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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 116

TO FACILITY OPERATING LICENSE NO. DPR-53

BALTIMORE GAS AND ELECTRIC COMPANY

CALVERT CLIFFS NUCLEAR POWER PLANT UNIT NO. 1

DOCKET NO. 50-317

Introduction

By application for license amendment dated December 17, 1985, as supplemented by letter dated January 16, 1986, the Baltimore Gas and Electric Company (BG&E) requested changes to the Technical Specifications (TS) for Calvert Cliffs Unit 1.

The proposed amendment would change the Unit 1 TS 3.3.3.2, "Incore Detectors" for the remainder of fuel Cycle 8 operation, as follows: (1) TS 3.3.3.2a would be changed so that the incore detectors would be used to determine azimuthal power tilt at three axial elevations, (2) the number of incore detector segments required for recalibration of the excore neutron flux detection system, in TS 3.3.3.2b, would be decreased from at least 75% to at least 50% of all incore detector segments, and (3) the number of incore detector locations required for monitoring radial peaking factors or linear heat rate would be decreased from at least 75% to at least 50% of all incore detector locations.

Discussion and Evaluation

The monitoring of incore neutron flux is accomplished by the incore detectors which provide the detailed power distributions necessary for Technical Specification surveillance of power peaks and core data trends. The 45 in-core self-powered rhodium detector strings are placed in the center control element assembly (CEA) guide tube of selected assemblies. Each detector string has four, 40 cm long rhodium detectors located at 20, 40, 60, and 80 percent core height. Under ideal conditions, the power distribution within the core is symmetrical in that the power produced in one geometric part of the core is the same as other similar geometric core locations. This symmetry exists for both axial (core top to core bottom) and radial (horizontally across the core) locations. Groups of incore detector strings are used to detect asymmetry with regard to power distribution. Since persistent asymmetric power distributions can lead to a degradation of core thermal-hydraulic performance and result in more adverse post-accident behavior, detection and correction of power asymmetry (power tilt) is important. In addition, incore detectors are used to calibrate the excore detectors which are used for core power level monitoring.

Due to the nature of the incore detector strings, a number of these detectors normally become inoperable during the course of a fuel cycle. With 45 operable incore detector strings, an expected number of failures would still provide an adequate, remaining, detector string complement in both number and location to meet the monitoring requirements of TS 3.3.3.2. An unexpectedly large number of detectors were found failed at startup for Unit 1 Cycle 8 and the number of failed incore detector strings for Unit 1 is approaching the current limits of TS 3.3.3.2. The proposed TS changes provide increased flexibility for Unit 1 Cycle 8 with respect to the acceptable number of failed incore detector strings.

Standard Technical Specifications for Combustion Engineering plants have a Technical Specification (3.3.3.2) requiring an incore detector system with at least 75% of all incore detector locations operable. This operability requirement is applicable when the incore detector system is used for (1) recalibration of the excore neutron flux detector system, or (2) monitoring the azimuthal power tilt, or (3) monitoring the linear heat generation rate. In addition, a surveillance requirement calls for the determination of a core power map once per every 31 effective full power days.

The incore detector system should be maintained as close as possible to 100% operability. This is necessary to be able to identify and evaluate any potential power distribution or reactivity anomaly which might occur during the operation of a power plant. An example of a power distribution anomaly is a corrosion, "crud", buildup problem that occurred at Calvert Cliffs, Unit 1 during a previous operating Cycle. Here, the incore detector system was an important tool in identifying and understanding the problem.

The 75% operability requirement for the incore detector locations, as specified in the Standard Technical Specifications for Combustion Engineering plants, was chosen so that (1) a reasonable number of incore detector failures could be accommodated, (2) overall core power distribution mapping capability could be retained, and (3) there would be incentive for incore detector system maintenance during the next refueling outage. Otherwise a decrease in the operability requirement could lead to a postponement in incore detector maintenance and replacement. Such a degraded incore detector system might not have the capability of identifying and resolving anomalous core conditions.

The NRC staff has reviewed and approved on a case-by-case basis other requests for TS changes for the duration of the affected operating cycle when incore detector failures in operating PWRs have approached or exceeded TS requirements. These interim Technical Specifications have generally been allowed either with increased surveillance (e.g., increased frequency of core mapping), or in most cases because there is substantial margin (usually late in cycle) to TS power peaking factor limits.

The proposed TS change is acceptable for Calvert Cliffs, Unit 1 for the remainder of Cycle 8 to allow a decrease from (at least) 75% operable detectors to (at least) 50% operable detectors. This proposed change is acceptable because the licensee has stated that it would administratively change the core mapping frequency requirement to 15, from 31, accumulated Mode 1 (above 5% power) days. In addition, there have been no reported core power distribution anomalies and potentially increased margin to TS power peaking limits may be expected in the latter part of Cycle 8.

In addition, a proposed TS change would be acceptable for the remainder of Cycle 8 for monitoring the azimuthal power tilt. The number of tilt determinations would remain the same. However, two azimuthal tilt estimates would be made at three of the axial elevations containing incore detectors. This is acceptable because core wide azimuthal tilts are generally observable at monitored as well as adjacent detector levels and there have been no reported azimuthal tilts during Cycle 8. Localized power distribution anomalies will, if significant, be observable by for example, the increased core mapping and surveillance available for the duration of Cycle 8.

The staff has also reviewed "Analysis of CECOR Power Peaking Uncertainties for Calvert Cliffs Unit 1 Cycle 8," Combustion Engineering Report No. CEN-318(B)-P, November 1985, submitted in support of the proposed TS changes. The statistical analysis discussed in the report supports the operation of Calvert Cliffs Unit 1 without requiring increases in the uncertainties presently approved for use with CECOR. The analysis was performed using the then-current detector failures present in Calvert Cliffs Unit 1 and assuming several extrapolated detector failure configurations. This analysis assumed, however, that expected normal core operation is maintained. No anomalous core conditions were examined.

Based upon the above, the staff concludes that the proposed changes to TS 3.3.3.2a, 3.3.3.2b, and 3.3.3.2c provide for an adequate complement of incore detectors for monitoring azimuthal power tilt, peaking factors or linear heat rate, and recalibration of the excore neutron flux detection system during the remainder of Unit 1, Cycle 8, in light of the increased use of core mapping surveillance to detect anomalies in the observable parameters. Accordingly, the proposed changes to the TS are acceptable.

Environmental Consideration

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously published a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR §51.22(c)(9). Pursuant to 10 CFR §51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

Conclusion

We have concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: March 31, 1986

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