

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 SECOND CYCLE

790212 0158

SUMMARY OF STARTUP TESTING
FOR
CALVERT CLIFFS UNIT TWO SECOND CYCLE

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

- II. The results of these tests and comparison with predictions are as follows:
 - A. All trippable CEA's reached a 90% insertion in less than 3.0 seconds at hot, full flow conditions. Except for those CEA's currently residing in Small Flow Hole Design Guide Tubes, there were no significant differences from previous tests. Table 1 presents a comparison between CEA's which have resided in both the Standard (large flow hole) and Small Flow Hole Design Guide Tubes.
 - B. Reactor Coolant System flow was verified not to have undergone any significant changes since the first cycle.

- C. The CEA Symmetry Check verified that all CEA's were attached to their extension shafts.
- D. Initial Criticality was achieved at 1153 ppm Boron with CEA Group Five at 68" withdrawn. Predicted value was 1180 ppm.
- E. Critical Boron Measurements - Table 2.
- F. Isothermal Temperature Coefficients - Table 3.
- G. CEA Group Worth Measurements - Table 4.
- H. Power Coefficient Measurements - Table 3.
- I. Power Distribution Measurements - Table 5.

III. All test results were within acceptance limits.

REFERENCES

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

TABLE 1

CEA DROP TIME TO 90% INSERTION

<u>CEDM No.</u>	<u>Hot (532°F) Full Flow Conditions</u>	
	<u>Cycle 1*</u>	<u>Cycle 2**</u>
38	2.15	2.79
41	2.11	2.77
42	2.21	2.80
45	2.19	2.76
55	2.19	2.54
58	2.18	2.61
61	2.27	2.66
54	2.25	2.66

* Resides in Standard Design Guide Tube

** Resides in Small Flow Hole Design Guide Tube

TABLE 2
CRITICAL BORON MEASUREMENTS

	<u>Measured</u>	<u>Predicted</u>
All Rods Out, 532°F	1185 ppm	1208 \pm 100 ppm
CEA Group 5, 4, 3, 2, 1 Fully Inserted	956 ppm	986 \pm 100 ppm

TABLE 3
ISOTHERMAL TEMPERATURE COEFFICIENTS AND POWER COEFFICIENTS

	<u>ITC</u>	
	<u>Measured</u>	<u>Predicted</u>
Zero Power, CEA Group 5 at 105" Withdrawn	+ .43 x 10 ⁻⁴ $\Delta\rho$ /°F	+ .43 \pm .3 x 10 ⁻⁴ $\Delta\rho$ /°F
50% Group 5 at 105"	+ .01 x 10 ⁻⁴ $\Delta\rho$ /°F	+ .07 \pm .3 x 10 ⁻⁴ $\Delta\rho$ /°F
100% Group 5 at 105"	- .50 x 10 ⁻⁴ $\Delta\rho$ /°F	- .24 \pm .3 x 10 ⁻⁴ $\Delta\rho$ /°F
	<u>POWER COEFFICIENT</u>	
50% Group 5 at 105"	-1.12 x 10 ⁻⁴ $\Delta\rho$ /%	- .99 \pm .2 x 10 ⁻⁴ $\Delta\rho$ /%
100% Group 5 at 105"	- .94 x 10 ⁻⁴ $\Delta\rho$ /%	- .77 \pm .2 x 10 ⁻⁴ $\Delta\rho$ /%

TABLE 4
CEA GROUP WORTH MEASUREMENTS

	<u>Measured (%$\Delta\rho$)</u>	<u>Predicted (%$\Delta\rho$)</u>
Group 5	.563	.585 \pm .088
Group 4	.372	.320 \pm .060
Group 3	.542	.541 \pm .081
Group 2	.455	.424 \pm .064
Group 1	.600	.654 \pm .090
TOTAL	2.532	2.524 \pm .252

TABLE 5
POWER DISTRIBUTION MEASUREMENTS

	<u>Measured</u>		<u>Acceptance Limits</u>	
	<u>50%</u>	<u>100%</u>	<u>50%</u>	<u>100%</u>
F_{xy}^T	1.64	1.58	≤ 1.74	≤ 1.61
F_r^T	1.51	1.48	≤ 1.644	≤ 1.54
T_q	.006	.006	≤ 0.030	≤ 0.030