B. Owen, Superintendent of Technical Services
   *R. T. Bond, Licensing and Projects Engineer
   *T. Cribb, Licensing Engineer

   Other licensee employees contacted included 17 operations personnel, 10 technicians, 16 operators, 7 mechanics, 10 security force members, and 5 office personnel.

   *Attended exit interview

2. Exit Interview

   The inspection scope and findings were summarized on August 7, 1981 with those persons indicated in Paragraph 1 above. The violation described in this report was discussed with and acknowledged by licensee management. Other inspection findings were acknowleged without significant comment.

3. Licensee Action on Previous Inspection Findings

   Not inspected.

4. Unresolved Items

   Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve noncompliance or deviations. New unresolved items identified during this inspection are discussed in paragraph 7.

5. Plant Operations

   The inspector reviewed plant operations throughout the report period to verify conformance with regulatory requirements, technical specifications and administrative controls. Control room logs, shift supervisors logs, shift turnover records and equipment removal and restoration records for the three units were selectively perused. Interviews were conducted with plant operations, maintenance, chemistry, health physics, and performance personnel on day and night shifts.

   Activities within the control rooms were monitored during day and night shifts and at shift changes. Actions and/or activities observed were conducted as prescribed in Section 3.08 of the Station Directives. The complement of licensed personnel on each shift met or exceeded the minimum required by technical specifications. Operators were responsive to plant annunicator alarms and appeared to be cognizant of plant conditions.

Plant tours were taken througout the reporting period on a selective basis. The areas toured include but are not limited to the following:

Turbine Building
Auxiliary Building
Units 1, 2, and 3 Electrical Equipment Rooms
Units 1, 2, and 3 Cable Spreading Rooms
Units 1 Reactor Building
Station Yard Zone within the protected area
Unit 1 Penetration Room

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

Oconee Unit 1 was in a refueling outage throughout the reporting period. Oconee Unit 2 and 3 operated at virtually 100% power throughout the reporting period aside from an ICS runback on Unit 2 as discussed below.

On July 28, 1981, at approximately 1740, Oconee Unit 2 experienced an ICS runback to 55% power due to the loss of a control rod group 2 out limit signal. ICS was taken to manual and the Unit was escalated to full power by 0300 the following day. The runback was attributable to the removal from service of back up control rod drive power supply for maintenance. Subsequent to the runback, the unit operated uneventfully throughout the remainder of the reporting period.

Within the areas inspected, one violation dealing with equipment removal and restoration was identified as discussed elsewhere in this report.

6. Surveillance Testing

The surveillance tests detailed below were analyzed and/or witnessed by the inspector to ascertain procedural and performance adequacy.

The completed test procedures examined were analyzed for embodiment of the necessary test prerequisites, preparations, instructions, acceptance criteria and sufficiency of technical content.

The selected tests witnessed were examined to ascertain that current, written approved procedures were available and in use, that test equipment in use was calibrated, that test prerequisites were met, system restoration was completed and test results were adequate.

The selected procedures perused attested conformance with applicable Technical Specifications, they appeared to have received the required administrative review and they apparently were performed within the surveillance frequency prescribed.

Procedure	Title	Date
PT/2/A/600/11	Emergency Feedwater System	7/13/81
IP/0/A/275/57	Emergency OTSG Level Control	7/16/81
IP/0/B/340/2	CRD Power Supply	7/17/81
PT/0/A/230/01	Radiation Monitor Check	7/26/81
PT/0/A/290/3	Turbine Control Valve Movement	7/28/81
PT/0/A/290/4	Turbine Valve Movement	7/28/81
PT/2/A/600/15	CRD Movement	8/3/81
PT/0/A/290/05	Secondary Systems Protection	8/4/81
PT/2/A/204/07	Reactor Building Spray Test	8/4/81
PT/1/A/0251/01	Low Pressure Service Water Pump Performance Test	8/13/81
PT/1/A/115/02	LPSW Valve Verification	8/1/81
PT/1/A/115/01	LPSW Valve Position	8/1/81

During the performance of Low Pressure Service Water (LPSW) Valve Position Verification (PT/1/A/115/01), the licensee discovered that the discharge valve of the "B" LPSW pump to the "A" service water header was shut rather than open as required. The "A" and "C" LPSW Pumps were available and in service fulfilling the Technical Specification requirements for the system.

The licensee determined that the valve problem arose due to confusion of a Performance Test Technican as to the responsibility for performing step 12.14 of PT/1/A/0251/01, which should have opened the valve. The test has been reviewed and the licensee is considering designating responsibility for action steps of performance tests by labeling sign-off blanks with the appropriate group; i.e, operational, performance, maintenance, etc. This effort should clearify each groups responsibility when two or more station groups are required to interface in performance of one procedure.

The inspector employed one or more of the following acceptance criteria for evaluating the above items:

10 CFR
ANSI N 18.7
Oconee Technical Specifications
Oconee Station Directives
Duke Administrative Policy Manual

Within the areas inspected no items of noncompliance or deviations were identified.

7. Monthly Maintenance Observation

Maintenance activities were observed and reviewed throughout the inspection period to verify that activities were accomplished using approved procedures or the activity was within the skill of the trade and that the work was done by qualified personnel. Where appropriate, limiting conditions for operation were examined to ensure that while equipment was removed from service, the TS requirements were satisfied. Also, work activities, procedures, and work requests were reviewed to ensure adequate fire and radiation protection precautions were observed, and that equipment repaired was tested and properly returned to service. Acceptance criteria used for this review were as follows:

-Station Directive 3.3.1, 3.3.2, 3.3.5, 3.3.11, 3.3.15
-Administrative Policy Manual, Sections 3.3 and 4.7
-Technical Specifications

Maintenance activities observed or reviewed were:

Work Request 18476 Repair of 3CS-170
Work Request 19131 Replace RPS channel "C" Power Supply
Work Request 19136 Repair Turbine Building Sump Pumps

Outstanding work requests #15780 of 4/7/81 to WR 18891 of 8/5/81 for Unit 2 were reviewed to determine that the licensee is giving priority to safety-related maintenance and not allowing a degradation of system performance by developing a back log of work items.

Within the areas inspected the inspector expressed concern to licensee maintenance about control of cleanliness on safety-related systems (Procedure MP/0/A/1808/1). During review of ongoing maintenance activities on the repair of 3CS-170 (WR #18476), the inspector requested that mechanics account for tools which were logged into the controlled work area in MP/0/A/1808/1. All tools logged were large and were accounted for; however, several smaller tools, specifically inside micrometers and a precision depth gauge were not listed. These small tools were being used inside the system and were most susceptible to loss therein.

There appeared to be a lack of understanding as to the intent of the procedure by the mechanics. In order to determine the extent to which system cleanliness procedures are being interpreted, the inspector will increase surveillance in this area and consider this issue as an unresolved item. (287/81-18-01)

8. Loose Reactor Internals

Examination

On July 15, while performing reactor vessel inspection using a remote control video camera, the licensee discovered loose parts in the bottom of the Unit 1 vessel. The delineation below summarized the results of the initial visual examination:

1. Four of 96 bolts connecting the thermal shield to the lower grid flow distributor flange were missing.

2. Approximately 80 per cent of the remaining thermal shield bolts were backed out from 0.1 to 0.5 inches.

3. Three bolt locking cups were missing.

4. One locking cup partially attached.

5. One guide block on the Y-axis was missing

Background

The thermal shield is a 2-inch-thick cylinder surrounding the core barrel; it extends the length of the core region (Refer to Figure 1). Its function is to provide shielding against gamma and neutron flux effects on the reactor vessel wall in the core region in order to reduce gamma heating in the reactor vessel wall and radiation effects on the vessel materials. The ID of the thermal shield is machined to clear the bottom flange of the core barrel and to engage the lower grid with a diametrical interference fit. Ninety-six 1-inch-diameter bolts secure the bottom end of the thermal shield to the lower grid plate. The four missing bolts were from this location. (Refer to Figure 2).

The thermal shield's upper support consists of a Stellite clamp and shim pad that are contoured to the thermal shield and core barrel curvature. Twenty of these assemblies are placed equal intervals around the top end of the thermal shield and secured to the core barrel by bolts (three in each assembly). The design restrains the thermal shield radially, both inward and outward, and allows axial motion to accomodate longitudinal differential thermal growth between the core barrel and the thermal shield. (Refer to Figure 3).

Attached to the exterior of the lower internals are 12 pairs of lateral restraint guide blocks. The block is about 3" x 6.5" x 5" and weighs approximately 18 lbs. One of these 24 guide blocks was observed to be missing.

A visual examination of selected areas of the core internals and the reactor vessel was conducted. The examination was designed to carefully inspect important areas of the reactor vessel internals and the inside of the vessel, and to locate the missing parts.

The following table summarizes the status of components missing and those retrieved to date: (Refer to Figure 4)

	Weight (lbs)	Dimensions	Initially Missing	Retrieved	Missing
Guide Block	18.0	3"x6.5"x5"	1	0	1
Guide Dowel	2.3	4.5", 1.5"D	1	0	1
Guide Block Bolt	0.902	4.1", 1.7"D, 1.0" D	1	0	1
Guide Block Bolt Washer	0.085	2" OD, 1.0" ID	1	0	1

Thermal Shield Bolt Heads	0.582	1.375", 1.75" D	5	2	1
Thermal Shield Bolt Shanks	0.669	5.125", 1.0" D	4	3	1
Thermal Shield Locking clips	0.124	1.0"x2.5"x 1.75"	3	0	0

Analysis of Occurence

The licensee, in conjunction with Babcock and Wilcox, is conducting an ongoing evaluation of the safety implications of the observed deficiencies. The evaluation is considering but is not necessarily limited to, the following areas:

1. Structural implications of the thermal shield bolt failures.
2. Structural implications of guide block failure.
3. Loose part implications; i.e., damage to the fuel, interference with CRD motion and damage to other RCS components due to loose parts.

Corrective Action

Duke Power Company and Babcock and Wilcox are continuing to define the program to address this event. The following is a brief summary of the major activities planned or implemented.

1. Evaluate the loose parts monitoring system and implement hardware/procedural changes as determined necessary.

2. Determine and implement inspection plans for Oconee Units 2 and 3 vessel internals, as appropriate.

3. Determine and implement plan for additional inspection of Oconee Unit 1 internals.

4. Develop and implement plan to remove Unit 1 thermal shield bolts.

5. Evaluate alternative design concepts and implement selected design.

The resident inspection staff will continue to monitor the licensee's efforts to resolve this situation.

9. Procedural Noncompliance

Detailed below are two similar incidents in which equipment was rendered inoperable due to improper performance of procedures while removing equipment from service.

a. Incident - High Pressure Service Water Inoperable

At approximately 0300 hours on July 17, 1981, the licensee detected that both High Pressure Service Water Pumps (HPSW) A&B had no control power indiccation. At the time, Unit 1 was at cold shutdown and Units 2 and 3 were operating at 100% power. Operations personnnel verified that the pump breakers were racked in and the control power fuses were functional. An attempt was made to start a HPSW pump to no avail. It was subsequently discovered that Control Breaker Source A&B breakers, located in cabinets B1T1 and B2T13, were open isolating control power to the HPSW pumps. The control power source breakers were reclosed, a HPSW pump performance test was performed and the pumps were declared operable at 1106 on July 17, 1981.

Both A&B High Pressure Service Water Pumps were inoperable from approximately 2330 on July 14, 1981 until 1106 on July 17, 1981 due to the aforementioned circumstances. The pumps would not start automatically nor could they be started manually. The main functions of the HPSW system are fire suppression water and lube water for the condenser circulating water pumps.

Analysis of the event revealed that the breakers were opened when other equipment was being removed from service for maintenance according to R&R procedure. The breakers were not detailed in the applicable equipment R&R nor addressed in any other procedure or administrative requirement associated with the maintenance.

b. Incident - Low Pressure Injection Pump Inoperable

At approximately 1155 on July 20, 1981, during an attempt to run a Low Pressure Injection (LPI) pump test, the licensee discovered pump 3B to be inoperable. The 4160 Volt breaker supplying the LPI pump would not close. Investigation revealed that the breaker spring charging motor had been deenergized.

The spring charging motor was reenergized; the pump was tested and declared operable at 1258 on July 20, 1981.

Evaluation

Subsequent investigation revealed the spring charging motor had been deenergized at 1800 on July 17 as a function of ongoing maintenance. The pump motor breaker will function one cycle subsequent to the spring charging motor being deenergized. The breaker did in fact function properly on July 18 at 0838 when a pump performance test was performed. On July 23, however, an attempted test revealed the problem. In effect, the B LPI pump was inoperable from 0838 on July 18, until 1258 on July 20. The impact of the inoperability of the pump is tempered by the fact that it was not called upon to perform its intended function during the period of inoperability and its redundant component/train was operable. The cause of the incident was the unauthorized opening of the spring charging motor breaker and the subsequent failure to close it. The spring charging motor was not addressed on the R&R on any other associated procedure. In both of the above described incidents, the personnel responsible performed unauthorized actions which resulted in the applicable equipment being rendered inoperable. In both cases actions were taken which were not entailed in either the applicable R&R or procedure.

Technical Specification 6.4.1 requires that the station be operated and maintained in accordance with written approved procedures. The above described incidents violate the requirements of this specification. This is a Violation 269/81-18-01 (Failure to follow procedure).

10. Personnel Contamination

Approximately two weeks prior to Unit 1 refuel shutdown on June 26, 1981 a primary leak occurred which resulted in significant Iodine-131 contamination inside containment.

Body burden analysis performed during this outage revealed that a number of individuals had received measurable thyroid uptakes of Iodine-131.

Initially, 328 thyroid analyses were performed. Of those 328 personnel, 51 received an uptake of greater than 5% permissable thyroid burden. The highest recorded was 34%. The personnel were continually monitored until August 3, when the Iodine had been eliminated to a level of less than the administrative action threshold of 5%.

Station Management took the following measures in response to the discussed condition:

1. Paper coveralls (bag suits) are now required for all reactor building work (to be worn over cloth coveralls).

2. An additional body burden analyser was installed to expedite counting of workers.

3. Additional manpower has been employed to calculate uptake doses to ensure regulatory and company limits are not exceeded.

4. Iodine contamination levels will be more closely monitored to ensure work areas are free from gross contamination when possible.

The resident inspection staff scrutinized the licensee's corrective efforts and will continue to monitor health physics activities.

11. Implementation of TMI Lessons Learned, NUREG 0737

The inspectors have reviewed the status of implementation of TMI Lessons Learned requirements of NUREG 0737 due for completion by July 1, 1981.

Oconee Unit 1, 2 and 3 implementation was found to be in accordance with specified NRC schedules.

The inspector reviewed the affected Nuclear Station Modifications (NSM) which implement certain NUREG 0737 items, to verify that each modification was reviewed and approved in accordance with technical specifications, NSM's were controlled by established procedures, test results of completed systems were reviewed and evaluated against predetermined criteria, and NSM met their intended function. Review of affected operating procedures, operator training and drawing updates is ongoing as is direct inspection of current outage work pertaining to unit one modifications.

The numbered designation of each item is consistent with that used in NUREG 0737.

II.E.1.1 Auxiliary Feedwater System (AFW) Evaluation

This item requires licensees to perform a reliability analysis to determine AFW system failure under various loss-of-feedwater transient conditions.

The licensee has responded to this item with letters dated December 21, 1979, July 23, 1980 and April 3, 1981. These responses detailed design changes to the AFW system to meet NRC requirements. The NRC staff evaluation of licensee responses to staff recommendations of system reliability is ongoing; the exact short term requirements have not yet been identified. However, DPC has proceeded with Nuclear Station Modification 1357, which upgrades the availability of cooling water to the auxiliary feedwater pump turbine. The inspectors have reviewed TN/2/A/I357/0/A, the installing procedure, and directly inspected piping installations on Units 2 and 3. The modification is in progress on unit one. The inspectors had no questions on the implementation documents.

II.E.1.2 Auxiliary Feedwater System (AFS) Automatic Initiation and Flow Indication

Part One - AFS Automatic Initiation

On November 21, 1979, Duke Power Company (DPC) briefly described the automatic initiation and auxiliary feedwater flow indication features at Oconee Units 1, 2, and 3. On December 21, 1979, DPC submitted an Emergency Feedwater System Reliability Analysis which further described the current system design. On July 23, 1980, DPC offered comments and recommendations on NUREG 0667, "Transient Response of Babcock & Wilcox-Designated Reactors." Attachment 2 of that letter further addressed the design of the Oconee emergency feedwater system and responded to recommendations of NUREG 0667 that are applicable to the Oconee units. On October 8, 1980, DPC provided additional information concerning the proposed upgrade of the emergency feedwater initiation circuitry to safety grade as well as the upgrade of the feedwater flow indication circuitry. In Attachment 2 of that letter, DPC discussed the proposed design upgrades with respect to IEEE Std 279.

By NRC letter to DPC dated June 3, 1981 the NRC Staff concluded that this issue had been adeauately resolved upon issuance of Technical Specification changes on system testing.

The licensee has implemented the NUREG requirements through Nuclear Station Modification 1394 which upgrades the systems circuits to safety grade. The inspector reviewed the implementing procedure, work requests and field installation and had no questions.

This modification is complete on Units 2 and 3 and is ongoing on Unit 1.

Part Two - Safety Grade Flow Indication

NRC staff review of AFS Flow indication during a January 14 inspection, documented in April 15, 1980 letter to DPC, concluded that the system met control grade requirements. On October 8, 1980 DPC provided information concerning upgrading the flow circuitry to safety grade. In a June 3, 1981 letter to DPC the NRC staff accepted the proposed designs. Nuclear Station Modification 1395 implements the designs.

Inspectors have reviewed the modification for technical content and found it consistent with above specified requirements. Also reviewed were completed installation procedures (TN/3/A/1395/01/0, TN/2/A/1395/01/0) and work requests.

This modification is complete for all Oconee units.

II.E.4.1 Dedicated H2 Control Penetrations

The Oconeee units are licensed to use a hydrogen purge system for post-accident hydrogen gas control of the containment atmosphere. The penetrations to be used are two dedicated 2-inch Reactor Building air sample penetrations. By letter to DPC dated April 15, 1980, the NRC Staff required the addition of another remote isolation valve inside the Reactor Building on each penetration of the Hydrogen purge/sampling system in order for the system to meet single failure critieria.

Nuclear Station Modification 1282 Part A implements these requirements. The inspectors have reviewed completed installation procedures (TN/2/A/1282/Prt A, TN/3/A/1282/Prt A) for technical content and adequacy in meeting the specified requirements. Inspection of installation work is on going on unit 1. The inspector had no questions.

This modification is complete on Units 2 and 3 and in progress on Unit 1.

II.E.4.2 Containment Isolation Dependability

<u>Item 5</u> - Requires that the licensee justify the minimum containment pressure setpoint that would be used to intitiate containment isolation. Duke response of January 2, 1981 specified and justified a 4 PSI setpoint. The NRC accepted the response and concluded that this item was satisfactory and

documented that position in a letter to DPC dated July 15, 1981. The containment pressure setpoint is specified in Technical Specification 3.5 at 4 Psi.

This item is complete on all Oconee units.

Item 7 - Requires that containment purge and vent isolation valves must close on a high radiation signal. DPC addressed this item is a January 2, 1981 letter to NRC which stated that, as designed, the Oconee purge system meets this requirement, no additional action would be necessary. NRC Staff review is ongoing and acceptance of the DPC response as stated is not documented. Inspectors have reviewed the system design and have verified that 4 of the system's 6 purge valves will receive a close signal on high radiation in the vent stack. This system design is identical on all Oconee Units.

II.K.2.10 Safety-Grade anticipatory Reactor Trip

This item requires a saety-grade anticipatory reactor trip on loss-of--feedwater and turbine trip for B&W designed units. DPC submitted proposed design details in letters to the NRC Staff dated August 18, 1980, October 7, 1980 and November 7, 1980. Approval of the system design was provided by a letter to the licensee from the NRC dated December 4, 1980. DPC letter of December 15, 1980 specified the installation schedule.

Nuclear Station Modification 1489 implements the above documented designs. The inspectors have reviewed the one completed procedure, TN/3/A/1489/03/0, and witnessed field installation of portions of this modification. The NSM appears to incorporate the required design details. The RPS trip setpoint for turbine trip/loss-of-feed water is specified in Technical Specification 3.5. The inspector had no questions on this item.

This item is complete on Oconee Unit 3, in progress on Oconee Unit 1, and scheduled for the next available outage of sufficient duration for Oconee Unit 2.

Of the areas inspected no violations were identified.