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O'REILLY,J.P. Region 2, Atlanta, Office of the Director

SUBJECT: Forwards Cycle 7 startup physics test rept.

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October 26, 1979

FILE: NG-3513 (R) SERIAL: GD-79-2678

Mr. James P. O'Reilly, Director
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, GA 30303

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
START-UP PHYSICS TEST REPORT

Dear Mr. O'Reilly:

In accordance with Section 6.9.1.a of the Technical Specifications for the H. B. Robinson Steam Electric Plant, Unit No. 2, the attached Cycle 7 Start-up Physics Test Report is submitted. This report fulfills the requirement for a summary report within ninety (90) days of the completion of the start-up test program following reactor power uprating.

The H. B. Robinson Unit No. 2 reactor power level was uprated from 2200 MWt to 2300 MWt during the Cycle 7 refueling outage. As outlined in our letter from Mr. E. E. Utley to Mr. A. Schwencer on March 17, 1978, additional core power distribution measurements were taken at 95.7% power (2200 MWt) and 100% power (2300 MWt). Also, NSSS parameters were closely monitored to ensure temperatures and pressures followed their expected trends during the last 100 MWt escalations in power, which they did.

Yours very truly,

B. J. Furr
Vice President - Generation

GD/CSB/jnh*
Attachment

A027
S/1

411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

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Enclosure To
Serial: GD-79-2678

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON UNIT NO. 2

CYCLE 7 STARTUP PHYSICS TEST RESULTS

Cycle 7 Initial Criticality: July 16, 1979.

Startup Physics Test Completion Date: July 30, 1979.

I. All Rods Out Critical Boron Concentration Measurements:

A. Acceptance Criteria: Prediction and measurement shall agree within ± 50 PPM.

B. Results:

Prediction: 1216 PPM

Measurement: 1227 PPM

Difference: 11 PPM

II. Control Rod Worth Measurements:

A. Acceptance Criteria:

1. Control Bank "C" integral reactivity worth prediction and measurement shall agree within ± 15%.
2. Control Bank "D" integral reactivity worth prediction and measurement shall agree within ± 15%.
3. Control Banks "C" & "D" combined integral reactivity worth prediction and measurement shall agree within ± 10%.

B. Results:

Bank	Prediction	Measurement	% Difference
C	745	723	-3.0
D	1279	1270	- .7
D&C	2024	1993	-1.5

pb

III. Moderator Temperature Coefficient Measurements:

A. Acceptance Criteria:

Sufficient data shall be collected to implement administrative controls to ensure that the moderator temperature coefficient during power escalation is non-positive.

B. Results:

Bank "D" Position	Bank "C" Position	Boron Concentration	Moderator Temperature Coefficient (PCM/°F)
211	228	1215 PPM	+2.82
0	209	1165 PPM	+0.26
42 (Overlap)	170	1145 PPM	-0.01
0	120	1119 PPM	-1.16

Administrative controls were implemented to ensure a non-positive moderator temperature coefficient during power escalation. These controls were based on the control rod positions and boron concentrations which were observed during the moderator temperature coefficient measurements.

IV. Power Distribution Measurements:

Flux maps were taken at approximately 0, 30, 70, 90, 95.7, and 100% power.

A. Acceptance Criteria:

1. Hot zero power map:

a. Assembly wise $F_{\Delta H}$ <(1.08 X predicted) if ($F_{\Delta H}$ predicted) $\geq$ 1.0.

b. Assembly wise $F_{\Delta H}$ < (1.15 X predicted) if ($F_{\Delta H}$ predicted) < 1.0.

c. Quadrant tilts < 1.02.

IV. Continued

2. Power maps:

a. $F_Q(Z) \leq 2.2/P$ P = Fraction of full power $P \geq 50\%$

b. $F^N_{\Delta H} < \begin{cases} \leq 1.55 & P \geq 50\% \\ \leq 4.4 & P < 50\% \end{cases} \frac{(1 + .2(1-P))}{1.04}$

c. Quadrant tilts < 1.02

B. Results:

1. Hot zero power map:

All assemblies satisfied the $F_{\Delta H}$ acceptance criteria. The most limiting comparisons were:

a. For $F_{\Delta H}$ predicted $\geq$ 1.0, quarter core location G-8.

Prediction = 1.071 1.08 X Prediction = 1.157

Measurement = 1.151

b. For $F_{\Delta H}$ predicted < 1.0 quarter core location G-9.

Prediction = .943 1.15 X Prediction = 1.084

Measurement = 1.022

The HZP quadrant tilts satisfied the acceptance criteria. The largest quadrant tilt measured was 1.004 (.4%) in the Northeast quadrant.

2. Power maps.

All maps satisfied each acceptance criteria. The following is a summary of the results:

% Power	F_Q Limit	$F_Q(Z)$	$1.55 \frac{(1 + .2(1-P))}{1.04}$	$F^N_{\Delta H}$	Maximum Quadrant Tilt
31	4.400	2.124	1.696	1.425	1.000 (<.1%)
69	3.188	2.390	1.583	1.390	1.009 (.9%)
90	2.444	1.974	1.520	1.393	1.008 (.8%)
95	2.316	1.974	1.505	1.401	1.008 (.8%)
100	2.200	1.880	1.490	1.399	1.005 (.5%)