AFFIDAVIT PURSUANT

TO 10 CFR 2.790

Combustion Engineering, Inc.)
State of Connecticut)
County of Hartford) SS.:

I, F. M. Stern depose and say that I am the Vice President, Products, Services and Development of Combustion Engineering, Inc., duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.790 of the Commission's regulations and in conjunction with the application of Baltimore Gas and Electric Co., for withholding this information.

The information for which proprietary treatment is sought is contained in the following document:

CEN-204(B)-P, Answers to NRC Questions for Calvert Cliffs 1 Cycle 6 - Set No. 1.

This document has been appropriately designated as proprietary.

I have personal knowledge of the criteria and procedures utilized by Combustion Engineering in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1. The information sought to be withheld from public disclosure is the basis for the limits on F_{xy}^{T}, which is owned and has been held in confidence by Combustion Engineering.

2. The information consists of test data or other similar data concerning a process, method or component, the application of which results in a substantial competitive advantage to Combustion Engineering.

3. The information is of a type customarily held in confidence by Combustion Engineering and not customarily disclosed to the public. Combustion Engineering has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The details of the aforementioned system were provided to the Nuclear Regulatory Commission via letter DP-537 from F.M. Stern to Frank Schroeder dated December 2, 1974. This system was applied in determining that the subject documents herein are proprietary.

4. The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.790 with the understanding that it is to be received in confidence by the Commission.

5. The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

6. Public disclosure of the information is likely to cause substantial harm to the competitive position of Combustion Engineering because:

a. A similar product is manufactured and sold by major pressurized water reactors competitors of Combustion Engineering.

b. Development of this information by C-E required hundreds of manhours of effort and tens of thousands of dollars. To the best of my knowledge and belief a competitor would have to undergo similar expense in generating equivalent information.

c. In order to acquire such information, a competitor would also require considerable time and inconvenience related to the development of a basis for limits on F_{xy}^{T}.

d. The information required significant effort and expense to obtain the licensing approvals necessary for application of the information. Avoidance of this expense would decrease a competitor's cost in applying the information and marketing the product to which the information is applicable.

e. The information consists of the basis for the limit on F_{xy}^{T}, the application of which provides a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Combustion Engineering, take marketing or other actions to improve their product's position or impair the position of Combustion Engineering's product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

f. In pricing Combustion Engineering's products and services, significant research, development, engineering, analytical, manufacturing, licensing, quality assurance and other costs and expenses must be included.

The ability of Combustion Engineering's competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

g. Use of the information by competitors in the international marketplace would increase their ability to market nuclear steam supply systems by reducing the costs associated with their technology development. In addition, disclosure would have an adverse economic impact on Combustion Engineering's potential for obtaining or maintaining foreign licensees.

Further the deponent sayeth not.

Fred M Stern

F. M. Stern
Vice President
Products, Services and Development

Sworn to before me

this 13th day of April, 1982

Carey J. Wenzel
Notary Public

CAREY J. WENZEL, NOTARY PUBLIC
State of Connecticut No. 59962
Commission Expires March 31, 1985

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET 50-317

CEN-204-(B)-NP

ANSWERS TO NRC QUESTIONS FOR CALVERT CLIFFS 1 CYCLE 6 - SET NO. 1

APRIL, 1982

Combustion Engineering, Inc.
Nuclear Power Systems
Power Systems Group
Windsor, Connecticut

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This report was prepared as an account of work sponsored by Combustion Engineering, Inc. Neither Combustion Engineering nor any person acting on its behalf:

A. Makes any warranty or representation, express or implied including the warranties of fitness for a particular purpose or merchantability, with respect to the accuracy, completeness, or usefullness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method or process disclosed in this report.

Question 1

Does the use of the DIT computer code to generate cross sections for PDQ calculations of local power peaking eliminate the need for the bias factor applied in previous reloads to account for increased pin power peaking near waterholes.

Answer

Corrections for increased pin power peaking near waterholes are necessary because of the limitations of diffusion theory. The DIT code, which is based on transport theory, is used to calculate the increased pin peaking near water holes. This increase in peaking can be incorporated into design analyses by either of two methods: (1) adjusting the cross sections used in PDQ for materials in the vicinity of the water hole to force agreement with the DIT calculated local power peaking, or (2) imposing a bias factor to account for the difference between DIT and PDQ calculated local peaking. The first method has been used in cores employing 16x16 fuel assemblies, while the second method has been used for cores employing 14x14 fuel assemblies, including the Calvert Cliffs units.

Question 2

Will Cycle 6 be operated with a 4-step CEA insertion allowance? If so, do axial peaking factors and CEA worth calculations account for this.

Answer

Cycle 6 will be operated with a 4-step CEA insertion allowance. Analyses have been performed for Cycle 6 which show that such an insertion has no significant impact on the CEA worth and axial peaking.

Question 3

Table 5-2 specifying the limiting values of reactivity worths and allowances is confusing. It is not in the same format as for the previous cycle and it is not clear how the total CEA worths for the reference cycle and Cycle 6 were obtained. Explain in more detail the precise core conditions assumed for the calculation of the worth of all CEAs inserted (line 1). In particular, include the assumed power level, boron concentration, average core temperature, and moderator void distribution. Explain the reason for the difference in zero power dependent insertion limit CEA bite between Cycle 6 and Cycle 5.

Answer

The format of Table 5-2 was changed in response to a question on the license submittal for the previous cycle. The format of Table 5-2 is the same as that employed in the response to that question (Question A1 of Reference 1) and the entries in the column for the reference cycle are identical. Subsequent license submittals, including the reload analysis presented for Cycle 4 of Calvert Cliffs Unit 2 (Reference 2) and the Unit 1 Cycle 6 license submittal, used this new format. A detailed explanation of the entries in Table 5-2 is contained in Reference 1.

The Cycle 6 zero power PDIL bite is significantly less than that of Cycle 5. This is due to the revision in PDIL for Cycle 6 which no longer permits insertion of CEA Bank 2 into the core under HZP conditions. Since the zero power bite consists of the total worth of all CEA's allowed in the core at HZP, removing Bank 2 from the core at HZP reduces the value of the zero power bite by the worth of Bank 2.

References for Question 3

1. Letter, A. E. Lundvall, Jr. (BG&E) to R. A. Clark (NRC), "Fifth Cycle License Application Response to NRC Staff Questions," October 31, 1980.

2. Letter, A. E. Lundvall, Jr. (BG&E) to R. A. Clark (NRC), "Fourth Cycle License Application," dated December 4, 1980.

Question 4

Explain in more detail the changes which have resulted in the revised Figure 3.2-2 for Linear Heat Rate Axial Flux Offset Control limits. Justify the increase in allowable rated thermal power to 100% between ASIs of -.06 and +.12 (T.S. Change #7).

Answer

There are presently two systems for monitoring the core peak linear heat rate which are capable of maintaining the peak linear heat rate within the limits imposed by LOCA requirements: (1) the in-core detector monitoring system (Specification 4.2.1.4) and (2) the ex-core detector monitoring system (Specification 4.2.1.3). Normally, the first line monitoring system is the in-core system. Ex-core monitoring is used only when the in-core monitoring system becomes unavailable (such as resulting from a temporary on-line computer outage).

For reload cycles prior to Cycle 6 ex-core monitoring of peak linear heat rate impeded full power capability due primarily to the use of a conservative value for the unrodded total planar radial peaking factor (F^T_{xy}) in the analysis which synthesized the ex-core LHR LCO curve (T.S. Figure 3.2-2). A conservative value of F^T_{xy} was used since F^T_{xy} is not an input parameter to the ex-core monitoring system. The assumed F^T_{xy} was intended to conservatively bound the expected values for the reload cycle of interest.

The F^T_{xy} factored into the ex-core LCO was also factored into the Axial Flux Offset LSSS (T.S. Figure 2.2-1). The assumed F^T_{xy} became a Technical Specification limit (old Specification 3.2.2) which had to be properly monitored to assure that both the ex-core LCO and the Axial Flux Offset LSSS remained conservative. If the unrodded F^T_{xy} limit was exceeded during normal operation, the F^T_{xy} LCO required that the increase in measured F^T_{xy} be traded off with a reduction in the allowed core power in such a way that both the ex-core LHR LCO and the Axial Flux Offset LSSS remained conservative for the higher measured F^T_{xy}. [

]

(old T.S. Figure 3.2-3) as illustrated in Figure 1*. The [

] was used to directly calculate the allowed core power (old Specification 3.2.2) and to calculate a scaling factor for adjusting the ex-core LHR LCO curve (N factor in old Specification 4.2.1.3). When the peak linear heat rate was monitored with the in-core system, the allowed thermal power in Figure 1 was 100% of rated power. When the peak linear heat rate was monitored with the ex-core system, the allowed thermal power in Figure 1 was respresented by the ex-core LHR LCO curve.

*Note: Figure 1 specifies the fractions of allowed thermal power; the allowed thermal power differs for the LSSS and LCO.

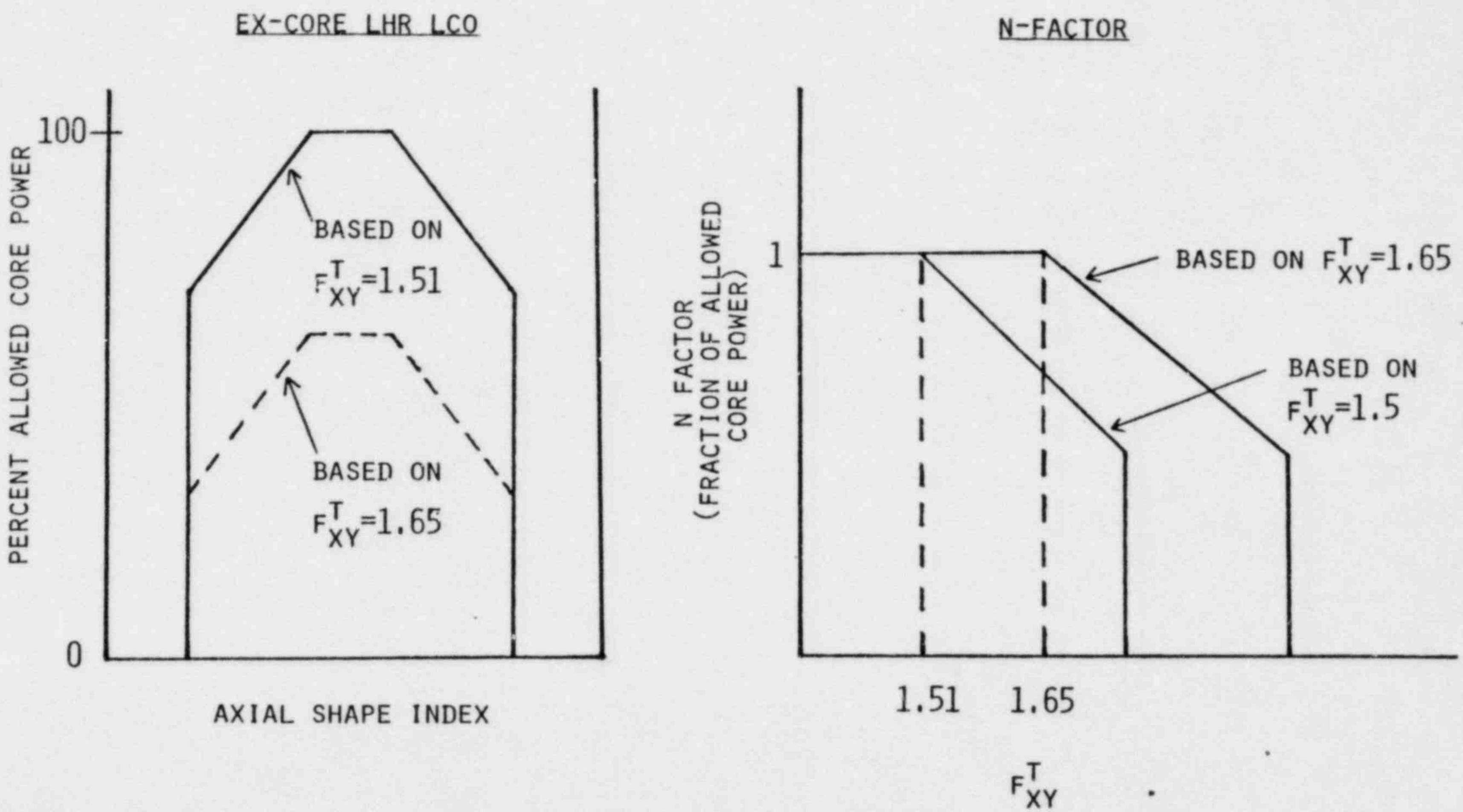
In order to allow full power capability with the ex-core system and also avoid unnecessary short term power level changes in the event of a temporary on-line computer outage, a parametric analysis was performed for Cycle 6 to determine the trade-off between the ex-core LHR LCO and the N factor curve. This analysis showed that an ex-core LHR LCO based on a lower unrodded F^T_{xy} limit of 1.51 instead of the Cycle 6 Technical Specification limit of 1.65, would allow full power operation for ASIs between -0.06 and +0.12 (T.S. change #7). Lowering the reference unrodded F^T_{xy} limit to 1.51 resulted in a more restrictive N factor curve as illustrated in Figure 2. This justified the need for making the N factor curve a separate specification [ ] (T.S. change 8 and 10). The reference F^T_{xy} limit factored into [ ] was not reduced to 1.51.

FRACTION OF ALLOWED THERMAL POWER

MEASURED F_{XY}^{T}

FIGURE 1

FIGURE 2



EX-CORE LHR LCO
PERCENT ALLOWED CORE POWER
100
0
BASED ON F_{XY}^T=1.51
BASED ON F_{XY}^T=1.65
AXIAL SHAPE INDEX
N-FACTOR
N FACTOR (FRACTION OF ALLOWED CORE POWER)
1
BASED ON F_{XY}^T=1.65
BASED ON F_{XY}^T=1.5
1.51
1.65
F_{XY}^T

Question 5

Explain in more detail the reason for the addition of T.S. 3.2.2.2. How was Figure 3.2-3b derived (T.S. change #14)?

Answer

As discussed in the answer to question Number 4, the ex-core LHR LCO was based on a lower F_{xy}^T limit to allow full power operation. Lowering the reference F_{xy}^T limit for the ex-core LHR LCO resulted in a very limiting N factor curve which justified the need for making the N factor curve a separate specification (T.S. change 8 and 10). This avoids an unnecessary penalty on allowed core power when monitoring with the in-core system.

The N factor curve in T.S. Figure 3.2-3b represents the [

] The T.S. Figure 3.2-3b will be used to calculate, in conjunction with Figure 3.2-2, the allowed core power level as a function of measured F_{xy}^T and the axial shape index when the in-core alarm system is out of service.

The new T.S. Figure 3.2-3a will be used to directly calculate the allowed power level as a function of measured F_{xy}^T [
] curve.