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

Report No.: 50-400/90-24

Licensee: Carolina Power and Light Company
P. O. Box 1551
Raleigh, NC 27602

Docket No.: 50-400 License No.: NPF-63

Facility Name: Harris 1

Inspection Conducted: November 17 - December 17, 1990

Inspectors: _____ 1/4/91
J. Tedrow, Senior Resident Inspector Date Signed

_____ 1/4/91
M. Shannon, Resident Inspector Date Signed

Approved by: _____ 1/4/91
H. Christensen, Section Chief Date Signed
Division of Reactor Projects

SUMMARY

Scope:

This routine inspection was conducted by two resident inspectors in the areas of plant operations, radiological controls, security, fire protection, surveillance observation, maintenance observation, safety system walkdown, review of Licensee Event Reports and 10 CFR Part 21 reports, meeting with local public officials, review of Plant Nuclear Safety Committee activities, and followup of onsite events. Numerous facility tours were conducted and facility operations observed. Some of these tours and observations were conducted on backshifts.

Results:

Two non-cited licensee identified violations were identified concerning the failure to properly monitor area temperatures for the spent fuel cooling pump and heat exchanger, paragraph 6.a, and failure to perform surveillance testing for a radiation monitor, paragraph 6.b.

An unresolved item concerning the operability of the reactor vessel level indicating system is identified in paragraph 2.a.(2).

A weakness was identified regarding the licensee's operation in a reduced reactor coolant system inventory condition, paragraph 2.b.(1). Good operator performance was noted when cold leg temperature instrument computer point failed, paragraph 2.b(1).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. Collins, Manager, Operations
G. Forehand, Manager, QA/QC
C. Gibson, Director, Programs and Procedures
J. Hammond, Manager, Onsite Nuclear Safety
C. Hinnant, Plant General Manager
J. Nevill, Manager, Technical Support
*C. Olexik, Manager, Regulatory Compliance
*R. Richey, Vice President, Harris Nuclear Project
J. Sipp, Manager, Environmental and Radiation Control
*M. Wallace, Sr. Specialist, Regulatory Compliance
E. Willett, Manager, Outages and Modifications
W. Wilson, Manager, Spent Nuclear Fuel
*L. Woods, Manager, System Engineering

Other licensee employees contacted included office, operations, engineering, maintenance, chemistry/radiation and corporate personnel.

*Attended exit interview

Acronyms and Initialisms used throughout this report are listed in the last paragraph.

2. Review of Plant Operations (71707)

The plant began this inspection period in cold shutdown (Mode 5). After repairing a minor leak on the "B" steam generator and other reliability related maintenance, a plant heatup was commenced on November 27. On November 29, a reactor startup was performed and criticality was achieved at 8:04 a.m. The plant resumed power operation (Mode 1) at 9:34 p.m. on November 29. On December 1, a plant shutdown was commenced due to leakage which had developed in the main condenser. At 8:07 p.m., on December 3, the Mode 5 condition was once again entered to facilitate main condenser repairs (see paragraph 10 for details of the condenser tube rupture event). Following restoration of plant chemistry and condenser repairs, a plant heatup and startup was performed. On December 9, at 8:55 p.m., the reactor was taken critical. The plant resumed power operation at 12:47 a.m. on December 10, and remained in power operation for the rest of this inspection period.

a. Shift Logs and Facility Records

The inspector reviewed records and discussed various entries with operations personnel to verify compliance with the Technical Specifications (TS) and the licensee's administrative procedures.

The following records were reviewed: Shift Foreman's Log; Outage Shift Manager's Log; Control Operator's Log; Night Order Book; Equipment Inoperable Record; Active Clearance Log; Jumper and Wire Removal Log; Shift Turnover Checklist; and selected Radwaste Logs. In addition, the inspector independently verified clearance order tagouts. As a result of these reviews, the following items were identified:

(1) To facilitate finding the location and repair of a steam generator tube leak, the licensee drained the RCS to the midloop condition. During this evolution the licensee experienced problems with reactor vessel level indication. As discussed in NRC Inspection Report 50-400/90-08, the industry has had several events while maintaining/placing the RCS in the midloop condition. In response to GL 88-17, Loss of Decay Heat Removal, the licensee had implemented several administrative controls to enhance safe operation. One of these controls consisted of the requirement to maintain two operable methods of monitoring reactor vessel level; an RCS standpipe and the RVLIS.

On November 14, during the draindown evolution, the inspector noted a discrepancy between logged RCS standpipe level indication and that indicated by the RVLIS. The licensee plots and compares these two indications on a curve which displays a predicted relationship between RVLIS (percent) versus RCS standpipe (inches below reactor vessel flange). An approximate error of 20 inches (or 5 percent RVLIS) existed from the predicted relationship. The inspector questioned plant operators and the STA about this discrepancy to determine which system was indicating correctly. These personnel stated that they believed the standpipe was indicating properly and that the indicated RVLIS values were shifted downwards by a loss of water in the reference leg to this system's level transmitters. This belief was supported by the trace of the actual curve which was parallel below the predicted curve. Operators considered one accurate level indication, along with the trend provided by the RVLIS to be sufficient. When questioned whether engineering concurred, the inspector was informed that system engineering had been contacted but had not yet responded. The inspector expressed his concern that without an engineering analysis of the discrepancy, midloop operations was being entered without meeting the requirement to have two operable and reliable indications of reactor vessel level. The licensee subsequently halted the draindown evolution at 67 inches below the reactor vessel flange, prior to entering midloop operation.

Plant system engineers agreed that water in the RVLIS reference leg had somehow been lost and generated a new operating curve based on the data already obtained from the draindown. The RCS standpipe indicated level was verified to be accurate based on the draining of the steam generator tubes which occurred at the

predicted level. With this information, licensee management decided to proceed with the draindown.

Upon completion of steam generator nozzle dam installation, an RCS fill was performed on November 16. Again, a deviation between actual indications and the predicted curve was observed. This time the actual data did not parallel the predicted curve which indicated that, once again, one of the two indication systems was in error. In this case, the standpipe indicated a higher reactor vessel level than the RVLIS. Instead of proceeding with the fill utilizing the more conservative RVLIS, plant operators utilized the standpipe as the correct indicated level and stopped the fill at approximately 20 inches below the reactor vessel flange. At this time operators discontinued the administrative controls in place for midloop operations which included securing the continuous standpipe watch and relaxing containment requirements. When system engineering reviewed this indication deviation, they suspected that the reactor vessel head had not properly vented and that a pressure buildup had developed in the reactor vessel which caused a higher level to be indicated in the standpipe. When the head was properly vented, the standpipe level dropped to approximately 37 inches below the vessel flange which required reinitiation of administrative controls for midloop operations. Fortunately, the error by the operators to believe the non-conservative vessel level indication occurred during the filling evolution, and not during the draining evolution, where the consequences could have been more severe.

Although no equipment damage resulted during these evolutions, the guidance provided to plant operators was not sufficient to prevent confusion among plant operators. The practice of relying on one level indication and a general trend provided by a separate system, does not comply with the intent of the GL requirement to have two reliable sources of vessel level indication. In this case, operators chose to utilize a non-conservative indication. Also, the guidance provided to plant operators did not address any action in case of a discrepancy between indicated levels. The licensee's operation during reduced RCS inventory is considered to be a weakness.

(2) Due to these RVLIS indication discrepancies, a further review of the design, operation and maintenance of the RVLIS system was performed. The inspector noted that the system design did not provide a vent path for the reference leg. It was also noted that following the reactor vessel head replacement and reconnection of the RVLIS reference leg piping, that the reference leg was not refilled prior to returning the RVLIS channels to operation. The failure to refill the reference leg could result in a RVLIS indication error of as much as 36 inches higher than actual level indication and since the reference leg

is common to both RVLIS channels, both channels would be in error by the same amount. At high RCS pressure the error due to any air in the reference leg would be negligible due to the compression of the air bubble. Following depressurization, the entrapped air bubble could and did replace the water in the reference leg which resulted in a 20 inch RVLIS indication error during the RCS drain down on November 11. The failure to refill the RVLIS reference leg could result in a non conservative RVLIS indication during reduced RCS inventory conditions. This concern with the improper RVLIS indication is considered to be an unresolved item pending evaluation by the RVLIS manufacturer.

URI (400/90-24-01): Failure to refill the RVLIS reference leg.

b. Facility Tours and Observations

Throughout the inspection period, facility tours were conducted to observe operations and maintenance activities in progress. Some operations and maintenance activity observations were conducted during backshifts. Also, during this inspection period, licensee meetings were attended by the inspectors to observe planning and management activities.

The facility tours and observations encompassed the following areas: security perimeter fence; control room; emergency diesel generator building; reactor auxiliary building; reactor containment building; waste processing building; fuel handling building; emergency service water building; battery rooms; and electrical switchgear rooms.

During these tours, the following observations were made:

(1) Monitoring Instrumentation - Equipment operating status, area atmospheric and liquid radiation monitors, electrical system lineup, reactor operating parameters, and auxiliary equipment operating parameters were observed to verify that indicated parameters were in accordance with the TS for the current operational mode.

While the inspector was observing control room activities on December 6, 1990, at approximately 1:45 p.m., the loop "A" wide range cold leg temperature computer indication failed and began decreasing. The operators promptly noted that the control board indication as well as the recorder tracer was stable and therefore the problem was limited to the computer point. Logic diagrams were reviewed and associated inputs such as LTOP were verified operable. The operators responded well to the failure since the computer point was being used for trending and incorrect operation could have resulted in an unwanted mode change.

(2) Shift Staffing - The inspectors verified that operating shift staffing was in accordance with TS requirements and that control room operations were being conducted in an orderly and professional manner. In addition, the inspector observed shift turnovers on various occasions to verify the continuity of plant status, operational problems, and other pertinent plant information during these turnovers.

(3) Plant Housekeeping Conditions - Storage of material and components, and cleanliness conditions of various areas throughout the facility were observed to determine whether safety and/or fire hazards existed.

(4) Radiological Protection Program - Radiation protection control activities were observed routinely to verify that these activities were in conformance with the facility policies and procedures, and in compliance with regulatory requirements. The inspectors also reviewed selected RWPs to verify that the RWP was current and that the controls were adequate.

(5) Security Control - In the course of the monthly activities, the inspector included a review of the licensee's physical security program. The performance of various shifts of the security force was observed in the conduct of daily activities to include: protected and vital area access controls; searching of personnel, packages, and vehicles; badge issuance and retrieval; escorting of visitors; patrols; and compensatory posts. In addition, the inspector observed the operational status of Closed Circuit Television (CCTV) monitors, the Intrusion Detection system in the central and secondary alarm stations, protected area lighting, protected and vital area barrier integrity, and the security organization interface with operations and maintenance.

(6) Fire Protection - Fire protection activities, staffing and equipment were observed to verify that fire brigade staffing was appropriate and that fire alarms, extinguishing equipment, actuating controls, fire fighting equipment, emergency equipment, and fire barriers were operable.

No violations or deviations were identified.

3. Surveillance Observation (61726)

Surveillance tests were observed to verify that approved procedures were being used; qualified personnel were conducting the tests; tests were adequate to verify equipment operability; calibrated equipment was utilized; and TS requirements were followed.

The following tests were observed and/or data reviewed:

- EPT-167 Steam Generator Secondary Leak Test
- OST-1026 RCS Leakage Evaluation
- OST-1131 Control Room HVAC System Inservice Inspection Test

No violations or deviations were identified.

4. Maintenance Observation (62703)

The inspector observed/reviewed maintenance activities to verify that correct equipment clearances were in effect; work requests and fire prevention work permits, as required, were issued and being followed; quality control personnel were available for inspection activities as required; and, TS requirements were being followed.

Maintenance was observed and work packages were reviewed for the following maintenance (WR/JO) activities:

- Troubleshooting the "A" emergency diesel generator slow start and voltage indication.
- Leak repair to equalizing line on "B" charging/safety injection pump.
- Removal of steam generator nozzle dams in accordance with procedure CM-M0176, Steam Generator Primary Nozzle Dam Installation, Operation, and Removal.
- Repair of boric acid leakage on various containment valves and flanges.

No violations or deviations were identified.

5. Safety Systems Walkdown (71710)

The inspector conducted a walkdown of the accessible piping inside containment for the service water, residual heat removal, and containment spray systems, to verify that the lineup was in accordance with license requirements for system operability and that the system drawings and procedures correctly reflected "as-built" plant conditions.

No violations or deviations were identified.

6. Review of Licensee Event Reports and 10 CFR Part 21 Reports (92700)

The following LERs and 10 CFR Part 21 Reports were reviewed for potential generic impact, to detect trends, and to determine whether corrective actions appeared appropriate. Events that were reported immediately were

reviewed as they occurred to determine if the TS were satisfied. LERs were reviewed in accordance with the current NRC Enforcement Policy.

a. (Closed) LER 90-21: This LER reported that fuel pool cooling pump and heat exchanger area temperatures were not monitored as required by TS 4.7.12. The licensee has revised the TS to delete this requirement and has reviewed other locations which require temperature monitoring and found those measurements satisfactory. This matter is considered to be a licensee identified NCV and is not cited because the criteria specified in section V.G.1 of the NRC Enforcement Policy were satisfied.

   NC4 (400/90-24-02): Failure to properly monitor fuel pool cooling pump and heat exchanger area temperatures as required by TS.

b. (Open) LER 90-22: This LER reported that a surveillance test was not performed on radiation monitor REM-3542 due to an incorrect procedure revision. Licensee corrective action for a previous LER (LER 90-05) required procedure revisions for various radiation monitors to delete unnecessary disconnections/reconnections of coaxial cables. These revisions incorrectly deleted a loss of counts test for monitor REM-3542, which is required by TS 4.3.3.10. The licensee has subsequently revised the test procedure to reincorporate the loss of counts test. Remaining corrective actions to be completed by the licensee include counseling maintenance procedure personnel on this incident and to test the radiation monitor upon completion of maintenance. This matter is considered to be a licensee identified NCV and is not cited because the criteria specified in section V.G.1 of the NRC Enforcement Policy were satisfied.

   NC4 (400/90-24-03): Failure to perform surveillance testing for a radiation monitor.

c. (Closed) P2190-08: The 10 CFR Part 21 report dated October 17, 1989, concerned the potential failure of overload relay heaters used in controllers manufactured by Telemecanique, Inc. Licensee personnel reviewed this matter, examined spare parts, and determined that heaters in stock are not subject to the type of failure mechanism detailed in the report.

7. Meeting with Local Public Officials (94600)

On November 26, 1990, the NRC Staff held a meeting with members of the county commission of Wake County. The objectives of this meeting were to:

- acquaint local officials with the mission of the NRC.

- introduce the resident inspectors stationed at the Shearon Harris Nuclear Plant.

- discuss the lines of communication between local officials and the NRC resident inspectors, regional offices, and headquarters office.

- discuss the operating status of the Shearon Harris Nuclear Plant.

- discuss any related community concerns with the plant or its operation.

The inspectors were impressed with the interest the community leaders showed in the Shearon Harris plant. It is felt that all participants benefitted from this meeting and that the meeting objectives were accomplished.

8. Review of Plant Nuclear Safety Committee Activities (40500)

The inspectors attended selected PNSC meetings to observe committee activities and verify TS requirements with respect to committee composition, duties, and responsibilities. Minutes from this meeting were also reviewed to verify accurate documentation. The inspector considers the conduct of these meetings to be good and that committee actions/recommendations enhance the safe operation of the plant.

No violations or deviations were identified.

9. Followup of Onsite Events (93702)

Condenser Tube Rupture.

On December 2, 1990, at 6:04 p.m., with the reactor at approximately 90 percent power, the licensee commenced a controlled plant shutdown due to a chemistry action level III on all three steam generators as a result of a main condenser tube rupture. The plant was off line at 9:18 p.m. and the reactor was shutdown at 9:19 p.m. No trips or actuations occurred during the expedited plant shutdown and operators performed well during the plant transient.

Upon inspection it was found that six condenser tubes had been ruptured and thirteen additional tubes damaged. All nineteen tubes were plugged. The cause of the tube ruptures was a baffle plate which broke loose and fell into the tube sheet. A review of ERFIS data and plant logs failed to find a plant condition which could have caused the baffle plate damage. A preliminary inspection of the condenser found additional damage to another baffle plate, which punctured the bottom of the condenser, a broken support structure brace, and loose bolts on one of the low pressure heaters. It was noted that the condensers had been inspected during the last refueling outage but not during the last two reliability outages. Additional detailed inspections of the condenser are planned.

The plant was taken to Mode 5 in order to effect repairs. To restore chemistry, the condensate polisher resin beds were replaced on four of five polishers; the fifth was regenerated. The hotwell was completely

drained; the condensate storage tank was drained and refilled; and the steam generators completely drained and refilled.

10. Exit Interview (30703)

The inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on December 17, 1990. During this meeting, the inspectors summarized the scope and findings of the inspection as they are detailed in this report, with particular emphasis on the violations, and unresolved item addressed below. Licensee representatives acknowledged the inspector's comments and did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

Item Number	Description and Reference
400/90-24-01	URI: Failure to refill the RVLIS reference leg, paragraph 2.a.(2).
400/90-24-02	NC4: Failure to properly monitor fuel pool cooling pump and head exchanger area temperatures as required by TS, paragraph 6.a.
400/90-24-03	NC4: Failure to perform surveillance testing for a radiation monitor, paragraph 6.b.

11. Acronyms and Initialisms

CCTV	-	Closed Circuit Television
CFR	-	Code of Federal Regulations
EPT	-	Engineering Performance Test
ERFIS	-	Emergency Response Facility Information System
GL	-	Generic Letter
HVAC	-	Heating, Ventilation and Air Conditioning
LER	-	Licensee Event Report
LTOP	-	Low Temperature Overpressure Protection
NCV	-	Non-cited Violation
NRC	-	Nuclear Regulatory Commission
OST	-	Operations Surveillance Test
PNSC	-	Plant Nuclear Safety Committee
RCS/RC	-	Reactor Coolant System
RVLIS	-	Reactor Vessel Level Indicating System
RWP	-	Radiation Work Permit
SOOR	-	Significant Operational Occurrence Report
STA	-	Shift Technical Advisor
TS	-	Technical Specification
URI	-	Unresolved Item
WR/JO	-	Work Request/Job Order