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VICE PRESIDENT
NUCLEAR ENERGY
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April 21, 1989

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 2; Docket No. 50-318
Emergency Technical Specification Change Request: Technical Specification 5.3 Reactor Core

REFERENCES:
(a) Letter from Mr. G. C. Creel (BG&E) to NRC Document Control Desk, dated February 7, 1989, Unit 2 Ninth Cycle License Application

(b) Letter from Mr. G. C. Creel (BG&E) to NRC Document Control Desk, dated March 15, 1989, Nuclear Fuel - Potential Loss of Shutdown Margin

Gentlemen:

The Baltimore Gas and Electric Company hereby requests an Amendment to its Operating License No. DPR-69 for Calvert Cliffs Unit No. 2, with the submittal of the proposed changes to the Technical Specifications. This emergency request supplements the reload application submitted in Reference (a).

We request that this Technical Specification change be approved for **MODES** 5 and 6 only. We will not operate in **MODES** 1 through 4 until Reference (a) is approved. A delay in loading new fuel into the core will result in a delay in startup. Therefore, to avoid delaying startup from the refueling outage, we request approval of the Technical Specification change by the close of business on May 1, 1989.

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CHANGE (BG&E FCR 89-69)

Change page 5-4 of the Unit 2 Technical Specifications to reflect a change in the maximum allowed fuel enrichment. The proposed change is shown on the marked-up pages attached to this transmittal.

STATEMENT OF EMERGENCY CIRCUMSTANCES

The Technical Specification, unless amended, would prevent Unit 2 from starting up on schedule. A delay in fuel loading will delay startup. The conditions leading to this situation could not have been reasonably anticipated. During previous refueling outages, new fuel has been loaded into the core prior to NRC approval of the reload application. In some cases, the reload application requested an increase in the maximum allowed fuel enrichment, and fuel was loaded into the core before the Technical Specifications were approved. We could not have reasonably anticipated that this reload would be any different than previous reloads. However, due, in part, to the heightened awareness from our submittal of a 10 CFR 21 report on the potential for a loss of shutdown margin (Reference b), we realized that this Technical Specification change should be approved prior to loading new fuel into the core during this refueling outage.

DISCUSSION

This change proposes to increase the maximum reload fuel enrichment described in Technical Specification 5.3.1. The current Technical Specification allows a maximum enrichment of 4.1 weight percent U-235 for reload fuel. We propose increasing the maximum enrichment to 4.35 weight percent U-235. The reload fuel has an enrichment of 4.30 weight percent. For a general description of the fuel, see Attachment (1). Detailed fuel descriptions are provided in Reference (a).

The nominal maximum fuel enrichment is 4.30 weight percent U-235. However, to include uncertainties, the Updated Final Safety Analysis Report, Chapter 14, safety analyses have included sufficient margin to allow for a maximum fuel enrichment of 4.35 weight percent U-235. The design basis events considered by Combustion Engineering are shown in Table 1. All events are bounded by previously approved analyses. Three events were reanalyzed in Reference (a). During refueling, the following events are applicable:

- o boron dilution - not reanalyzed
- o fuel handling - reanalyzed

The boron dilution incident was not specifically reanalyzed for this cycle. The dilution event is bounded by previously approved analyses. The fuel handling event was reanalyzed to evaluate the effect of dropping an irradiated 4.30 weight percent U-235 fuel assembly. The results of the analyses are provided in Attachment (2). Attachment (2) concludes that the site boundary whole body and thyroid dose will not increase compared with the results of the previous analysis.

LOSS OF SHUTDOWN MARGIN CONSIDERATIONS

On March 10, 1989, we notified Region I of a condition that we believe meets the reporting criteria of 10 CFR 21 (Reference b). Over the course of the last several fuel cycles, we have increased the enrichment of our fuel. In the current cycle, we are loading 4.30 $^{w}/o$ fuel in the core. Some of the fresh fuel assemblies are highly reactive ($k_{\infty} > 1.0$) under refueling conditions. As part of the core design consulting services, CE provided confirmation that the refueling boron concentration is sufficient to maintain $k_{eff} < 0.95$ for the final core configuration.

In the past, our refueling procedures allowed placement of fuel assemblies in intermediate positions during core alterations. A significant amount of reactivity could be added to a sub-critical geometry by placing a highly reactive fuel assembly in certain intermediate positions. We have relied on sub-critical multiplication to detect an impending criticality during refueling. With the highly reactive fuel, sub-critical multiplication may not provide adequate warning of an approach to criticality.

To correct this potential hazard, we have revised our Core Refueling Procedure (FH-6) to protect against the two avenues for challenging shutdown margin; intermediate fuel placement allowed by procedure, and inadvertent misplacement of fuel assemblies.

Appendix C has been added to FH-6 to address allowable intermediate fuel locations. During Unit 2 Cycle 9 refueling, a full core offload will be performed. Reloading of the fuel will be done in a row-by-row manner. We intend to place all fuel assemblies in their final location. If a fuel assembly cannot be placed in its final location, Appendix C will be used to determine an acceptable alternate location. Alternate locations include any empty fuel location in the core which meets the Appendix C criteria, and the upenders. Appendix C requires that the reactivity of the fuel assembly be less than or equal to the reactivity allowed for the intermediate space where it will be placed. For example, if the k_{∞} of a fuel assembly is .96, it cannot be placed in a space with an allowed reactivity of $k_{\infty} = .88$. However, it could be placed in a space with an allowed reactivity of $K_{\infty} = .98$ because the fuel assembly is less reactive ($k_{\infty} = .96$) than the space is designed for. With these controls in place, fuel will not be placed, by procedure, in a more reactive location than the final core design allows.

New fuel is of the greatest concern because it is the most reactive fuel being loaded into the core. Therefore, FH-6 also requires operators to identify a fuel assembly as new or irradiated by its appearance. An irradiated assembly will have an oxide layer and appear black. This visual check will be used in addition to the normal fuel assembly location checks. Additionally, all core location coordinates will be reverified prior to assembly insertion to ensure that the location should receive a new or irradiated assembly, and proper placement of a new or irradiated assembly will be verified after insertion. These additional checks will ensure that a new fuel assembly is picked up and placed where a new assembly is supposed to go. Some of the new assemblies are shimmed with B_4C rods, while others are not. It is not possible to differentiate between the two during this visual check. Only the fuel assembly serial numbers allow distinction between shimmed and unshimmed assemblies. However, any new assembly, whether shimmed or unshimmed, can be placed in any new assembly location in the core without challenging the 5% shutdown margin.

These additional changes to the Core Refueling Procedure (FH-6) ensure that the fuel cannot be placed, by procedure, in a more reactive configuration than Combustion Engineering has analyzed.

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

For MODES 5 and 6, the applicable accident analyses are the fuel handling event and boron dilution event. As discussed in Reference (a) and in the Attachments to this letter, the consequences of these events are not increased over previously approved analyses. Also applicable to this Technical Specification change is the shutdown margin analysis performed for the final core design. This analysis (Reference a) ensures that the final core design does not reduce the 5% shutdown margin required by Technical Specification 3.9.1. The changes made to our Core Refueling Procedure (FH-6) ensure that any intermediate fuel placements do not challenge the 5% shutdown margin. The sequence of loading fuel (full core off load - full core reload) is not new. This fuel loading sequence has been used previously. We have not increased the probability of an accident because we have not changed the equipment or sequence for loading fuel into the core. Therefore, loading new fuel into the core does not increase the probability or consequences of an accident previously evaluated.

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

Increasing the maximum allowed fuel enrichment from 4.1 to 4.35 weight percent U-235 does not create the possibility of a new or different type of accident. Two accidents are normally considered for MODE 5 and 6 during a fuel reload application; a boron dilution event and a fuel handling event. The shutdown margin is confirmed for the final core design under refueling conditions in the reload application. In response to a potential loss of shutdown margin hazard, identified in a 10 CFR 21 report (Reference b), procedure changes have been made to eliminate this potential concern. Additionally, the fuel loading sequence has been used previously. New visual checks have been added to the Core Refueling Procedure, but the manner in which fuel is physically handled has not changed; it will continue to be handled as safely and conservatively as before.

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

Procedure changes have been put in place to ensure that the most reactive fuel assemblies are not placed in a configuration that could lead to a reduction in shutdown margin. Nuclear Engineering personnel will oversee the implementation of the procedure. As described above, the procedure requires multiple visual checks and verifications by plant staff members. Changes to the fuel move sequence requires approval by several plant staff members, including a Senior Reactor Operator license holder and the Nuclear Engineering Senior Shift Engineer. Therefore, loading new fuel into the core during this refueling outage does not involve a significant reduction in the margin of safety.

SAFETY COMMITTEE REVIEW

These 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.

FEE DETERMINATION

Pursuant to 10 CFR 170.21, we are including BG&E Check No. 1921369 in the amount of $150.00 to the NRC to cover the application fee for this request.

Very truly yours,

STATE OF MARYLAND :
: **TO WIT** :
COUNTY OF CALVERT :

I hereby certify that on the 21st day of April, 1989, before me, the subscriber, a Notary Public of the State of Maryland in and for Calvert 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:

Donna L. McCready
Notary Public

My Commission Expires: July 1, 1990
Date

GCC/PSF/dlm

Attachments
cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
S. A. McNeil, NRC
W. T. Russell, NRC
H. Eichenholz/V. L. Pritchett, NRC
T. Magette, DNR