



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 148 TO FACILITY OPERATING LICENSE NO. DPR-53
AND AMENDMENT NO. 129 TO FACILITY OPERATING LICENSE NO. DPR-69
BALTIMORE GAS AND ELECTRIC COMPANY
CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 50-317 AND 50-318

1.0 INTRODUCTION

By letter dated June 16, 1988, Baltimore Gas and Electric Company (BG&E or the licensee) requested amendments to the Technical Specifications (TS) for the Calvert Cliffs Nuclear Power Plant, Units 1 and 2. The proposed amendments address operability and surveillance requirements for the core exit thermocouples (CETs).

The CETs are identified in Regulatory Guide 1.97 as Category 1 instrumentation for indicating the potential for fuel cladding failure. The instrumentation used for indicating the status of Category 1 variables should be qualified in accordance with 10 CFR 50.49.

In the submittal, the licensee proposes the use of unqualified CETs during the interim period before all CETs are upgraded with qualified connectors. Additionally, BG&E added CET surveillance requirements to Calvert Cliffs 1 and 2 Tables 4.3-10.

In a letter to BG&E dated August 21, 1989, the staff requested additional information. On September 20, 1989, BG&E responded to the request for additional information (RAI) by addressing the location of the CETs, calibration concerns, undetected failures, schedule for replacement of unqualified thermocouples, and determination of operability. Then, by letter dated August 3, 1990, BG&E provided supplemental information and details related to the power supplies and physical location of the CETs in the reactor core.

9010240144 901012
PDR ADOCK 05000317
P PDC

2.0 EVALUATION

The licensee originally requested a TS change to allow substitution of unqualified CET channels for a qualified, but inoperable, CET channel until all CETs could be upgraded. However, in response to our RAI, the licensee stated that there are now at least five qualified CETs per core quadrant in each unit. Since a minimum of two independent sets of two qualified CETs per core quadrant are required to be operable, the licensee has removed the proposed footnote from Table 3.3-10.

While there are at least five CETs per core quadrant, the licensee must also ensure that there are two independent, safety grade channels of CETs per core quadrant. A CET channel includes the safety grade power supply for all the CETs in that channel. Loss of a power supply will result in loss of all CETs powered by that supply. Consequently, even though there are five qualified CETs per core quadrant, a unit could still be in a limiting condition of operation if all five CETs are powered from the same safety grade power supply.

Additionally, the distribution of CETs in a channel must be such that the quadrant radial enthalpy (temperature) gradient may be monitored. That is, the remaining operable CETs in a channel must be distributed such that there is at least one CET near the center of the core, and at least one CET near the core perimeter, in each quadrant. The licensee's initial map of CET locations did not provide sufficient detail to confirm this channel distribution of qualified CETs.

BG&E responded to these concerns in its August 3, 1990, letter which provided core quadrant maps that identified the CET power supplies as channel "ZA" or "ZB." Also, the Unit 2 CETs are now qualified except for the four locations, 34, 38, 41, and 45 (one in each quadrant). Therefore, Unit 2 easily satisfies both of the above criteria. In Unit 1, 23 of 45 CETs have been replaced with qualified CETs to date. These CETs are distributed such that the first criteria identified above is met. At this time, there is a single exception to the second criteria: the quadrant which contains CET Nos. 2, 10, 13, 14, 15, 16, 17, 33, 34, 35, and 36. Of these, CET Nos. 10, 14, 33, 34, and 35 are qualified, but only CET No. 14 is "ZB" powered. Therefore, this quadrant of Unit 1 does not provide for measuring radial enthalpy gradient using the "ZB" channel. The remaining Unit 1 CETs are scheduled to be replaced in an upcoming outage and the second criteria identified above will be met at that time.

This licensee indicated that the measurement for the radial enthalpy gradient for the Unit 1 CETs will be met in the upcoming refueling outage (RFO-10) currently scheduled for the fall of 1991. We find this schedule acceptable and our concerns have been addressed.

The licensee requests addition of the CETs to Table 3.3-10. The licensee's time limit for returning a CET channel to OPERABLE status is specified by Action Statement 31. This Action Statement requires:

"With the number of OPERABLE post-accident monitoring channels [one] less than required by Table 3.3-10, either restore the inoperable channel to OPERABLE status within 30 days or be in HOT SHUTDOWN within the next 12 hours."

The licensee identified the electronic components that are to be included in the CET channel calibrations. With the exception of the channel power supplies, all electronic components in the instrument channel are included in the channel calibrations. The licensee stated that it is not feasible to recalibrate the sensor portion of a CET after the CET is installed in the core. The licensee referenced a Combustion Engineering Owners Group (CEOG) report that indicates the majority of operational CETs are normally within $\pm 10^\circ\text{F}$ of one another, and instrument drift is negligible. The staff concurs that it may not be feasible to remove a CET sensor solely to recalibrate the sensor. Nevertheless, the licensee must demonstrate through periodic surveillance, that the CETs respond as designed. This can be accomplished, in part, by performing a cross-comparison of the output of different sensors that have a known relationship to each other. Another acceptable method for verifying stability of the CET sensors is to compare the output of different sensors under isothermal conditions (all sensors at the same temperature) over a range of temperatures, in lieu of calibrating the CETs using an accepted calibration standard.

The licensee stated that the CETs are compared to hot leg RTDs, which, according to TS Table-4.3-10, are calibrated each refueling outage. A CET will be considered INOPERABLE if the temperature difference between RTD and CET is greater than 45°F . This method of verifying operability within design parameters is acceptable.

The licensee stated that the schedule for replacing a CET is dependent on the depletion of four rhodium neutron detectors in the associated Incore Instrument string. Consequently, the number of channels to be replaced each refueling outage can be only estimated. The licensee's predicted schedule of CET replacement indicates the unqualified CETs will be replaced over the next two refueling outages. Given the number of qualified CETs now installed in each unit, this schedule is reasonable.

The licensee has requested staff approval to add the CETs to TS Table 4.3-10, "Post-Accident Monitoring Instrumentation Surveillance Requirements." The CET channel check and channel calibration are to be performed at the same frequency as other instrumentation in this table. The provisions of this amendment of the surveillance and calibration frequency requirements are consistent with the surveillance and calibration requirements for other methods of detecting the onset of inadequate core cooling (reactor vessel level and subcooling indications). Therefore, this is acceptable.

3.0 SUMMARY

We have determined, based on the above discussion, that there is adequate instrumentation (approximately 45 CETs) available to determine inadequate core cooling by monitoring core exit coolant temperatures.

The licensee's requested inclusion of the CET instrumentation operability requirement (30 days to restore the required minimum operable channels) is acceptable. The 30-day instrumentation surveillance interval is acceptable. We, therefore, find the proposed TS for Calvert Cliffs Nuclear Power Plant, Units 1 and 2, acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change to a requirement with respect to the installation or use of the facilities' components located within the restricted areas as defined in 10 CFR Part 20, and changes to the surveillance requirements. The staff has determined that these amendments involve 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 issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, these amendments meet 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 these amendments.

5.0 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 these amendments will not be inimical to the common defense and security or to the health and safety of the public.

PRINCIPAL CONTRIBUTORS:

M. Waterman
D. McDonald

Dated: October 12, 1990