



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

NOV - 7 1992

Report Nos.: 50-325/92-42 and 50-324/92-42

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

Docket Nos.: 50-325 and 50-324

License Nos.: DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: November 16-20, 1992

Inspector: Paul J. Fillion
Paul J. Fillion

12/3/92
Date Signed

Approved by: M. Shymlock
Milton Shymlock, Chief
Plant Systems Section
Engineering Branch
Division of Reactor Safety

12-3-92
Date Signed

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of engineering and technical support. The implementation of modifications and repair work on electrical systems was inspected.

Results:

In the areas inspected, violations or deviations were not identified. Good effort in identification and resolution of equipment problems was noted, for example, in the current transformer replacement project (section 2b).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

P. Berry, Procurement Engineer
C. Bowen, Systems Engineer
*J. Brown, General Manager Unit 2
J. Cannon, Systems Engineer
J. Deitrick, Supervisor, Electrical Analysis
R. Drew, Systems Engineer
*S. Floyd, Manager, Regulatory Compliance
T. Jones, Sr. Specialist, Regulatory Compliance
*J. Leininger, Site Manager, Nuclear Engineering Department
*G. Miller, Manager, Systems Engineering
*R. Morgan, General Manager Unit 1
J. O'Connor, Electrical Unit Manager, Nuclear Engineering Department
*S. Tabor, Sr. Specialist, Regulatory Compliance
W. Shade, Sr. Electrical Engineer, Nuclear Engineering Department
T. Simonson, Systems Engineer

Other licensee employees contacted during this inspection included engineers, security force members, technicians, and administrative personnel.

NRC Resident Inspector

*R. Prevatte

*Attended exit interview

2. Engineering and Technical Support (37700)

Engineering and technical support activities were evaluated using four projects related to electrical systems as examples. The four projects were:

- Replacement of batteries which were approaching end of useful life
 - Replacement of defective current transformers
 - Installation of control switches to allow quick interconnection of Unit 1 and Unit 2 buses in a blackout scenario
 - Root cause analysis and repairs to non-safety-related uninterruptible power supplies.
- a. Replacement of the safety-related batteries

Due to the fact that the safety-related 250/125V batteries in Unit 2 were approaching the end of their service life (they were approximately 17 years old), the batteries were replaced in late

1991. The new batteries were model NCX-17 manufactured by GNB Batteries, Inc and they had a 1200 A-H rating. They were essentially identical to the batteries they replaced.

The Unit 1 batteries were the same model number and age as the Unit 2 batteries. The Unit 1 batteries were scheduled for replacement with new NCX-17's in early 1993. The Unit 1 batteries were on-site at the time of the inspection and were undergoing conditioning procedures.

The batteries installed in Unit 2 were purchased commercial grade from GNB Batteries, Inc. because the manufacturer did not offer safety-related batteries at the time the purchase order was placed. Licensees are allowed to purchase commercial grade equipment for installation in safety-related systems as long as the equipment is found acceptable by careful evaluation known as a dedication process. This dedication process included three major elements:

- (1) A review of GNB's quality assurance program of commercial grade batteries. Seismic qualification was included.
- (2) Receipt inspections defined by the engineer.
- (3) Testing of certain parts at CP&L's test facility.

The NRC inspector reviewed the details of the dedication process and concluded that it was adequate.

Acceptance capacity tests were performed at the factory and a service test was performed after installation. The NRC inspector reviewed the results of both these tests, and found them acceptable.

When the purchase order was placed for the Unit 1 batteries, GNB Batteries incorporated had a contract with Nuclear Logistics, Inc. (NLI) of Fort Worth, Texas, to provide a quality assurance program which would allow upgrading the commercial grade batteries to safety-related batteries. Therefore, the Unit 1 batteries were purchased safety-related. After manufacture the batteries were shipped to NLI for acceptance capacity testing. At the time the Brunswick batteries were at NLI for testing, NLI's testing program had identified a problem with the one-minute ratings published by GNB for the NCX series of batteries. For example, NLI demonstrated that the NCX-17 had a one-minute capacity of 1165 Amperes instead of the originally published capacity of 1306 Amperes. The error that GNB had been making was that they were not considering the momentary voltage dip caused by the Coup de Fouet effect when determining the one-minute rating. The performance tests were performed by GNB in such a manner that they did not detect the Coup de Fouet effect. NLI issued a report pursuant to 10 CFR 21 regarding the revised one-minute rates. The

NRC performed an inspection at the GNB factory to investigate this matter in August, 1992. Results of this inspection are contained in NRC Inspection Report 99901251/92-01.

The licensee has evaluated the impact of the reduced one-minute rating for their particular application. Their conclusion was that the batteries remain OPERABLE and that only the excess capacity margin was reduced. The NRC inspector reviewed this evaluation and agreed that the conclusion was correct.

The licensee's procedure for the service test to be performed at 18-month intervals according to the Technical Specification was also reviewed. The inspector focused on the procedure steps, test equipment and criteria with regard to the first minute. The test set applied the proper value of current and was programmed to stop the test if the voltage went below 105V at any time. The test was in concert with the system voltage calculations which assumed a minimum battery voltage of 105V throughout the duty cycle. Therefore, the test procedure was good in that it empirically demonstrated that the battery could deliver the design current and voltage.

b. Replacement of Safety-Related Current Transformers (CT's)

During the course of performing routine maintenance inspections of the 4KV switchgear, the licensee noticed cracks on the case of a current transformer which was mounted in the cable compartment. Then special inspections on that same day identified twenty-two cracked current transformers. In all these cases, the cracks could be seen at the top of the CT, and penetrated the secondary winding potting compound. The discoveries were made on February 21, 1991.

On April 9, 1991, ASEA Brown Boveri (ABB), the manufacturer of the CT's, issued a Part 21 Report which addressed the same type CT's installed at Brunswick. A supplementary Part 21 Report was issued April 30, 1991. In essence these reports state that the surface cracks on the CT's could result in reduced Basic Impulse Level (BIL) of the CT. They also recommended that the older CT's which had epoxy insulation be replaced with the newer model which had polyurethane based insulation. Only CT's which exhibited the cracking needed to be replaced. Periodic inspections will continue.

At the time of the inspection the licensee had identified 39 cracked CT's. At least 27 of these had already been replaced. All the cracked CT's would be replaced before startup of the Units. The inspector randomly selected two switchgear compartments to confirm that the changeout work had been done. The compartments selected were:

- * Residual Heat Removal Service Water Pump 2B

* Residual Heat Removal Service Water Pump 1B

The inspector observed that the work had been properly done.

Records indicated that each new CT was thoroughly tested at the factory and received ratio and insulation resistance tests at the site.

The evolution described above represents good effort on the part of the licensee in identification and resolution of equipment problems. A potential problem was identified during the course of preventive maintenance inspections by a craftsman, it was reported to the appropriate individuals, aggressive followup was conducted and conservative actions were taken.

c. Installation of Control Switches to Allow Quick Interconnection of Unit 1 and Unit 2 Buses in a "Station Blackout" Scenario.

According to the licensee's submittal made pursuant to 10 CFR 50.63, Loss of all alternating current power, the licensee has installed new local control switches to allow quick interconnection of the Unit 1 and Unit 2 buses as part of a strategy for coping with loss of all AC power on one Unit. The interconnecting bus duct and circuit breakers had been installed since original construction, but the breakers had been maintained racked out. The new local control switches were fully operational at the time of the inspection.

The inspector interviewed the cognizant engineers to ascertain that all appropriate design considerations were addressed, that an adequate test program was carried out and that operators were properly trained on use of the new switches. The inspector also walked down the switchgear to confirm that the switch nameplates were correct.

d. Repairs to Uninterruptible Power Supplies 1A, 1B, 2A and 2B.

Unit 1 experienced an automatic reactor scram in January, 1992. The initiating event was a malfunction in the non-safety-related vital bus uninterruptible power supply (UPS) primary power source. Root cause analysis which was carried out by the licensee and the manufacturer concluded that two printed circuit cards had failed.

The modulation index control MIC card for phase "A" was found to have a defective capacitor. The manufacturer has no history of failures of the MIC card to indicate a problem with components or workmanship. They believe that the failure of this card was due to random component failure. Nevertheless, the licensee has elected to replace the MIC cards in all the UPS. One reason for this decision was that the capacitors could be exhibiting deterioration due to aging. At the time of the inspection, 9 of the 12 MIC cards had been replaced.

The synchronizer card was found to have a defective integrated circuit. The licensee has replaced the synchronizer cards in all UPSs with ones having a more rugged chip.

In addition to the replacement of parts, additional testing and alignment was conducted by the manufacturer and CP&L personnel on the 1A UPS.

The inspector concluded that the root cause analysis of the UPS failure and subsequent corrective actions were adequate.

3. Exit Interview

The inspection scope and results were summarized on November 20, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report.