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JOSEPH A. TIERNAN
VICE PRESIDENT
NUCLEAR ENERGY

March 25, 1988

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
Unit 1 Cycle 10 Response to Request for Additional Information
(TAC 67143)

REFERENCES:

(a) Letter from Mr. S.A. McNeil (NRC), to Mr. J.A. Tiernan (BG&E), Request for Additional Information - Unit 1 Cycle 10 Reload (TAC 67143), dated March 11, 1988

(b) Letter from Mr. J.A. Tiernan (BG&E), to Document Control Desk (NRC), Unit 1 Tenth Cycle License Application, dated February 12, 1988

(c) Letter from Mr. J.A. Tiernan (BG&E), to Document Control Desk (NRC), Unit 2 Eighth Cycle License Amendment, dated February 6, 1987

(d) CENPD-139-P-A, C-E Fuel Evaluation Model Topical Report, July, 1974

(e) CEN-161-(B)-P, Improvements to Fuel Evaluation Model, July, 1981

(f) CEN-161(B)-P, Supplement 1-P, Improvements to Fuel Evaluation Model, April, 1986

(g) Letter from Mr. S.A. McNeil (NRC), to Mr. J.A. Tiernan (BG&E); Safety Evaluation of Topical Report CEN-161(b)-P, Supplement 1-P, Improvements to Fuel Evaluation Model, dated February 4, 1987

(h) CEN-348(B)-P, Extended Statistical Combination of Uncertainties, January, 1987

Gentlemen:

The following responses address NRC concerns presented in Reference (a), as regards the Unit 1 Cycle 10 Reload Design (Reference (b)). Reference (a) questions are repeated with Baltimore Gas & Electric's response following.

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QUESTION 1

Your staff stated on March 10, 1988, that they intend to withdraw the changes proposed to make the requirements of Technical Specification (TS) 3/4.1.1, "Boration Control, Shutdown Margin - $T_{avg} > 200^{o}F$," inapplicable to critical operating modes (Modes 1 and 2 when $K_{eff} \geq 1.0$). Therefore, please provide the appropriate data on CEA worths to verify that the shutdown margin requirements at EOC, hot zero power can be achieved.

RESPONSE

The following table presents a summary of CEA shutdown worths and reactivity allowances for the end of Unit 1 Cycle 10 zero power steam line break accident and a comparison to reference cycle data (Unit 2 Cycle 8, Reference (c)).

CALVERT CLIFFS UNIT 1 CYCLE 10
LIMITING VALUES OF REACTIVITY WORTHS AND ALLOWANCES
FOR THE END-OF-CYCLE (EOC) HOT ZERO POWER (HZP)
STEAM LINE RUPTURE ACCIDENT, % delta rho

		Reference Cycle (Unit 2 Cycle 8)	Unit 1 Cycle 10
1.	Worth of all CEA's Inserted	9.4	9.0
2.	Stuck CEA Allowance	1.7	1.1
3.	Worth of all CEA's Less Worth of Most Reactive Stuck CEA	7.7	7.9
4.	Power Dependent Insertion Limit CEA Bite at Zero Power	2.0	2.0
5.	Calculated Scram Worth	5.7	5.9
6.	Physics Uncertainty Plus Bias	0.7	0.8
7.	Net Available Scram Worth	5.0	5.1
8.	Technical Specification Shutdown Margin	4.5	5.0
9.	Margin in Excess of Technical Specification Margin	0.5	0.1

QUESTION 2

Table 9-1 of your February 12, 1988 submittal states that your proposed change to Limiting Condition For Operation 3.1.1.4, "Moderator Temperature Coefficient," (MTC) is identical to the change proposed in your letter of February 6, 1987 (Unit 2 Cycle 8 Reload request) as was approved in our Safety Evaluation dated May 4, 1987. In this Safety Evaluation, the acceptability of this MTC change was contingent upon your commitment to a negative MTC at hot full-power, equilibrium xenon conditions. This commitment was made in lieu of your submission of an evaluation of the impact of increasingly positive MTC's on the safety margin provided for ATWS. Please commit to a negative MTC at hot full-power, equilibrium xenon conditions or provide your analysis of the impact of this MTC change upon the ATWS safety margin.

RESPONSE

Unit 1 Cycle 10 is predicted to have a negative MTC at hot full power, equilibrium xenon conditions, at all times in the cycle provided the burnup at the end of Cycle 9 is at least 9,800 MWD/T. The least negative MTC which could occur during the cycle has been calculated to occur at the beginning of Cycle 10 when the Cycle 9 shutdown burnup is only 9,800 MWD/T. Table 5-1 of Reference (b) shows that the least negative MTC under these conditions is predicted to be $-.2 \times 10^{-4}$ delta rho/^{o}F. Since it is presently known that Cycle 9 will terminate at a burnup considerably in excess of 9,800 MWD/t, Cycle 10 is assured of having a negative MTC at hot full power, equilibrium xenon conditions.

QUESTION 3

The maximum pin burnup for some C-E fuel may reach 54,100 MWD/T during Cycle 10 which is higher than the 52,000 MWD/T value accepted by the staff for high burnup C-E fuel. Therefore, please confirm that the maximum pressure within these pins will remain below the nominal system pressure of 2250 psia.

RESPONSE

The thermal performance of composite fuel rods that envelope the fuel rods present on Cycle 10 has been evaluated using the FATES3B version of the C-E fuel evaluation model (References (d), (e), (f), and (g)). The analysis was performed using a power history that enveloped the power and burnup levels representative of the peak fuel rod at each burnup interval, from beginning of cycle to a rod average burnup in excess of 54,100 MWT/T. The maximum rod internal pressure is predicted to remain below the nominal system pressure of 2250 psia throughout the burnup range analyzed.

QUESTION 4

Since the C-E fuel DNBR calculations are based on the CE-1 correlation, whereas the ANF fuel DNBR calculations are based on the XNB correlation, how is the extended SCU methodology affected by the mixed C-E/ANF core?

RESPONSE

The Extended SCU methodology provides (Reference (h)):

> "...at least a 95% probability at a 95% confidence level that the hottest fuel rod will not experience Departure from Nucleate Boiling during normal operation or an Anticipated Operational Occurrence initiated from within the LCO limits."

Since the ANF fuel is being inserted in the Calvert Cliffs Unit 1 Cycle 10 core as a demonstration program, the ANF fuel is being located in non-limiting locations and will have maximum 1-pin peaks which are predicted to be at least 10% below the maximum 1-pin peak in the core for standard operating conditions (Reference (b)). As a result, the ANF fuel will not contain the hottest fuel rod, and the Extended SCU methods need not address the ANF fuel. ANF has determined (Reference (b)):

> "Insertion of the lead [demonstration] assemblies does not significantly affect the MDNBR of the hot C-E assembly...".

Thus, since the presence of the ANF demonstration fuel will not significantly alter the DNBR performance of the hot C-E assembly, the Extended SCU analysis remains valid for the C-E fuel.

In summary, the ANF demonstration fuel will be located in non-limiting core positions and thus need not be addressed by the Extended SCU analysis. Furthermore, ANF has determined that the presence of the ANF fuel will not significantly change the DNBR performance of the hot C-E assembly. Therefore, the Extended SCU analysis remains valid for the C-E fuel in the Calvert Cliffs Unit 1 Cycle 10 core.

Very truly yours,

JA Tiernan

STATE OF MARYLAND :
Calvert County : TO WIT :
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I hereby certify that on the 25th day of March, 1988, before me, the subscriber, a Notary Public of the State of Maryland in and for St. Mary's County, personally appeared Joseph A. Tiernan, 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:

Mary Patricia Mattingly
Notary Public
MARY PATRICIA MATTINGLY

My Commission Expires: 7-1-90

March 25, 1988
Date

JAT/DSE/lmt

Attachments

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
S. A. McNeil, NRC
W. T. Russell, NRC
D. C. Trimble, NRC
T. Magette, DNR