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DEC 2 8 1982

Docket No. STN 50-470

Mr. A. E. Scherer, Director
Nuclear Licensing
Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

Dear Mr. Scherer:

Subject: CESSAR - Request for Additional Information

Section 4.4.6 of the CESSAR System 80 Safety Evaluation Report, NUREG-0852, stated that CE had not made a decision concerning the application of Statistical Combination of Uncertainties (SCU) for the System 80 plants. By letter dated February 9, 1982, you responded to this item stating that SCU methods ". . . essentially identical to the methods applied to combine system parameter uncertainties for ANO-Unit 2," would be used for CESSAR plants.

By letter dated May 14, 1982, you submitted in accordance with the staff's request, a report on the statistical combination of system parameter uncertainties for the System 80 plants. The staff has found that additional information concerning the May 14, 1982 submittal is required before we can complete our review.

Within seven days following your receipt of this letter, please provide your schedule for the responses to the enclosed questions. If appropriate, we can meet with you to discuss either the questions or your responses to assure that the necessary information will be provided.

Please contact Gary Meyer (301-492-7364), the CESSAR Project Manager, should you require any further clarification of thenenclosed request for information.

Sincerely,

/S/

Cecil O. Thomas, Chief
Standardization & Special
Projects Branch
Division of Licensing

"The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511."

Enclosure: As stated

cc: See next page

OFFICE	SSPB:DL	SSPB:DL	SSPB:DL				
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DATE	12/22/82	12/ /82	12/28/82				

Combustion Engineering, Inc.

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CESSAR SCU REVIEW (ENCLOSURE 1-P TO LD-82-054)

1. Previous thermal margin analysis using the combination of system parameter uncertainties approach has shown the most adverse set of state parameters (excluding axial shape index) to be at their minimum values (Combustion Engineering 1980a, 1980b). Explain why the sensitivity calculations performed for the System 30 plants no longer show the most adverse state parameters at their minimum values.

2. Describe more fully the data base used in determining the mean and standard deviation given for the enthalpy rise factor described in Section 3.5.

3. Describe the procedure used in determining the mean and standard deviation for the engineering heat flux factor described in Section 3.6.

4. Describe more fully the data base used in determining the mean and standard deviation for the systematic gap width described in Section 3.8.

5. In Table 3-3, the most sensitive operating conditions were determined by selecting: one of three operating pressures (1750, 2250, 2400 psi), one of four inlet temperatures (465, 550, 565, 615°F), and one of three design flows (75, 100, 120%) at a constant ASI. TORC simulations were then performed with nominal, adversely, and advantageously perturbed system parameters. The combination of pressure/temperature/flow conditions which displayed the largest overall MDNBR was then selected as most sensitive. Only 14 of 36 pressure/temperature/flow combinations were run in determining the most sensitive operating conditions.

   Close inspection of Table 3-3 shows a number of conflicting trends. For example, at constant pressure and flow, both maximum and minimum values of inlet temperature can be found to give the greatest sensitivity. Additionally, at constant pressure and inlet temperature, both high and low values of flow will provide maximum sensitivity. This suggests some interaction between operating parameters with respect to MDNBR sensitivity and implies that it may be necessary to run all 36 combinations (3 x 4 x 3) of pressures/temperatures/flows to accurately determine the most sensitive operating conditions. Furthermore, completion of the pressure/temperature/flow run matrix does not ensure that the most sensitive operating conditions have been identified, only that the most sensitive operating conditions of the selected values have been found. Demonstrate that Table 3-3 does indeed give the most sensitive operating conditions.

6. Table A-1, which lists the coded set of system parameters used to generate the response surface, shows no difference between cases 1 and 2. Is this correct?

7. It is assumed that since the TORC code (Combustion Engineering 1975, 1977) was used for both DNB data analysis and for DNB evaluation in the reactor, the uncertainties in the code are cancelled in the reactor application. Although it is agreed that the code uncertainty is small and perhaps conservative, the conservativeness is not confirmed for all cases nor is the smallness quantified. This problem exists for all subchannel codes. Justify why the TORC code should be exempt from this source of uncertainty.

8. The manner in which the most sensitive ASI and the most sensitive operating conditions are determined implicitly assumes that there is no interaction between ASI and operating conditions. This should be either demonstrated or justified.

9. The discussion of the inlet flow distribution is unclear. One possible interpretation is that the lowest of three observed values was used. However, three values are not sufficient to characterize a distribution, and certainly the lowest of three is not an acceptable lower bound on the potential values. Please clarify the method used to account for this uncertainty.

10. On page 3-16, Table 3-2, the "advantageously perturbed" column for axial shape, 0.337, has a value less than nominal. Why? Also, there are several errors in the "% change" column.

11. In Section 6-1, p. 6-1, line 5, σ_S = 0.0011711. On line 6, σ_S is used as 0.001939. Which is correct?

12. In Section 6-1, line 11, is there a square root symbol missing?

REFERENCES

Combustion Engineering, 1980a. "Statistical Combination of Uncertainties Methodology, Part 2: Combination of System Parameter Uncertainties in Thermal Margin Analysis for Calvert Cliffs Units 1 and 2, CEN-124(B)-P. January 1980.

Combustion Engineering, 1980b. "Statistical Combination of Uncertainties: Combination of System Parameter Uncertainties in Thermal Margin Analysis for Arkansas Nuclear One Unit 2. November 1980.

Combustion Engineering, 1975. TORC Code: A Computer Code for Determining Thermal Margin of a Reactor Core. CENP-161-P. Windsor, Connecticut.

Combustion Engineering. 1977. TORC Code: Verification and Simplified Modeling Models. CENPD-206-P. Windsor, Connecticut.