

BALTIMORE GAS AND ELECTRIC COMPANY

CALVERT CLIFFS NUCLEAR POWER PLANT

UNIT 2

Docket No. 50-318

License No. DPR-69

SUMMARY OF STARTUP TESTING

FOR CYCLE SIX

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SUMMARY OF STARTUP TESTING FOR
CALVERT CLIFFS UNIT TWO CYCLE SIX

- I. The following tests were conducted for the startup of Calvert Cliffs Unit Two Cycle Six. All tests were conducted in a manner similar to Initial Startup (Reference 1).
 - A. CEDM/CEA Performance Test
 - B. RCS Flow Verification
 - C. Initial Criticality
 - D. CEA Symmetry Check
 - E. Critical Boron Concentration Measurements
 - F. Isothermal Temperature and Power Coefficient Measurements
 - G. Group Rod Worth Measurements
 - H. Power Distribution Measurements

- II. The results of these tests and comparison with predictions are as follows:
 - A. The proper functioning of the CEDMs and CEA position indication was verified through insertion and withdrawal of CEAs. All CEAs reached a 90% insertion in less than 3.1 seconds at hot, full flow conditions. The slowest CEA (56) reached 90% insertion in 2.54 seconds.
 - B. Reactor Coolant Flow was verified to be consistent with previous testing.
 - C. Initial criticality was achieved at 1615 ppm Boron with CEA Group 5 at 87.7" withdrawn. Predicted value was 1576 ppm Boron.
 - D. The CEA Symmetry Check verified that all CEAs were attached to their extension shafts. An evaluation of the quantitative reactivity change for dual CEAs yielded an azimuthal tilt estimate of 2.75%, well within the 10% acceptance limit.

E. Critical Boron Measurements - Table 1.

F. Isothermal Temperature and Power Coefficients - Table 2.

G. CEA Group Worth Measurements - Table 3.

H. Power Distribution Measurements - Table 4, Figure 1 and 2.

III. All tests were within acceptance limits.

The ARO zero power Moderator Temperature Coefficient (MTC) was determined to be $+54 \times 10^{-4}$ delta rho/ $^{\circ}$ F. Although this was well within the acceptance criteria (± 3 of prediction), it exceeded the Technical Specification limit of $+5 \times 10^{-4}$ delta rho/ $^{\circ}$ F. Special test exception 3.10.2 was invoked until Low Power Testing was complete, at which time CEAs were inserted to reduce MTC. Operational restrictions were placed on boron concentration to ensure that MTC remained within limits during power escalation and early in the cycle until excess core reactivity was reduced. These actions were taken with concurrence from the fuel vendor and the Plant Safety Committee.

TABLE 1
CRITICAL BORON MEASUREMENTS

	<u>Measured</u>	<u>Predicted</u>
All Rods Out, 532°F CEA Group's	1629 ppm	1590 ± 50 ppm
Inserted 5,4,3,2,1	1366 ppm	1336 ± 50 ppm

TABLE 2
ISOTHERMAL TEMPERATURE COEFFICIENTS AND POWER COEFFICIENTS

	<u>Measured</u>	<u>ITC</u> <u>Predicted</u>
Zero Power, CEA Group 5 at All Rods Out	+0.389 x 10 ⁻⁴ delta Rho/°F	+0.30 ± 0.3 x 10 ⁻⁴ delta Rho/°F
50% Power, CEA Group 5 at 105" Withdrawn	-0.020 x 10 ⁻⁴ delta Rho/°F	0.03 ± 0.3 x 10 ⁻⁴ delta Rho/°F
100% Power, CEA Group 5 at 105" Withdrawn	-0.319 x 10 ⁻⁴ delta Rho/°F	-0.27 ± 0.3 x 10 ⁻⁴ delta Rho/°F

POWER COEFFICIENT

50% Power, CEA Group 5 at 105" Withdrawn	-1.012 x 10 ⁻⁴ delta Rho/% Power	-1.00 ± 0.2 x 10 ⁻⁴ delta Rho/% Power
100% Power, CEA Group 5 at 105" Withdrawn	-0.933 x 10 ⁻⁴ delta Rho/% Power	-0.88 ± 0.2 x 10 ⁻⁴ delta Rho/% Power

TABLE 3
CEA GROUP WORTH MEASUREMENTS

	<u>Measured</u> <u>(% delta Rho)</u>	<u>Predicted</u> <u>(% delta Rho)</u>
Group 5	0.396	0.420 ± .063
Group 4	0.215	0.233 ± .035
Group 3	0.585	0.615 ± .092
Group 2	0.378	0.403 ± .060
Group 1	<u>0.700</u>	<u>0.754 ± .113</u>
TOTAL	2.274	2.425 ± .242

TABLE 4
POWER DISTRIBUTION MEASUREMENTS

	<u>50% Power</u>		<u>100% Power</u>	
	<u>Measured</u>	<u>Acceptance</u> <u>Limits</u>	<u>Measured</u>	<u>Acceptance</u> <u>Limits</u>
F_{xy}^T	1.6804	1.785	1.5994	1.700
F_r^T	1.5972	1.720	1.5197	1.650
T_q	0.0109	0.030	0.0036	0.030

[illegible]

UNIT 2 CYCLE 6

MEASURED: 97.0% POWER, EQUILIBRIUM XENON, BANK 5 @ 105 IN. WITHDRAWN, 302.4 MWD/T

FIGURE 2

[illegible]

REFERENCES

1. Calvert Cliffs Nuclear Power Plant Unit 2 Startup Test Report, May 12, 1977.



CHARLES CENTER • P. O. BOX 1475 • BALTIMORE, MARYLAND 21203

ARTHUR E. LUNDVALL, JR.
VICE PRESIDENT
SUPPLY

October 8, 1984

Dr. Thomas E. Murley
Regional Administrator
U.S. Nuclear Regulatory Commission
Region 1
631 Park Avenue
King of Prussia, PA 19406

SUBJECT: Calvert Cliffs Nuclear Power Plant Unit No. 2,
Docket No. 50-318 Report of Startup Testing for
Cycle 6

Gentlemen:

Startup testing for Calvert Cliffs Unit 2, Cycle 6 was completed on July 23, 1984. A summary of the results from those tests is enclosed.

Very truly yours,

AEL/JFW/jes

Enclosure

cc: Director Inspection and Enforcement
U.S. Nuclear Regulatory Commission
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