13.4 POST-REFUELING STARTUP TESTING

The following discussions represent the major startup tests conducted for Calvert Cliffs subsequent to each refueling. Sufficient data is obtained to verify that the plant operates in a safe condition within the bounds of the applicable acceptance criteria and, therefore, the Safety Analysis.

13.4.1 HOT FUNCTIONAL TESTING

13.4.1.1 CEDM Performance Testing

During this testing, the proper functioning of the control element assemblies (CEAs), control element drive mechanisms (CEDMs), and CEA position indication are verified through the insertion and withdrawal of the CEAs. Rod drop times are measured and evaluated. Proper latching of the single CEA to the respective CEA extension shaft is confirmed. Any irregularities are analyzed.

13.4.1.2 RCS Flow Verification

Reactor Coolant System (RCS) flow rates are verified based on differential pressure measurements obtained across the reactor coolant pumps and the reactor vessel. These values are compared for consistency to those obtained during previous testing.

13.4.2 INITIAL CRITICALITY

Approach to criticality commences with the withdrawal of the Shutdown CEA Groups, followed by the withdrawal, in sequence, of the Regulating CEA Groups, concluding with Group 5 at mid-core. Criticality is established through boron dilution. The plant is allowed to stabilize, then proceed to the low power physics tests to verify physics design parameters.

13.4.3 LOW POWER PHYSICS TESTING

13.4.3.1 Deleted

13.4.3.2 Critical Boron Concentration

Critical Boron Concentrations are determined for all CEAs withdrawn and with CEA Groups 1 through 5 inserted.

13.4.3.3 Isothermal Temperature Coefficient

The Isothermal Temperature Coefficient is determined by varying the RCS temperature. Control element assembly Regulating Group 5 is used to maintain flux and reactivity within a defined operating band.

13.4.3.4 CEA Group Worth Measurements

The RCS is diluted/borated while the CEAs are inserted/withdrawn in order to compensate for a change in reactivity. These changes are monitored via the reactivity computer.

13.4.4 POWER ASCENSION TEST

Power ascension testing consists of frequent monitoring of core power distribution with specific acceptance and review criteria established as found in Section 13.4.5. Equilibrium conditions are established near full power. The Isothermal Temperature Coefficient is measured and compared with predictions.

13.4.5 ACCEPTANCE CRITERIA

Acceptance and review criteria for the above startup tests are listed below:

Parameters	Acceptance Criteria	Review Criteria
CEA Groups Worth	Greater of ± 15% Or ± 0.1% $\Delta\rho$	Greater of ± 15% Or ± 0.1% $\Delta\rho$
Total Regulating CEA Group Worth	± 10% of predicted	± 10% of predicted
Critical Boron Concentration	± 0.75% $\Delta\rho$ of predicted	± 0.5% $\Delta\rho$ of predicted
Isothermal Temperature Coefficient	Technical Specification limits for Moderator Temperature Coefficient	± 0.2×10^{-4} $\Delta\rho$/°F
Power Distribution	Technical Specification limits on F_r^T and T_q	Measured radial assembly power distributions (the greater of)
30%		± 15% or ± 0.15 RPD, or as limited by the applicable core misload detection analysis
60% - 80%		± 10% or ± 0.10 RPD
Full Power		± 10% or ± 0.10 RPD
		Where RPD is the relative power density
Core Symmetry Evaluation		
a. Tilt		
30% Power	None	± 3%
60-80,97% Power	± 3%	± 2%
b. Symmetric ICI Box Powers	None	± 10%

13.4.6 ACTION AND REVIEW PLAN

The Manager-Reactor Engineering will review the comparison of measurements with Review/Acceptance Criteria.

If any Review Criteria are exceeded, an evaluation will be made to determine first, the applicability of the prediction to the precise plant conditions under which the measurement was performed and, second, the accuracy of the measurement. As a result of this review, the measurement may be repeated and/or the prediction may be updated, if required, to reflect actual plant conditions at the time of measurement.

If any measurement from the lower power physics tests exceeds its Review Criteria, the Plant Operations and Safety Review Committee will review results of the low power physics tests and ensure that Acceptance Criteria are met prior to recommending operation above 5% of Rated Thermal Power. If, as a result of this review, it is determined that a Technical Specification limit has been exceeded, then appropriate action as required by Technical Specifications will be taken. A similar action plan for power ascension testing will be followed prior to increasing power beyond the 60 - 80% testing band.

If any Acceptance Criteria, except for bank worth, are exceeded, the validity of the physics data input to the Safety Analysis for the entire cycle will be determined. If it can be demonstrated that the measured value of the particular parameter in question, when

combined with the values of the other safety-related parameters, does not increase the severity or consequences of accidents or anticipated operational occurrences, the test results will be deemed acceptable. Additional measurements of safety-related parameters may be performed in order to support this demonstration.

If any regulating bank worth measurement falls outside of its acceptance criterion or if the total worth of the regulating banks falls outside of its acceptance criterion, shutdown Bank C shall be measured and compared with its acceptance criterion. If shutdown Bank C worth falls outside of its acceptance criterion or if the accumulated total worth of all the banks measured falls below their total worth acceptance criterion (after appropriate corrections and adjustments), then an evaluation shall be made of the validity of the safety analyses for the entire cycle, similar to the procedure discussed above for other measurement data.

If the combination of safety parameters determined above falls outside of the range of safety parameters used to support the proposed operation of the plant, the plant operating limits will be adjusted to prevent conditions that could result in exceeding the Specified Acceptable Fuel Design Limits.