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

Report No.: 50-395/88-27

Licensee: South Carolina Electric and Gas Company
Columbia, SC 29218

Docket No.: 50-395 License No.: NPF-12

Facility Name: Summer

Inspection Conducted: October 31 - November 4, 1988

Inspector: for Mark Jape 11/18/88
P. T. Burnett Date Signed

Approved by: Jape 11/18/88
F. Jape, Chief Date Signed
Test Programs Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, announced inspection addressed the areas of refueling activities, routine surveillance of core power distribution limits, shutdown margin and reactivity anomaly, moderator temperature coefficient at power, and calibration of nuclear instruments.

Results: One industrial safety hazard was identified, an improperly secured high-pressure gas bottle on a fuel handling bridge - paragraph 2.

The frequency of instrument performance checks of the incore moveable detectors was questioned - paragraph 3.d.

A need for an additional acceptance criterion in the quarterly incore-excore nuclear instrument correlation was identified - paragraph 6.

No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*M. N. Browne, General Manager, Station Support
*R. M. Campbell, Senior Engineer ISEG
*H. I. Donnelly, Senior Engineer, Regulatory Interface
W. Higgins, Supervisor, Regulatory Compliance
W. Haltiwanger, Senior Reactor Engineer
*S. R. Hunt, Manager, Quality Systems
*A. R. Koon, Manager, Nuclear Licensing
*K. W. Nettles, General Manager, Nuclear Safety
J. Shepp, Associate Manager, Operations
*J. L. Skolds, General Manager, Nuclear Plant Operations
G. J. Taylor, Manager, Operations
*D. C. Warner, Manager, Core Engineering and Nuclear Computer Services
*M. B. Williams, General Manager, Nuclear Services
K. W. Woodward, Manager, Nuclear Operations Education and Training

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

NRC Inspector

P. Hopkins, Resident Inspector

*Attended exit interview

A list of acronyms and initialisms used in this report is given in the final paragraph.

2. Refueling Activities for Cycle 5 (60170)

Defueling and refueling activities for the end of cycle 4 and the beginning of cycle 5 were scheduled and controlled by REP-107.002 (Revision 3), Core Shuffle. This inspection started with refueling about one-third completed. A review of the working copy of the procedure and the refueling log book confirmed that the procedure had been maintained up-to-date and that no significant fuel handling problems had been encountered.

The inspector witnessed the management of refueling activities from the command post in the control room and observed the movement of fuel in the refueling canal and reactor vessel and in the spent fuel pool. The senior operator for refueling was on the refueling bridge whenever fuel was being moved in the vessel. Another SRO was stationed in the spent fuel pool area. Actual fuel manipulations were performed by contractor personnel under the supervision of the SROs.

One example of an industrial safety hazard was noted. A large nitrogen gas bottle was mounted on the fuel handling bridge in the SFP and was secured with twine. The usual practice is to secure gas bottles with chain. When the problem was identified to the SRO on the floor, he immediately took action to secure the bottle at two elevations with heavy fabric straps and to replace the protective cap on the bottle. The nitrogen was used to power a gripper on a fuel insert handling tool, and that activity will be part of most future refueling programs. At the exit interview, the licensee agreed to provide a proper stanchion or vertical cradle to secure the gas bottle properly.

Control room activities included monitoring ICRR for each assembly addition to the core. The grapple was released only when an acceptable ICRR was calculated. The inspector confirmed that new baseline count rates were obtained and a new statistical reliability test performed whenever there was an extended interruption in refueling activities.

Other fuel handling procedures reviewed for technical content and found to be satisfactory included:

a. REP-106.012 (Revision 1), Unusual Operations Involving Fuel Inserts,

b. REP-106.016 (Revision 1), Fuel Integrity Monitoring

No violations or deviations were identified

3. Surveillance of Core Power Distribution Limits (61702)

The following procedures used in surveillance of core power distribution were reviewed for technical adequacy and implementation of TS surveillance requirements:

a. STP-212.001 (Revision 4), Reactor Core Flux Mapping,

b. STP-204.001 (Revision 4), Hot Channel Factor Tests, and

c. STP-205.001 (Revision 5), RCS Flow Rate and R Determination.

All procedures were found to be acceptable in content.

Station records for operating cycle 4 (June 1987 to August 1988) were reviewed to determine if these STPs were performed with acceptable frequency and acceptable results. For all of these STPs, the records confirmed both acceptable frequency and results. However, one question arose regarding the method of performing a test:

d. STP-212.001 has provisions for determining the optimum excitation voltage for the moveable incore detectors by running a current versus voltage curve or plateau. This operation was, apparently performed only twice in the cycle: on 6-9-87 at 27% RTP and on 6-11-87 at 99.7% RTP. The cycle extended to August 1988 without further testing of

the voltage saturation curve; as far as can be determined by the records sent to permanent storage. Such infrequent determination of the plateau is permitted by step 6.9.2 of the procedure, but is not typical of industry practice. At the exit interview, the licensee agreed to review this aspect of the procedure.

4. Determination of Reactor Shutdown Margin and Reactivity Balances (61707)

The following procedures used in surveillance of core shutdown margin, estimated critical conditions and reactivity anomaly were reviewed for technical adequacy and implementation of TS surveillance requirements:

a. STP-134.001 (Revision 7), Shutdown Margin Verification,

b. STP-201.001 (Revision 3), Core Reactivity Balance,

c. REP-109.022 (Revision 1), Inverse Count Rate Ratio Plot, and

d. REP-109.001 (Revision 0), Calculation of Estimated Critical Conditions.

Station records for operating cycle 4 (June 1987 to August 1988) were reviewed, or sampled, to determine if these STPs were performed with acceptable frequency and acceptable results.

e. Performance of STP-134.001 was sampled. Over 20 procedures completed in modes 2 - 5 were examined and found acceptable.

f. STP-201.001 was performed, as required, on 31 EFPD intervals with acceptable results. Typically the reactivity deviations from the boron letdown curve were less than 100 pcm, or well within the limit of 1000 pcm.

g. REP-109.001 requires a comparison of predicted and actual critical conditions and a justification for the difference if it exceeds 50 steps on D bank. In the one case during the cycle (June 17, 1987) in which the agreement was outside the limit, no justification was provided in or appended to the procedure. However, in the file containing all of the copies of this procedure completed in cycle 4, there was a five-page hand written analysis of the startup in question. All of the contributors to the difference appeared to be examined adequately. However, this analysis should have been noted in the appropriate section of the procedure and appended to the procedure.

5. Measurement of Moderator Temperature Coefficient at End of Core Life (61708)

STP-210.001 (Revision 4), was performed on June 22, 1988 at an equilibrium C_B of 275 ppmB. Power was held constant within 0.3% RTP while C_B was first increased and them decreased 17 ppmB with the reactivity change compensated by changes in RCS average temperature. The two resulting

measurements of MTC were in good agreement, -30.7 pcm/°F and -29.9 pcm/°F respectively, and were acceptably more positive than the limiting value of - 33 pcm/°F of TS 4.1.1.3b. An attempt was made to measure the MTC at EOL by correlation of burnup and temperature reduction necessary to maintain constant power. The result was acceptable from a TS standpoint, but was in poor agreement with the value from the boron change method and with the prediction, hence it was discarded.

6. Incore/Excore Detector Calibration (61705)

STP-209.002, Incore versus Excore Axial Offset, was performed at 90 day intervals throughout cycle 4. For all of the five sets of measurements, the range of incore axial offset obtained spanned the range observed in the unperturbed condition throughout the cycle. For the first two measurements, the data packages contained the correlation coefficients of the fits of incore axial offset versus chamber current for each of the eight chambers. This information was absent from the remainder. The confidence that can be placed in the measurements and the quality of the measurements are directly related to the correlation coefficients. This information should be part of the retained records, and an acceptance criterion established for the correlation coefficient.

A related procedure, STP-202.001 (Revision 3), Target Axial Flux Difference Measurements was performed with 31 EFPD frequency throughout the cycle. The target stayed within a very narrow band from +1.75% to -3.3% over the entire cycle.

7. Followup of Previous Violation (92702)

(Closed) Violation 395/88-07-01: Failure to properly implement procedures. The licensee has completed corrective action to require a series of STPs and the REPs be revised to require independent verification of all procedure results. This item is closed.

8. Exit Interview

The inspection scope and findings were summarized on November 4, 1988, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

9. Acronyms and Initialisms Used in This Report

EFPD - Effective Full Power Day
EOL - End Of Life
ICRR - Inverse Count Rate Ratio
ISEG - Independent Safety Engineering Group
MTC - Moderator Temperature Coefficient

pcm - Percent Millirho
ppmB - Parts Per Million Boron
RCS - Reactor Coolant System
REP - Reactor Engineering Procedure
RTP - Rated Thermal Power
SFP - Spent Fuel Pool
SRO - Senior Reactor Operator
STP - Surveillance Test Procedure
TS - Technical Specification