BALTIMORE GAS AND ELECTRIC COMPANY

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May 27, 1980

ARTHUR E. LUNDVALL, JR.
VICE PRESIDENT
SUPPLY

Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Subject: Calvert Cliffs Nuclear Power Plant
Units Nos. 1 & 2, Dockets Nos. 50-317 & 50-318
Partial-Loop Operation

References: (a) BG&E letter dated 4/5/79 from A. E. Lundvall, Jr. to H. R. Denton, Application for Amendment
(b) NRC letter (undated), received 1/28/80 from R. W. Reid to A. E. Lundvall, Jr., Request for Additional Information.

Gentlemen:

Reference (b) requested additional information concerning our application for an amendment to the Calvert Cliffs Units 1 and 2 operating licenses to allow operation with less than four reactor coolant pumps operating, Reference (a).

Enclosure (1) to this letter provides the requested information. We have determined that this constitutes supplementary information to a previous request and that, pursuant to 10 CFR Part 170, no additional fee is required.

Very truly yours,

Arthur E. Lundvall Jr.

cc: J. A. Biddison, Esquire
G. F. Trowbridge, Esquire
Mr. E. L. Conner, Jr. - NRC
Mr. P. W. Kruse - CE

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RESPONSE TO NRC DATA REQUEST

The requested NRC information is listed in Reference 1. The response to this request is presented below.

QUESTION #1:

"The analysis used a review of large break sizes to determine the limiting blowdown period. The staff assumes that this study was performed for the standard C-E geometry. Justify that partial-loop operation will not impact the blowdown, refill and safety injection times. Also, provide the blowdown and safety injection times as a function of break size and the break size used in the present analysis".

RESPONSE:

Specific part-loop blowdown thermal hydraulic calculations were not performed. Instead, rod heatup during the "blowdown" period was considered to be adiabatic. There was no clad to coolant heat transfer during this period. This approach is the most conservative. Without any thermal hydraulic calculations having been performed, no specific break size is modeled. The analysis was, however, performed in this manner so as to represent "a large break". The length of time for this adiabatic period was taken from consideration of partial loop operation on the length of the blowdown period. For the Calvert Cliffs plants the typical large break four-loop blowdown time is 21 seconds. We have performed three-loop calculations in the past and have found the blowdown time lengthened by a second. Extrapolation of this trend would lead to the value of 23 seconds used in our two-loop analysis for the blowdown period. Similar differences were found in the safety injection and refill times. A safety injection time of 19.0 seconds and a contact time of 36 seconds were selected as conservative values.

QUESTION #2:

"A constant heat transfer coefficient of 5 BTU/hr-ft^2-OF to represent steam cooling and a rod-to-rod radiation contribution was used in this analysis. Justify that this constant is a minimum value for this case; that is, a quasi-pool boiling and thermal radiation to steam condition at reduced power. Also, provide the following time dependent data in plot form for the ruptured and peak clad temperature nodes:

a. The sink temperature, T_{oo}, for the steam cooling heat transfer.
b. The surface heat flux due to steam cooling.
c. The surface heat flux due to rod-to-rod radiation."

RESPONSE:

The justification of the value of 5.0 BTU/hr ft^2 °F as the steam cooling heat transfer coefficient is explained in Section S.III.D.6.b of Supplement 1 to CENPD-132. This model has been examined and approved by the NRC in Reference 2. This value is employed in all C-E ECCS calculations to represent a conservative lower limit for rod to coolant heat transfer during the reflood period.

The time dependent data requested is listed in Table 1 for the peak clad temperature node and Table 2 for the rupture node.

QUESTION #3:

"Provide the following additional information:

a. the hot pin axial power profile
b. the power decay curve in tabular form
c. the time varying inlet core reflood rate in plot form
d. the time varying core outlet mass flow in plot form
e. and, the time varying core mixture level in plot form."

RESPONSE:

The hot pin axial power shape is described in Section IV.A.4.b of CENPD-132.

The decay heat power is given in Table 3.

The time varying reflood rate, outlet mass flow, and mixture level are given in Figures 1, 2 and 3, respectively.

REFERENCES:

1. Letter from R. W. Reid (NRC) to A. E. Lundvall (BG&E) received 2/7/80.

2. Letter from Olan D. Parr (NRC) to F. M. Stern (C-E) dated 6/13/75.

TABLE 1

CALVERT CLIFFS I AND II PART-LOOP OPERATION
PEAK CLAD TEMPERATURE NODE

Time	Steam Cooling Sink Temperature (°F)	Steam Cooling Surface Heat Flux (BTU/hr ft^2)	Thermal Radiation Heat Flux (BTU/hr ft^2)
0.0-23.0	–	0.0	0.0
23.0	–	0.0	0.0
30.0	–	0.0	844.87
36.0	259.6	5491.	899.28
40.0	259.6	5526.	834.40
50.0	259.6	5652.	1667.5
60.1	259.6	5784.	2166.1
70.1	259.6	5909.	2691.2
80.1	259.6	6003.	3177.2
90.1	259.6	6071.	3628.8
100.1	259.6	6134.	4025.5
110.1	259.6	6182.	4338.5
120.1	259.6	6209.	4590.7
130.1	259.6	6242.	4738.4
140.1	259.6	6255.	4834.6
150.1	259.6	6264.	4915.5
160.1	259.6	6272.	4978.5
170.1	259.6	6274.	5025.6
180.1	259.6	6272.	5057.7
190.1	259.6	6264.	5076.5
200.1	259.6	6256.	5084.1

TABLE 2

CALVERT CLIFFS I AND II PART-LOOP OPERATION
RUPTURE NODE

Time	Steam Cooling Sink Temperature (°F)	Steam Cooling Surface Heat Flux (BTU/hr ft^2)	Thermal Radiation Heat Flux (BTU/hr ft^2)
0.0 - 23.0	-	0.0	0.0
23.0	-	0.0	0.0
30.0	-	0.0	652.53
36.0	259.6	6749.	770.86
40.0	259.6	6688.	152.31
50.0	259.6	6665.	345.40
60.1	259.6	6772.	368.40
70.1	259.6	6911.	728.64
80.1	259.6	7040.	1159.9
90.1	259.6	7145.	1514.8
100.1	259.6	7220.	1800.2
110.1	259.6	7273.	2017.4
120.1	259.6	7304.	2186.4
130.1	259.6	7334.	2276.5
140.1	259.6	7362.	2338.3
150.1	259.6	7368.	2381.5
160.1	259.6	7374.	2406.0
170.1	259.6	7375.	2414.8
180.1	259.6	7361.	2409.4
190.1	259.6	7348.	2391.9
200.1	259.6	7325.	2364.8

TABLE 3

CALVERT CLIFFS I AND II PART-LOOP OPERATION

DECAY HEAT TRANSIENT

Time	Normalized Decay Heat Fraction *
0.1	0.086
4.0	0.070
10.0	0.063
50.0	0.053
100.0	0.049
200.0	0.044
500.0	0.039
1000.0	0.020

*Fraction of 1377 Mwt

FIGURE 1

MASS ADDED TO CORE
DURING REFLOOD

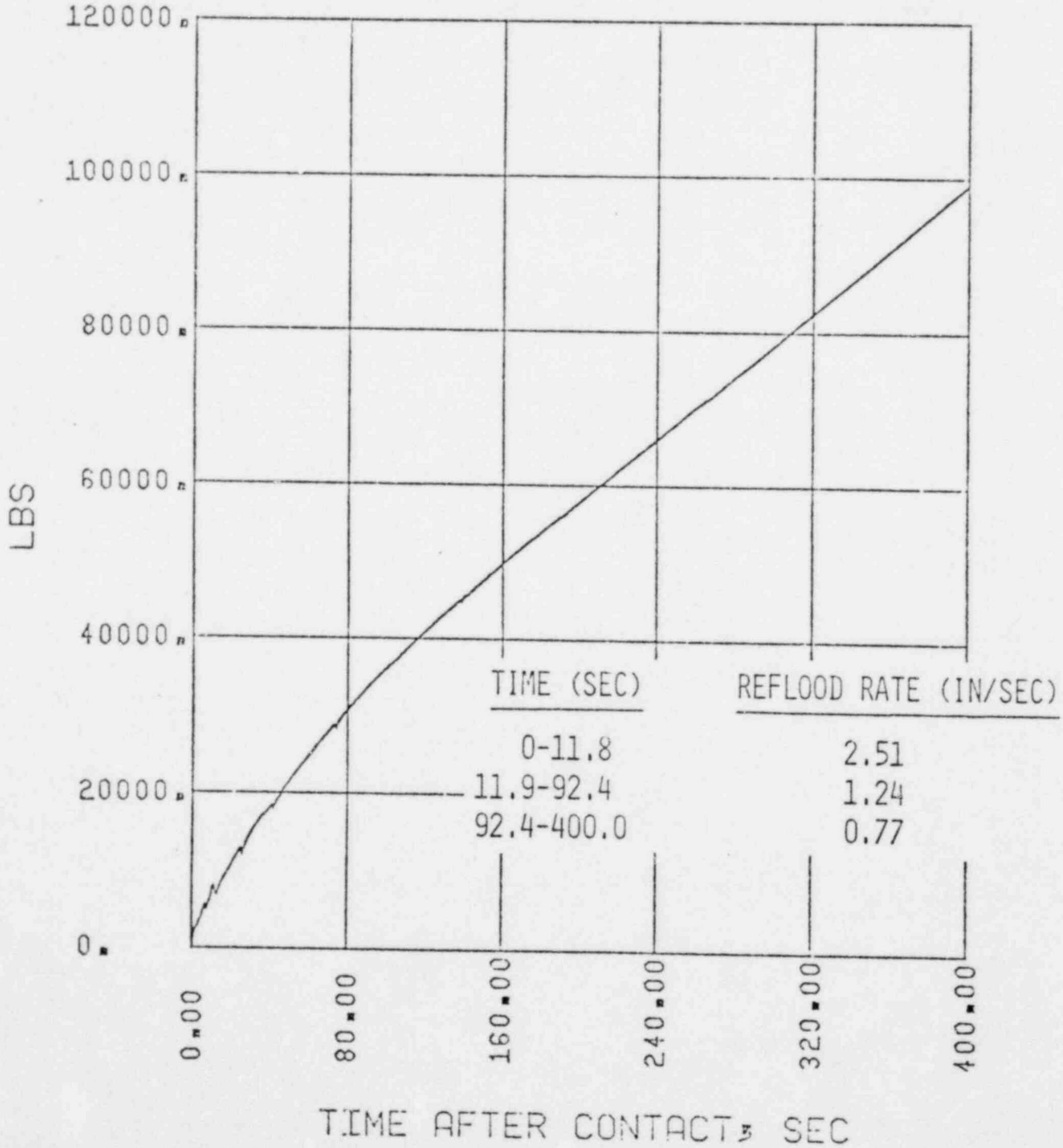

FIGURE 2

CORE OUTLET MASS
FLOW RATE

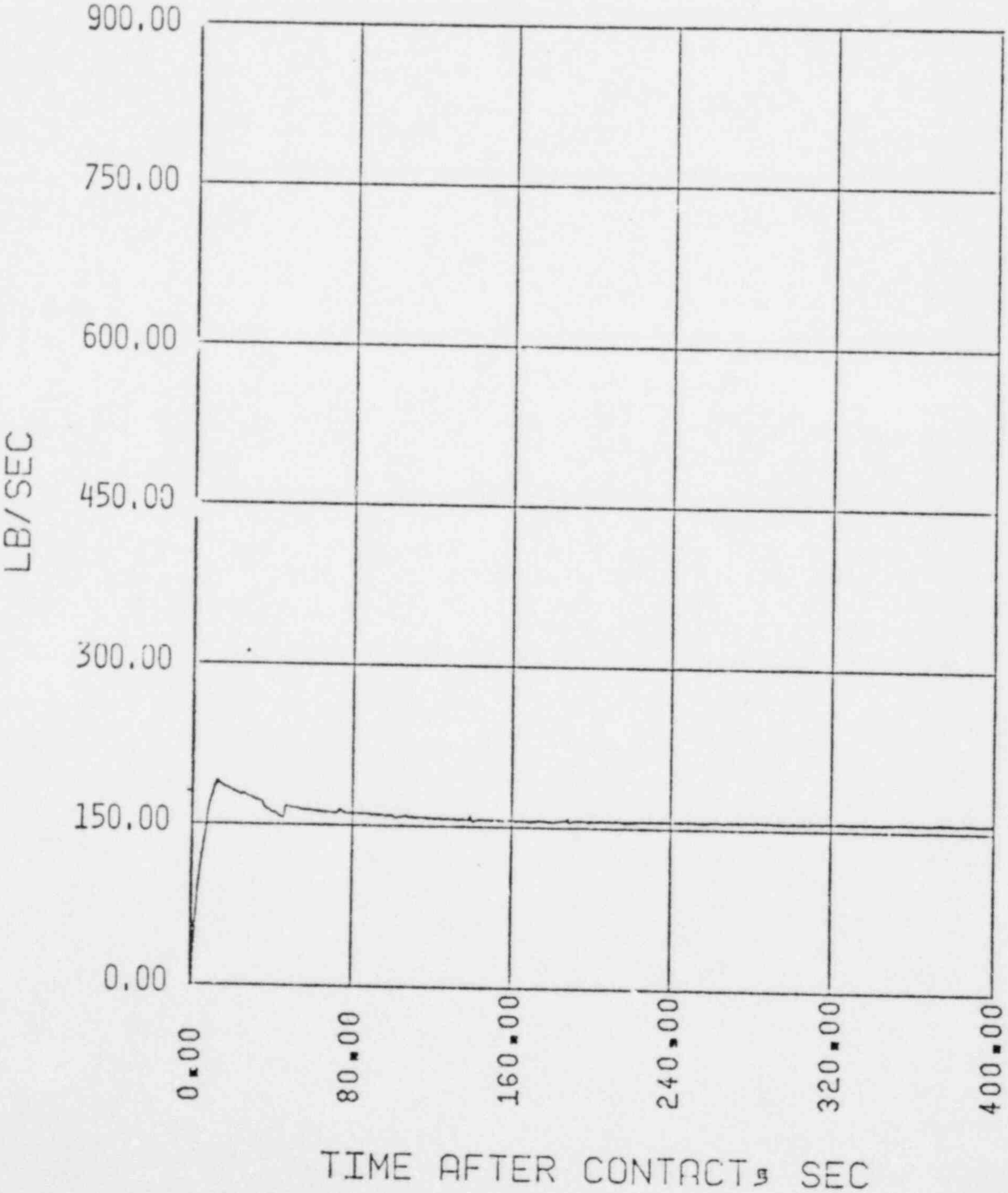

FIGURE 3

MIXTURE LEVEL