



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

ENCLOSURE 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATING TO CHANGES TO TECHNICAL SPECIFICATION SURVEILLANCE  
REQUIREMENTS ON CEA DROP TIME AND INCORE DETECTORS  
BALTIMORE GAS AND ELECTRIC COMPANY  
CALVERT CLIFFS UNITS 1 AND 2  
DOCKET NOS. 50-317 & 50-318

1.0 INTRODUCTION

By letter dated January 20, 1987 (Ref. 1), the Baltimore Gas and Electric Company (BG&E or the licensee) made application to amend Facility Operating License Nos. DPR-53 and DPR-69 for Calvert Cliffs Unit Nos. 1 and 2, respectively. The proposed amendment would change the interval for performing two Technical Specification Surveillance Requirements from at least once per 18 months to at least once per refueling interval. These changes are proposed to support 24 month refueling cycles for Calvert Cliffs Units 1 and 2. Calvert Cliffs Unit 2 Cycle 8 is a recently approved 24 month fuel cycle which is scheduled for startup in May 1987. The two Surveillance Requirements addressed in this safety evaluation are Surveillance Requirement 4.1.3.4.c on CEA Drop Time and Surveillance Requirement 4.3.3.2.b on Incore Detectors.

The staff has reviewed the proposed license amendment and prepared the following evaluation.

2.0 EVALUATION

a. Surveillance Requirement 4.1.3.4.c CEA Drop Time

Each full length control element assembly (CEA) drop time must be verified to be less than or equal to 3.1 seconds according to the current Surveillance Requirement 4.1.3.4 (1) following each removal of the reactor vessel head

(4.1.3.4.a), (2) following maintenance or modification of the CEA drive system which could affect specific CEA drop times (4.1.3.4.b), and (3) at least once per 18 months (4.1.3.4.c). The CEA drop time is measured from the time that electrical power is interrupted to a fully withdrawn CEA to the time required for the CEA to be at its 90% insertion position. This drop time testing is performed at a reactor coolant system average temperature greater than or equal to 515° F and with all four reactor coolant pumps operating. These conditions are representative of reactor conditions for reactor trips from operating conditions. The purpose of the CEA drop time testing is to ensure that scram insertion times are consistent with those used in the safety analyses.

To justify changing Surveillance Requirement 4.1.3.4.c to state "at least once per refueling interval" instead of "at least once per 18 months", BG&E analyzed CEA drop time measurements from 15 hot functional sets of test data. Eight sets of measurements were from Unit 1 and seven from Unit 2. The licensee found that the average CEA drop time for standard fuel assemblies is approximately 2.3 seconds. The maximum standard deviation for drop times from any fuel cycle is 0.094 seconds. The 15 sets of test data included data from both 12 month and 18 month fuel cycles. The licensee concluded that the data indicate that no increase in drop time trend is observed for either longer fuel cycles or to increased periods between surveillance testing.

Factors which could adversely affect the CEA drop times when the surveillance interval is increased are (1) changes in component clearances, (2) changes in the physical configuration of the CEA or guide tubes, and (3) the buildup of corrosion products and suspended material in the coolant system that could interfere with CEA motion. The licensee states that changes to component clearances and changes in the physical configuration of the CEA or guide tubes are more likely to occur when the reactor vessel head is removed and when maintenance is performed on the CEAs (including replacement) and that portion of the drive system directly interfacing with a fuel assembly. For these two factors, Surveillance Requirements 4.1.3.4.a and 4.1.3.4.b are applicable and not affected by the proposed change in the testing interval of Surveillance

Requirement 4.1.3.4.c. The licensee states that corrosion products and suspended material in the coolant system are minimized by coolant chemistry requirements and other controls on the reactor coolant system. In addition, each full-length CEA is exercised at least once per 31 days in accordance with Surveillance Requirement 4.1.3.1.2. The testing required by this Surveillance Requirement will detect sticking CEAs. Each planned or unplanned reactor trip that may occur during extended 24 month fuel cycles would provide additional information on CEA drop times and operability.

The staff concurs with the licensee's assessment that extending the interval of Surveillance Requirement 4.1.3.4.c from 18 months to at least once per refueling interval is acceptable. This concurrence is based on the licensee's analysis of previous fuel cycles CEA drop time measurements which do not exhibit any adverse effects for 18 months cycles as compared to 12 month cycles and on a review of other relevant factors which could adversely affect CEA drop times but are covered by other Surveillance Requirements.

b. Surveillance Requirement 4.3.3.2.b Incore Detectors

The incore detection system must be demonstrated to be operable at least once per 18 months by performance of a channel calibration according to the current Surveillance Requirement 4.3.3.2.b. This channel calibration excludes the neutron detectors but includes all electronic components. The channel calibration consists of two parts: (1) a resistance check of the cable from the computer termination to the reactor core, and (2) a check of the ability of the computer to read a known voltage level. The resistance check verifies cable integrity. The licensee has reviewed tests performed since the initial startup of Calvert Cliffs Units 1 and 2. No evidence of cable degradation was found. The licensee is, however, in the process of replacing the in-containment cable with environmentally qualified cable. The design specification for the new cable will ensure that it is at least as reliable as the cable it replaces.

The second part of the channel calibration checks the computer's ability to read a known voltage level. Three known inputs are input into the computer: (1) a short circuit, (2) a 150 millivolt signal, and (3) a 250 millivolt signal. Proper computer readings are verified for each test with the voltages being between  $\pm 2$  millivolts. Other checks to verify proper computer operation are also performed and include CRT and alarm printer verification. The licensee reviewed test data from initial plant startup to the present time and reports that this test has been consistently performed satisfactorily.

To justify changing Surveillance Requirement 4.3.3.2.b to state "at least once per refueling interval" instead of "at least once per 18 months", the licensee states that no adverse trends have been observed for the test data and with 18 month fuel cycles as compared to 12 month fuel cycles. In addition, performance of the power distribution Surveillance Requirements 4.2.2.1.2 and 4.2.3.2, performed at least once per 31 Mode 1 days, provides further assurance of the operability of the incore detection system. The licensee states that, with the incore detector system inoperable, other methods are employed to carry out its monitoring and calibration functions.

The staff concurs with the licensee's assessment that extending the interval of Surveillance Requirement 4.3.3.2.b from 18 months to at least once per refueling interval is acceptable. This concurrence is based on the licensee's analysis of previous fuel cycles incore detection system calibration data which do not exhibit any adverse trends for 18 month fuel cycles as compared to 12 month fuel cycles and on power distribution Surveillance Requirements that are imposed at least once every 31 Mode 1 days, which will provide a check of anomalous incore detector readings.

### 3.0 CONCLUSIONS

On the basis of the staff's review, which is discussed above, the staff concludes that the proposed amendment to Facility Operating License Nos. DPR-53 and DPR-69 is acceptable. That is, the staff concludes that Technical

Specification Surveillance Requirements 4.1.3.4.c and 4.3.3.2.b on CEA Drop Time and Incore Detection System, respectively, may be changed from a time interval of "at least once per 18 months" to "at least once per refueling interval".

#### 4.0 REFERENCES

1. Letter from J. A. Tiernan (BG&E) to the U.S. NRC, dated January 20, 1987.

ENCLOSURE 2  
CALVERT CLIFFS UNITS 1 AND 2  
SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

Functional Areas

1. Management Involvement in Assuring Quality.  
The justification for the changes provided in the submittal were complete and acceptable.  
Rating: Category 1
2. Approach to Resolution of Technical Issues from a Safety Standpoint.  
All potential issues were treated in an acceptable manner.  
Rating: Category 1
3. Responsiveness to NRC Initiatives  
N/A
4. Enforcement History  
N/A
5. Operational and Construction Events  
N/A
6. Staffing (including Management)  
N/A
7. Training and Qualification Effectiveness  
N/A

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\* Reference: NRC Manual Appendix 0516 - Systematic Assessment of Licensee Performance