

50-269-270-287

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TO: MR B C RUSCHE

FROM: DUKE POWER CO  
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PLANT NAME: Oconee

## ENCLOSURE

OCONEE NUCLEAR STATION UNIT 2 CYCLE 2 ZERO  
POWER PHYSICS TEST REPORT.....

ACKNOWLEDGED

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## SAFETY

## FOR ACTION/INFORMATION

ENVIRO

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| MIPC  | MACCARRY       | KIRKWOOD                                     | ERNST  |
| CASE  | KNIGHT         |  | BALLARD  |
| HANAUER                                       | SIHWEIL        | OPERATING REACTORS                           | SPANGLER                                       |
| HARLESS                                       | PAWLICKI       | STELLO                                       |  |
|   |                |  | SITE TECH.                                     |
| PROJECT MANAGEMENT                            | REACTOR SAFETY | OPERATING TECH.                              | GAMMILL  |
| S- BOYD                                       | ROSS           | <input checked="" type="checkbox"/> EISENHUT | STEPP  |
| P. COLLINS                                    | NOVAK          | <input checked="" type="checkbox"/> SHAO     | HULMAN   |
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| PETERSON                                      | CHECK          | <input checked="" type="checkbox"/> BUTLER   | SITE ANALYSIS                                  |
| MELTZ   |                | <input checked="" type="checkbox"/> GRIMES   | VOLLMER  |
| HELTEMES                                      | AT & I         |  | BUNCH  |
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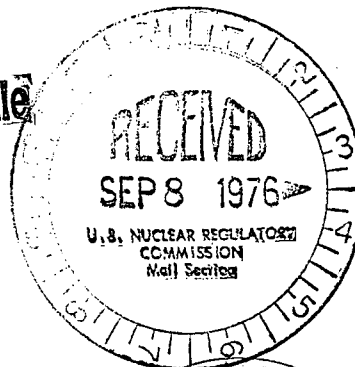
DUKE POWER COMPANY  
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422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.  
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STEAM PRODUCTION

TELEPHONE: AREA 704  
373-4083

Regulatory Docket File

August 27, 1976



Mr. Benard C. Rusche, Director  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Attention: Mr. A. Schwencer, Chief  
Operating Reactors Branch No. 1

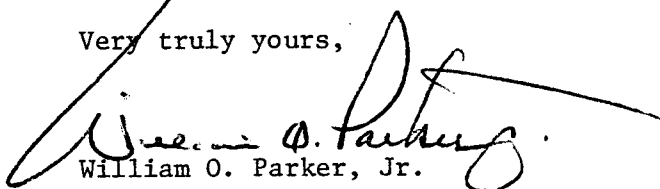


Re: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287

Dear Mr. Rusche:

Attached is the Oconee Unit 2, Cycle 2 Zero Power Physics Test Report, which provides a comparison of the predicted core physics parameters with those measured during the Cycle 2 zero power physics test program of Oconee Unit 2. This report is submitted in conformance with the Commission's request as specified in the safety evaluation report accompanying your letter of June 30, 1976.

Very truly yours,

  
William O. Parker, Jr.

EDB/PMA:vr  
Attachment

OCONEE NUCLEAR STATION  
UNIT 2

CYCLE 2 ZERO POWER PHYSICS TEST REPORT

The Cycle 2 startup test program for Oconee Unit 2 consisted of pre-critical tests, zero power physics tests, and power escalation tests. This report provides a summary of the zero power test results and includes comparisons of measured and predicted values of important core parameters.

The Cycle 2 zero power testing was initiated on July 8, 1976, and consisted of critical boron concentration and boron worth measurement, temperature reactivity coefficient measurement, control group worth measurement, and ejected rod worth measurements. All tests were conducted at hot zero power conditions (532°F, 2155 psig, and 0 %FP). A summary of the results of these tests follows:

1. Critical Boron Concentration and Boron Worth Measurement

Deboronation to criticality was started with an initial Reactor Coolant System boron concentration of 1835 ppmb, and criticality was achieved with a boron concentration of 1420 ppmb. The boron concentration for the all-rods-out condition was determined to be 1426 ppmb. This value differed by only 4 ppmb from the predicted value of 1430 ppmb and was well within the acceptance criterion requiring agreement within 100 ppmb.

The differential boron worth was measured to be 1.03%  $\Delta k/k/100$  ppmb. This value was within 2.2 percent of the predicted worth of 1.008%  $\Delta k/k/100$  ppmb and met the acceptance criterion requiring agreement within 10 percent.

2. Temperature Reactivity Coefficient Measurement

Temperature reactivity coefficients were determined for the condition in which all control rods were fully withdrawn and for the condition in which only the safety rods (Groups 1-4) were withdrawn.

Table 1 compares the results of the measurements with their respective predicted values, and it is seen that the test results were within the acceptance criterion limit.

3. Control Rod Group Worth Measurement

Table 2 summarizes the results of the control rod group worth measurements. As indicated, measured values of all control rod group worths are within acceptance tolerances. The most important quantity among control rod group worths is the total group worth, and it is note worthy that the measured and predicted values of the total group worth are in remarkable agreement (within 1.7 percent of each other).

4. Ejected Rod Worth Measurement

The value of the worst case ejected rod worth was measured to be 0.51%  $\Delta k/k$ , as compared to the predicted value of 0.59%  $\Delta k/k$ , and is well below the maximum allowable value of 1.0%  $\Delta k/k$ .

TABLE 1

COMPARISON OF PREDICTED TEMPERATURE COEFFICIENTS  
WITH THOSE MEASURED DURING ZERO POWER PHYSICS TESTS

|                 | Measured Value<br>( $10^{-4} \Delta k/k/^{\circ}F$ ) | Predicted<br>Value<br>( $10^{-4} \Delta k/k/^{\circ}F$ ) | Deviation From<br>Predicted Value<br>( $10^{-4} \Delta k/k/^{\circ}F$ ) | Acceptance<br>Tolerance<br>( $10^{-4} \Delta k/k/^{\circ}F$ ) |
|-----------------|--|--|---|---|
| All rods out    | 0.24   | 0.05   | 0.19  | $\pm 0.4$   |
| Safety Rods Out | -0.45  | -0.68  | 0.23  | $\pm 0.4$   |

TABLE 2

COMPARISON OF MEASURED AND PREDICTED  
CONTROL ROD GROUP WORTHS

| CRA Group | Measured Worth<br>% $\Delta k/k$ | Predicted Worth<br>% $\Delta k/k$ | % Difference | (%)<br>Acceptance<br>Tolerance |
|-----------|----------------------------------|-----------------------------------|--------------|--------------------------------|
| 7         | 0.767                            | 0.830                             | 7.6          | $\pm 20$                       |
| 6         | 1.024                            | 1.189                             | 13.9         | $\pm 20$                       |
| 5         | 0.709                            | 0.813                             | 12.8         | $\pm 20$                       |
| 1-4       | 7.15                             | 6.987                             | 2.3          | $\pm 20$                       |
| TOTAL 1-7 | 9.65                             | 9.82                              | 1.7          | $\pm 15$                       |