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March 2, 1990

U. S. Nuclear Regulatory Commission  
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant  
Unit No. 1; Docket No. 50-317  
Technical Specification Change - Low Temperature Overpressure  
Protection System

- REFERENCE:
- (a) Letter from G. C. Creel (BG&E) to Document Control Desk, dated March 2, 1990, Clarification of the Low Temperature Overpressure Protection System Description
  - (b) Letter from G. C. Creel (BG&E) to Document Control Desk (NRC), dated October 27, 1989, Request for Amendment
  - (c) Letter from G. C. Creel (BG&E) to Document Control Desk (NRC), dated February 7, 1990, Description of Calvert Cliffs Low Temperature Overpressure Protection System
  - (d) Letter from G. C. Creel (BG&E) to Document Control Desk (NRC), dated February 14, 1990, Technical Specification Change - HPSI Pump Operability in MODE 3 (TAC No. 75562)
  - (e) Letter from S. A. McNeil (NRC) to J. A. Tiernan (BG&E) dated February 4, 1987, Projected Values of Material Properties for Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events

Gentlemen:

On November 27, 1989, a meeting was held with Nuclear Regulatory Commission (NRC) representatives to discuss our current Low Temperature Overpressure Protection (LTOP) system. As a result of that meeting, the Baltimore Gas and Electric Company hereby requests an Amendment to its Operating License No. DPR-53 for Calvert Cliffs Unit No. 1 with the submittal of the attached proposed changes to the Technical Specifications. The purpose of this amendment request is to bring the Technical Specifications into conformance with the current LTOP system established in accordance with 10 CFR 50, Appendix G. This system is described in Reference (a). These changes would establish more conservative operating limits than exist in the current Technical Specifications.

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## DISCUSSION

In 1976, the Nuclear Regulatory Commission (NRC) required commercial nuclear power plants to institute automatic and administrative controls to prevent exceeding the 10 CFR 50, Appendix G operating limits (Pressure-Temperature Limits) for the reactor vessel during operations at low temperature. The Unit 1 Low Temperature Overpressure Protection (LTOP) controls were based on Pressure-Temperature (P-T) limits for the reactor vessel that were applicable for the first 10 Effective Full Power Years (EFPY) of operation (Figure 3.4-2a in the Technical Specifications). Operation has now shifted to the P-T limits that are applicable for 10-to-40 EFPY of operation (Figure 3.4-2b in the Technical Specifications). Using the 10-to-40 EFPY P-T limits as a basis for LTOP controls, however, would severely impact plant operation at low temperature since an insufficient pressure band would be available for operation of reactor coolant pumps.

In 1987, we reviewed the draft revision to Regulatory Guide 1.99 which addressed a change in the potential for brittle fracture of the reactor vessel at low temperatures. We realized that our reactor vessels might be affected by the material property changes described in the draft Regulatory Guide. Because of these concerns, which reduce our operating window, we requested Southwest Research Institute (SwRI) to provide 10 CFR 50, Appendix G heatup and cooldown curves for 12 EFPY. The method described in the draft Regulatory Guide was used to generate these curves. The SwRI report that describes the initial results has been provided to the NRC as Attachment 2 to Reference (b). The final analytical results were accepted by BG&E in early 1989.

## TECHNICAL SPECIFICATION CHANGES

The following proposed changes to the Technical Specifications would incorporate the 12 EFPY P-T heatup rates for the Unit 1 reactor vessel, as developed from the draft Revision 2 to Regulatory Guide 1.99. In addition, the proposed changes would adjust the LTOP controls as required to ensure the 12 EFPY P-T limits (based on the draft Regulatory Guide) are not exceeded. Reference (c) describes how the various setpoints and administrative controls were derived. New 12 EFPY heatup and cooldown curves are under development to replace the existing 10-40 EFPY heatup and cooldown curves. The basis for these curves will be the final Revision 2 to Regulatory Guide 1.99. The use of the final Regulatory Guide 1.99, Revision 2 will have some impact on three of the parameters presented in these proposed changes. It is expected the MPT enable temperature, the PORV pressure setpoint, and possibly the HPSI pump flow will need to be adjusted slightly. The changes to these parameters are expected to be minimal, and should have no impact on the overall LTOP system configuration. The 12 EFPY curves and the above-mentioned adjustments will be submitted in a separate license amendment request by May 15, 1990. Unit 1 is currently scheduled to return to operation in March 1990 for a short period of time. In April, 1990, Unit 1 will be shutdown for an outage of approximately 90 days duration.

Change pages 3/4 1-8, -10, 4-2a, -23, -26, -26a, -26b, 5-4, 5-6, B3/4 4-1 and 5-2 of the Unit 1 Technical Specifications as shown on the marked-up pages attached to this transmittal.



Changes proposed to incorporate 12 EFPY P-T heatup rates:

- a. Limiting Condition for Operation (LCO) 3.4.9.1 currently provides a heatup rate based on 0-to-10 and 10-to-40 EFPY of operation. We need to incorporate heat-up rate based on 12 EFPY of operation. Therefore, BG&E proposes to change the existing maximum allowable heat-up rate of 100°F in any one hour period to the following:

<u>Maximum Allowable Heatup Rate</u>	<u>RCS Temperature</u>
70°F in any one hour period	RCS > 250°F
40°F in any one hour period	RCS ≤ 250°F

In addition, the ACTION STATEMENT for LCO 3.4.9.1 should be changed to bring it into conformance with the 10-to-40 EFPY P-T curves (Figure 3.4-2b). The ACTION STATEMENT currently requires a cooldown to less than 200°F and 500 psia. When compared to the 10-to-40 EFPY cooldown curve, this ACTION STATEMENT violates the P-T curve. To correct the ACTION STATEMENT, we propose a cooldown to less than 200°F and 300 psia.

- b. Changes to the ACTION STATEMENT of Technical Specification 3.4.9.2 are proposed to ensure that cooldown actions required are consistent with the 10-to-40 EFPY P-T curves. These cooldown actions are consistent with the proposed ACTION STATEMENT in Technical Specification 3.4.9.1. (See a.)

Changes proposed to adjust the LTOP controls:

- c. LCO 3.4.9.3 currently requires two PORVs be operable with a lift setting of  $\leq 450$  psig, or a reactor coolant system vent of  $\geq 1.3$  square inches when one or more RCS cold leg temperature is  $\leq 275^\circ\text{F}$ . This proposed change would lower the required PORV lift setting to  $\leq 422.7$  psia and require system vents equivalent to the number of PORVs not available. The proposed change would also require two of three HPSI pumps to be disabled, and the HPSI loop motor-operated valves be prevented from automatically aligning HPSI pump flow to the RCS. If a HPSI pump is to be used, the total flow will be throttled or a vent equivalent to two PORVs will be required.

The temperature at which this Technical Specification is applicable has been raised to  $\leq 319^\circ\text{F}$  in conformance with the analysis described in Reference (c). The controls of this proposed Technical Specification are not applicable if a system vent greater than 8 square inches exists. A system vent greater than 8 square inches has a greater flow area than six PORVs (7.8 square inches). Every two PORVs can handle the full flow of a HPSI pump and the full flow of three charging pumps. Therefore, a vent of this size will handle the injection from any operable set of pumps.

ACTION STATEMENT changes are proposed to provide appropriate actions based on the requirements proposed for the LCO. Proposed ACTION STATEMENT (a) maintains the same venting requirements found in the existing ACTION STATEMENT, however, the action times have been changed. The current action times are 7 days to restore a PORV to OPERABLE status or the RCS must be vented within 8 hours. The proposed change would only allow 5 days to restore the PORV to OPERABLE status and would increase the time permitted to vent the RCS to 48 hours. This change is proposed because it is impractical to attempt to depressurize and vent the RCS within 8 hours. If the RCS were at 319°F and 422 psia (LTOP entry conditions), BG&E has determined that a cooldown of the RCS to less than 200°F and depressurization within 48 hours is practicable. In addition, the proposed change does not increase the total time a PORV could be out of service (7 days) before a vent is established in the RCS. ACTION STATEMENT (b) currently requires that a  $\geq 1.3$  square inch vent be established within 8 hours if both PORVs are inoperable. The proposed change would increase the vent size to  $\geq 2.6$  square inches (equivalent to two PORVs) or allow entry into LCO 3.4.9.3.a.2. The action time has been increased from 8 hours to 48 hours for the reasons mentioned above. ACTION STATEMENT (c) has not been changed. ACTION STATEMENT (d) has been relabeled as ACTION STATEMENT (g).

Three new ACTION STATEMENTS have been added to reflect the additional controls added to the LCO. Proposed ACTION STATEMENT (d) requires placing at least two HPSI pump handswitches in Pull-to-Lock within 15 minutes and disabling two HPSI pumps within 4 hours if less than two pumps are disabled. Proposed ACTION STATEMENT (e) addresses the disabling of the automatic alignment feature of the HPSI pump flowpath. It requires that the HPSI loop MOVs be closed and disabled or the affected HPSI header be isolated within 4 hours. In addition, because a HPSI header may now be isolated, the ACTION STATEMENT directs the operator to enter applicable HPSI flowpath ACTION STATEMENTS. Proposed ACTION STATEMENT (f) addresses actions to be taken if HPSI pump flow exceeds 350 gpm while an RCS vent  $\leq 2.6$  square inches exists. Flow must be immediately reduced to within limits and the pressure must be verified to have remained within limits. If the RCS pressure exceeded the limits given on the 10-to-40 EPFY curve, then a Special Report will be submitted in accordance with ACTION STATEMENT (c).

This change will ensure that appropriate overpressure protection is provided in the low temperature region. The basis for this LCO will be changed at a later date.

- d. Surveillance Requirement 4.4.9.3.3 is added to verify the new conditions proposed in paragraph (c), above, for overpressure protection. Specifically, the proposed change requires verification that the motor circuit breakers are removed for the two inoperable HPSI pumps or their discharge valves are locked shut. It would also require that the automatic opening feature of the HPSI loop motor operated valves be verified disabled. These verifications would be done at least once per 12 hours.



These proposed surveillances and their associated times are consistent with similar previous surveillances (Technical Specification 4.5.3.2). Therefore, Surveillance Requirement 4.5.3.2 is deleted due to redundancy with the above changes.

Changes proposed to modify RCP controls:

- e. Proposed footnote (\*\*\*) is appended to the APPLICABILITY of LCO 3.4.1.3 and requires that a reactor coolant pump not be started when RCS cold leg temperature is less than or equal to 275°F unless (1) the pressurizer water volume is less than 600 cubic feet or (2) the secondary water temperature of each steam generator is less than 46°F (34°F when measured by a surface contact instrument) above each of the RCS cold leg temperatures. The proposed change would require that a reactor coolant pump not be started when the RCS cold leg temperature is less than or equal to 319°F unless (1) pressurizer indicated water level is less than 170" (609 cubic feet) and (2) the secondary water temperature of each steam generator is less than 150°F above the RCS temperature. This proposed change will ensure that a reactor coolant pump is not started while the RCS is water solid and the energy addition caused by starting a reactor coolant pump will not cause pressure to exceed the 12 EFY P-T limits.
- f. The basis for LCO 3.4.1.3 is changed to reflect the above restrictions.

Changes proposed to modify HPSI pump controls

- g. Currently, LCOs 3.1.2.1 and 3.1.2.3 allow the use of a HPSI pump to provide a source of boron injection in **MODES 5 and 6**. The proposed change would add a footnote (\*) which defines an operable HPSI pump as being in pull-to-lock and states that HPSI pump manual use is in accordance with approved procedures under the restrictions outlined in change (c). This footnote will provide assurance that the use of a HPSI pump while borating will not overpressurize the RCS.
- h. LCO 3.5.3 requires one operable HPSI pump in **MODE 3** (with pressurizer pressure < 1750 psia) and **MODE 4**. Footnote (#) to this LCO states that a maximum of one HPSI pump shall be operable when the temperature of one or more RCS cold legs is  $\leq 275^{\circ}\text{F}$ . The proposed change increases the applicable temperature to 319°F. Additionally, the footnote will now state that the operable pump may be in pull-to-lock and can be manually operated in accordance with approved procedures (from Reference (d)). This change will also assure appropriate overpressure protection is provided in the low temperature region.
- i. A footnote has been proposed for the surveillance requirements of Technical Specification 4.5.2. The note allows full flow testing of a HPSI pump to be conducted at RCS temperatures  $\leq 319^{\circ}\text{F}$  as long as the HPSI pump is recirculating RCS water. This prevents a mass addition to the RCS from other water sources. If a HPSI pump is to be tested without recirculating

RCS water, the controls of LCO 3.4.9.3 apply. These controls, discussed in change (c), limit the mass addition from a HPSI pump or require an appropriate vent to exist. This prevents overpressurization of the RCS due to a mass addition transient.

- j. The basis for LCO 3.5.3 have been changed to reflect the new restrictions on HPSI operation imposed by the above changes.

#### **DETERMINATION OF SIGNIFICANT HAZARDS**

This proposed change has been evaluated against the standards in 10 CFR 50.92 and has been determined to involve no significant hazards considerations, in that operation of the facility in accordance with the proposed amendment would not:

- (i) involve a significant increase in the probability or consequences of an accident previously evaluated; or

The Unit 1 12 EFY P-T limits were conservatively developed in accordance with the fracture toughness requirements of 10 CFR 50, Appendix G as supplemented by the ASME Code Section III, Appendix G. The mechanical properties and chemical composition of the reactor vessel beltline materials used in the analysis were the same as those used to evaluate the Pressurized Thermal Shock (PTS) concern in January 1986. These material characteristics have been reviewed and accepted by the NRC (Reference (e)). The peak reactor vessel fluence was calculated using Discrete Ordinate Transport (DOT) calculations with a DOT IV.3 computer code. The analysis of the reactor vessel material irradiation surveillance specimens was used to verify the validity of the fluence calculations. The Adjusted  $RT_{NDT}$  values were based on the conservative methodology provided in Regulatory Guide 1.99, Revision 2 (Draft).

The LTOP controls have been revised to ensure compliance with the 12 EFY P-T limits as described in this submittal. Administrative controls have been revised to prevent occurrence of events for which automatic protection is insufficient. The PORV low pressure setpoint has been reduced from 450 psig (464.7 psia) to 422.7 psia to ensure protection is provided during solid plant conditions. The revised P-T limits provide conservative limits on reactor coolant system pressure to minimize the likelihood of a rapidly propagating fracture due to pressure transients at low temperature.

The revised LTOP controls provide adequate assurance that the P-T limits will not be exceeded during normal operation and anticipated operational occurrences in the low temperature region. Therefore, the proposed amendment does not involve an increase in the probability or consequences of accidents previously evaluated.

- (ii) create the possibility of a new or different type of accident from any accident previously evaluated; or

The P-T limits and revised LTOP controls do not represent a significant change in the configuration or operation of the plant. Specifically, no new hardware is being added to the plant as a result of these proposed changes, no existing equipment is being modified, nor are any significantly different types of operations being introduced. Therefore, the proposed amendment would not create the possibility of a new or different kind of accident from those previously evaluated.

- (iii) involve a significant reduction in the margin of safety.

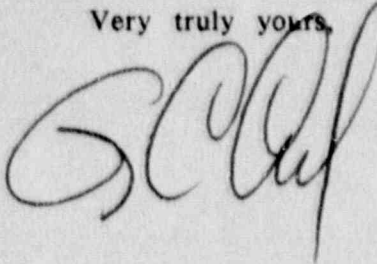
The 12 EFPY curves provide an adequate margin of safety as required by 10 CFR 50, Appendix G, as supplemented by ASME Code Section III, Appendix G. The conservative methodology of Regulatory Guide 1.99, Revision 2 (Draft) also provides an adequate margin of safety for the prediction of reactor vessel neutron embrittlement. The revised LTOP administrative controls provide adequate protection assuming failure of the most limiting single active component. Therefore, the proposed amendment would not significantly reduce the margin of safety.

#### **SAFETY COMMITTEE REVIEW**

The attached proposed changes to the Technical Specifications and our determination of significant hazards have been reviewed by our Plant Operations and Off-Site Safety Review Committees, and they have concluded that implementation of these changes will not result in an undue risk to the health and safety of the public.



Very truly yours,



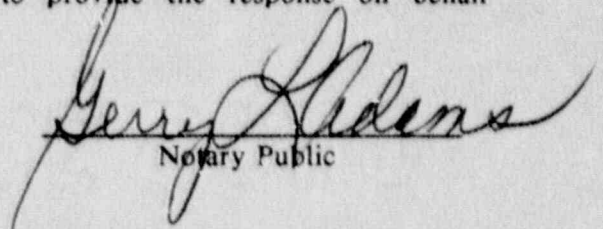
STATE OF MARYLAND

County of Calvert

TO WIT:

I hereby certify that on the 2nd day of March, 1990, before me, the subscriber, a Notary Public of the State of Maryland in and for St. Marys County, personally appeared George C. Creel, being duly sworn, and states that he is Vice President of the Baltimore Gas and Electric Company, a corporation of the State of Maryland; that he provides the foregoing response for the purposes therein set forth; that the statements made are true and correct to the best of his knowledge, information, and belief; and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal:

  
Notary Public

My Commission Expires:

1 July 1990  
Date

GCC/PSF/bjd

Attachment

cc: D. A. Brune, Esquire  
J. E. Silberg, Esquire  
R. A. Capra, NRC  
D. G. McDonald, Jr., NRC  
W. T. Russell, NRC  
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