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

Report No.: 50-400/86-74

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

Docket No.: 50-400 License No.: CPPR-158

Facility Name: Harris 1

Inspection Conducted: September 15-19, 1986

Inspectors: _____ 10/15/86
M. Thomas Date Signed

_____ 10/15/86
J. Menning Date Signed

_____ 10/15/86
P. B. Moore Date Signed

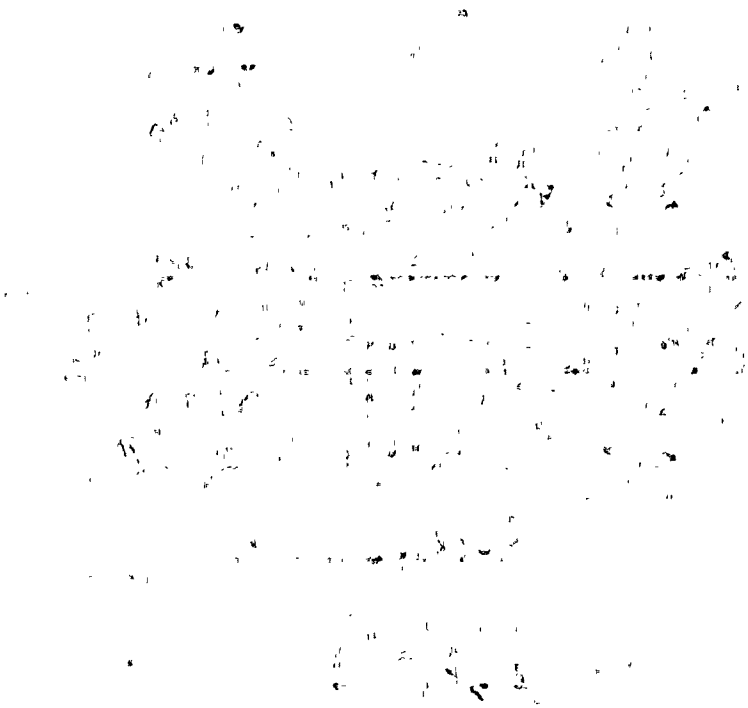
_____ 10/15/86
H. L. Whitener Date Signed

Approved by: _____ 10/15/86
F. Jape, Section Chief Date Signed
Test Programs Section, Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection was conducted in the areas of integrated engineered safeguard features (ESF) test witnessing, integrated leak rate test (ILRT) results review, and review of licensee program addressing service water systems fouling.

Results: No violations or deviations were identified.



REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. A. Watson, Vice President, Harris Nuclear Project
*J. L. Willis, Plant General Manager
*H. R. Banks, Manager, Corporate Quality Assurance
*R. T. Biggerstaff, Principle Engineer, Onsite Nuclear Safety (ONS)
*J. M. Collins, Manager, Operations
J. Dority, Startup Supervisor, Electrical and Instrumentation
*C. L. Dumsday, Startup Engineer
*G. L. Forehand, Director, QA/QC
*J. L. Harness, Assistant Plant General Manager
*C. S. Hinnant, Manager, Startup
*O. N. Hudson, Regulatory Compliance Staff
*G. T. Lew, Engineer
*S. L. Mabe, Startup Supervisor, Balance of Plant
*C. E. Rose, Project QA/QC Specialist
*J. R. Sipp, Manager, Environmental and Radiation Control
*D. Tibbitts, Director, Regulatory Compliance
*R. B. VanMetre, Manager, Technical Support
*M. G. Wallace, Regulatory Compliance Staff

Other licensee employees contacted included startup test engineers, engineers, technicians, operators, security force members, and office personnel.

NRC Resident Inspectors

*G. Maxwell, Senior Resident Inspector
S. Burris, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on September 19, 1986, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The following new items were identified during this inspection.

- IFI 400/86-74-01, Review of ESF test data obtained when power was lost to the computer, paragraph 5.b.

- IFI 400/86-74-02, Review of procedure for weekly monitoring of service water system heat exchangers, paragraph 7.e.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Preoperational Test Witnessing (70315, 70316)

The inspector witnessed the conduct of portions of preoperational (preop) test 1-1090-P-03, Engineered Safety Features (ESF) Integrated Test. This included discussions with the startup manager, startup supervisors and ESF test coordinators, general observations of testing and operations in the control room, and witnessing of the test sections discussed below. The test was witnessed to verify that:

- Appropriate revision of the procedure was available and in use by test personnel.
- Test prerequisites were met.
- Personnel involved in the test were briefed prior to beginning the test.
- Proper plant systems were in service.
- The test was performed in accordance with requirements.
- Test data were collected and recorded for evaluation.
- Problems encountered during testing were properly identified and documented for evaluation.

The following sections of the test were observed.

a. Section 6.1, Train A on preferred power, which demonstrated that all Train A ESF components actuated to their safety positions following receipt of safety actuation signals; verified that the components shedded and sequenced at the proper times; and verified that the components remained in their safety positions following reset of the safety actuation signals.

During performance of Section 6.1 on September 16, 1986, the test coordinator recognized that one page of the test procedure had been inadvertently overlooked which resulted in several steps not being performed. The test was terminated at that point and appropriate actions were taken to perform Section 6.1 over.

After completing Section 6.1, emergency diesel generator (EDG) A was to be paralleled with offsite power and operated at full load until full load temperature conditions were reached. This was in preparation for performance of Section 6.3. During preparations to parallel EDG A with offsite power, the diesel tripped on a high vibration signal. After troubleshooting licensee personnel stated that one of the vibration switches had gone bad. After replacing the vibration switch, EDG A was started and operated in order to properly set the vibration switch. While attempting to shutdown EDG A on two separate occasions, licensee personnel were unable to open the EDG output breaker by using the controls in the main control room or in the EDG A room. The breaker had to be manually tripped. During troubleshooting, the licensee found that some of the windings on the breaker trip coil had shorted, causing the trip coil not to open the breaker. This occurred intermittently. The breaker was replaced with a spare component cooling water pump breaker in order to continue ESF testing. Maintenance work request WR/JO 86-BEWL1 was written to replace the trip coil on the EDG A breaker.

b. Section 6.3, Train A on emergency power, which demonstrated that all Train A ESF components actuated to their safety positions following receipt of safety actuation signals with only design minimum DC voltage available; proper startup of EDG A from a hot condition upon receipt of a loss of offsite power signal and proper operation for the design accident loading sequence to design load requirements; capability of EDG A to maintain voltage and frequency within limits following a loss of the largest single load; ability to transfer the emergency load to offsite power and place EDG A in standby following recovery from a loss of offsite power; and verify proper load group assignments.

During performance of Section 6.3 on September 17, 1986, the computer was lost for a short period of time due to problems with the battery backup power supply for the computer. Licensee personnel stated that losing the power to the computer caused the time resolution to be off by a factor of 10 (1.0 seconds instead of 0.1 seconds). The question was raised as to what effect this had on data acquisition and test results for Section 6.3. The inspector informed licensee personnel that this question will be reviewed when a detailed review of the integrated ESF test results are reviewed during a followup inspection. This item will be tracked as Inspector Followup Item 50-400/86-74-01, Review of ESF test data obtained when power was lost to the computer.

c. Section 6.4, Train B on emergency power. The objectives of this section are the same as those described above for Section 6.3, except that Train B components are tested in this section.

Section 6.4 was performed on September 18, 1986. During performance of Section 6.4, operations personnel inadvertently operated the handswitch that resets the safety injection signal instead of the handswitch that actuates the safety injection signal. This happened because the safety injection signals are initiated several seconds after the loss of

offsite power is initiated. During that time between initiation of the loss of offsite power and initiation of safety injection, the control room was completely dark. Plant systems and equipment were realigned and Section 6.4 was performed over.

d. Section 6.5, Trains A and B on emergency, demonstrated that all Trains A and B ESF components simultaneously actuate to their safety positions following receipt of the safety actuation signals; and the ESF support systems (cooling, ventilation, etc.) can support extended system operation.

Section 6.5 was performed on September 18, 1986. During performance of Section 6.5, the components which were suppose to start in response to the safety injection signals did not start and those which start in response to a loss of offsite power signal did start. Licensee personnel found that the solid state protection system (SSPS) was in the test position instead of the operate position. Licensee personnel stated that the procedural step which places the SSPS in operate (added by test change notice No. 5) had not been performed due to miscommunication between the test coordinator and operations personnel. Plant systems and equipment were realigned and Section 6.5 was repeated.

During performance of the test, the inspector did not observe any major equipment or system logic problems. However, the data obtained during the test had not been reduced to a form where a detailed review could be performed to determine if all the equipment performed as required and all acceptance criteria were met. The test results will be reviewed in detail during a followup inspection.

No violations or deviations were identified.

6. Integrated Leak Rate Test Report Review (70323)

Pursuant to 10 CFR 50, Appendix J, Section VB, the licensee submitted the Reactor Containment Building Integrated Leak Rate Test report to the NRC by letter, dated June 18, 1986, Serial: NLS-86-232. Review of this test report shows that test events have been adequately described, and that test results have been analyzed, evaluated and accurately reported. The evaluation and analysis of test results contained in the report supports the licensee's contention that the leak tight integrity of the reactor containment building has been satisfactorily demonstrated. Also, the test results are consistent with observations and analysis made during witnessing of the test and documented in IE Inspection Report Nos. 50-400/86-08 and 50-400/86-13.

The inspector concludes that the Reactor Containment Building Integrated Leak Rate Test report submitted to the NRC June 18, 1986, meets the requirement of 10 CFR 50, Appendix J, Section VB and is acceptable.

7. Service Water System

Inspection of the service water system involved reviews of system design requirements, preoperational testing, draft technical specification requirements, operating procedures, and program for preventative maintenance, chemistry control, and sampling for Asiatic clams. The reviews in each of these areas are discussed below along with the determinations made by the inspectors.

Although not related to potential fouling problems within the service water system, the inspectors initially reviewed a CP&L report (No. MS-861404 (0) dated August 25, 1986) on the subject of service water system problems. This report presented the findings of a study that was initiated as a result of problems experienced with the system during the early part of 1986 and the failures of several components. In essence, CP&L had compiled a list of service water system problems, evaluated these problems and any corrective action taken, and developed recommendations for the resolution of remaining open items.

a. Review of System Design

The inspectors reviewed the service water system design as described in Section 9.2.1 of the Final Safety Analysis Report, CP&L's system description, and applicable drawings (No. CPL-2163 S-0547 and 0548). The intent was to identify the safety-related components cooled by service water and subsequently determine whether CP&L's plans and procedures for detecting and controlling fouling address all of these components. The inspectors also identified design flow requirements for the safety-related components as part of this review.

b. Review of Preoperational Testing

The inspectors reviewed the Emergency Service Water (ESW) System Pre-operational test. The test was performed on August 28, 1986, and at the time of the inspection, the Joint Test Group had yet to approve the test. There were 5 Test Change Notices written against the test. These included changes to the test document that renumbered valves, changed incorrect valve positions, deleted calibration requirements for lake level instrumentation, and provided for a data sign-off line. These changes were identified in the report and had no significant effect on the validity of the test. Six Test Exceptions were written during the test. Four had to do with not meeting the tight flow tolerances established for the test. The other two concerned a high shutoff head on a Service Water booster pump, and test gauges being out of calibration. All of the exceptions were well explained and properly dispositioned. The test gauges that were out of calibration were recalibrated and a partial retest was performed. The actual test procedure was complete and all steps were signed-off. Acceptance criteria was given and in conjunction with the test exceptions, met. The test appears to have adequately shown that the ESW system will perform properly in an operational mode. This is contigent upon adherance to surveillance instructions and operating procedures. Overall, the ESW system Pre-operational Test appears to be adequate.

c. Review of Draft Technical Specification Requirements

The inspectors reviewed draft technical specification requirements to determine the extent to which related surveillance testing could be used to detect system or component fouling. Section 4.7.4.a requires the verification at least once per 31 days that each emergency service water system valve servicing safety-related equipment, that is not locked, sealed, or otherwise secured in position is in its correct position. Section 4.7.4.b requires the verification at least once per 18 months during shutdown that each emergency service water system automatic valve servicing safety-related equipment or isolating non-safety portions of the system actuates to its correct position on a safety injection test signal, and that each emergency service water pump starts automatically on a safety injection test signal. In addition, Section 4.6.2.3 requires that containment fan coolers be demonstrated operable at least once per 31 days in part by verifying a cooling water flow rate of greater than or equal to 1,500 gpm to each cooler. The inspectors also reviewed the following procedures that are to be used to satisfy these surveillance requirements:

(1) OST-1015, "Emergency Service Water System Operability Monthly Interval - Modes 1, 2, 3, 4," Revision 2, 05/05/86

(2) OST-1010, "Containment Cooling System Operability Test Monthly Interval Modes 1, 2, 3, 4, 5," Revision 2, 05/08/86

(3) OST-1825, "Safety Injection: ESF Response Time, Train A 18 Month Interval Modes 5, 6," Revision 1, 09/17/86

(4) OST-1826, "Safety Injection: ESF Response Time, Train B 18 Month Interval Modes 5, 6," Revision 1, 09/17/96

The inspectors concluded that of the surveillance requirements related to service water system operability, only those associated with the containment fan coolers (Section 4.6.2.3) will be useful for detecting fouling. Cooling water flow rates through the coolers will be determined and recorded monthly, and data can be trended to identify fouling that impedes flow. The surveillance requirements related to the emergency service water system (Sections 4.7.4.a and 4.7.4.b) can be satisfied as long as fouling is not so gross as to restrict valve movement or pump operation.

d. Review of Abnormal Operating Procedures

The inspectors reviewed the following abnormal operating procedure for the service water system to determine if methods are specified for dealing with sudden, fouling-related flow blockages within the system:

- AOP-22, "Loss of Service Water," Revision 1, 04/28/86

Review revealed that this procedure addresses three types of events

loss of an emergency service water header, loss of an emergency service water pump, and loss of a normal service water pump. Methods for dealing with fouling-related flow blockages are not provided. As part of their review of abnormal operating procedures, the inspectors contacted training personnel to determine if the licensed operator training program includes discussions of service water system fouling problems. The training personnel indicated that although heat exchanger fouling is discussed in conjunction with chlorination system and heat transfer theory training, the program does not currently specifically cover fouling-related flow blockage within the service water system and methods to mitigate such events.

e. Review of Preventative Maintenance Program

The inspectors reviewed CP&L's planned preventative maintenance program for the service water system to identify provisions for detecting and controlling fouling. This review revealed that three types of activities are planned that will function to detect and control fouling. CP&L plans to performance test a component cooling water heat exchanger on an annual or semiannual basis. The intent is to determine and trend heat transfer rates. CP&L has also identified the safety-related heat exchangers cooled by service water and plans to inspect at least one of these heat exchangers each outage. Finally, CP&L plans to record and trend instrument readings from certain of the safety-related heat exchangers on a weekly basis. The inspector reviewed the following related procedures:

(1) PPP-212, "Component Cooling Water Heat Exchanger Performance Test," Revision 0, 03/29/85

(2) RPT-001, "Inspection for Asiatic Clams in the Service Water System," Revision 0, 01/29/86

At the time of this inspection, CP&L had not yet developed an approved procedure for the weekly recording of instrument readings from the safety-related heat exchangers. However, a computer printout listing the heat exchangers that are planned to be monitored was available and reviewed by the inspectors. Pending review of the approved procedure that formalizes CP&L's plans, this matter is identified as Inspector Followup Item 400/86-74-02, Review of Procedure for Weekly Monitoring of Service Water System Heat Exchangers.

f. Review of Chemistry Control Program

The inspectors reviewed CP&L's chemistry control program for the service water system to determine whether chlorination is being utilized and whether corrosion control measures have been established for the system's carbon steel piping. The inspectors determined that the service water system is currently chlorinated, primarily for the control of micro organisms. Chlorine level is adjusted as required to maintain bacteria counts below a specified level. It was also

determined that CP&L has instituted a program to inhibit system corrosion by chemical treatment. This program is implemented by contract personnel under the direction of the plant staff. The inspectors reviewed the following procedure for the control of service water system chemistry:

- CRC-155, "Chemistry Control of Circulating Water, Service Water and Cooling Tower Basin," Revision 2, 09/02/86

CP&L also monitors system corrosion via in-stream corrosion coupons and corrosion probes. Cognizant plant personnel indicated that monitoring results to date show that chemical treatment has been effective in significantly reducing corrosion rates. An onsite corrosion simulator is used to confirm levels of chemical treatment. The corrosion simulator is essentially a flow loop in which conditions within the service water system can be simulated. It consists of a miniature cooling tower and heat exchanger, pumps, heaters, and supporting instrumentation to monitor conditions within the loop and corrosion. The inspectors examined both the in-stream monitoring equipment and the corrosion simulator.

g. Review of Program for Asiatic Clam Sampling

The inspectors reviewed CP&L's program for Asiatic clam sampling to determine what sampling requirements have been established and if evidence of clams has been discovered either in plant systems or in the vicinity of the plant. The inspectors reviewed the following procedure that delineates sampling requirements:

- Biology Unit Technical Procedure No. 6.2.3, "Sampling for Asiatic Clams in Intake Bays of the SHNPP Emergency Service Water System and Cooling Tower Makeup System," Revision 2, 01/09/86

CP&L's current program specifies that samples are to be taken semi-annually at emergency service water system intake bays on both the auxiliary and main reservoirs and at a cooling tower makeup system intake bay on the main reservoir. Cognizant personnel indicated that requirements for Asiatic clam monitoring are being modified to include sampling to the fire protection system. CP&L personnel also stated that although evidence of Asiatic clams was found in two samples taken from the vicinity of the plant in 1984, no evidence had been found in any of the samples subsequently taken.

h. Corrective Actions

The inspectors reviewed 4 Design Change Notices and 6 Field Change Notices for completeness and correctness. Access to this information was easy and tracing the documents to the responsible personnel presented no problem. The inspectors found no problems in this area.

i. Conclusions of Service Water System Review

Based on the existing potential for fouling, the inspectors concluded that CP&L's plans and procedures for detecting and controlling service water system fouling appear to be adequate. In the absence of Asiatic clams, the most likely fouling agents are silt/clay, corrosion products, and microorganisms. The ongoing chemistry control program and the planned preventative maintenance program are capable of detecting and controlling these agents. The ongoing Asiatic clam sampling program coupled with preventative maintenance provide means for detecting the presence of clams in the service water system. Should Asiatic clam infestation become a problem in the future, modifications to CP&L's current plans and procedures would likely be required to provide for effective control of system fouling.