UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

TRCA

June 20, 1980

Docket No. 50-336

Mr. W. G. Counsil, Vice President
Nuclear Engineering & Operations
Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06101

Dear Mr. Counsil:

In the process of reviewing the Basic Safety Report supporting the Cycle 4 Reload of Millstone, Unit No. 2, we find that additional information as delaited in the enclosure is needed to complete our review. These questions relate to fuel design and physics calculations. Other questions may arise from reviews under way by the Thermal-Hydraulic Sections of the Core Performance Branch and by the Reactor Systems Branch.

In order to meet the agreed upon schedule for this review, please provide the additional information, previously telecopied to Mr. R. Kacich on June 16, 1980, by June 30, 1980.

Sincerely,

Robert A. Clark

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

Enclosure: Request for
Additional
Information

cc w/enclosure: See next page

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ENCLOSURE

Questions on Westinghouse Basic Safety Report for Millstone, Unit 2

1. Coolant pressure drop calculations for the Westinghouse fuel assembly design indicates a matching of the overall pressure drop with that for the original Combustion Engineering Millstone 2 fuel assembly design. However, at each axial elevation the pressure drops do not match up between the Westinghouse and Combustion Engineering fuel designs. The largest variation in pressure drops for the two designs occurs at the lower nozzle where the Westinghouse design has a higher pressure-loss coefficient. This variation in pressure drop will result in an inlet flow maldistribution with less direct flow through the Westinghouse bottom nozzle. The BSR should provide justification as to why the resulting cross flow downstream of the bottom nozzle will not produce an unacceptable degree of fretting wear at sites where spacer grid springs and dimples contact fuel rods.

2. The Westinghouse fuel assembly design has 4 holddown springs, while the original Combustion Engineering design has 5 springs. Discuss the differences in the static and dynamic response of each fuel assembly design. The raised pad on the center of the top nozzle orifice plate prevents the Westinghouse holddown springs from being compressed solid. Does this pad limit the axial distance that the Westinghouse fuel assemblies can grow relative to that of the original Combustion Engineering fuel assemblies? Will the spacer grids of the two fuel assembly designs always line up? What is the safety significance if grid-to-grid alignment cannot be assured (i.e., will there be neutronic anomalies, will assembly peripheral fuel rods be punctured)?

3. The BSR states that cladding flattening is precluded during the projected exposure of the fuel. Provide the minimum time to collapse as calculated with the COLLAP code. What is the design maximum value of fuel assembly burnup?

4. What is the calculated minimum shoulder gap which allows for differential growth between fuel rods and the fuel assembly? Provide the two Zircaloy growth correlations used in this calculation and describe or provide the data base from which these correlations were determined. How were the growth correlations combined with (a) fabrication tolerances, (b) differential thermal strains of the fuel assembly and reactor internals, and (c) elastic compression and creep of the guide thimble tubes? For steady-state operation, at what axially-averaged assembly burnup will interference result in rod bow?

5. The NRC staff has not commenced the review of the Westinghouse generic topical report WCAP-8691, Revision 1, "Fuel Rod Bowing Evaluation," which is referenced in the BSR. Specifically, the BSR uses a formula from WCAP-8691 that projects anticipated rod bow magnitudes due solely to geometrical changes in the fuel rod thickness and diameter and spacer grid span length. This formula has been somewhat controversial and has not been accepted by the staff. Therefore, we will require that the degree of rod bowing in the Westinghouse reload fuel be calculated with the existing approved method, which is relatively more conservative. In spite of this additional conservatism, however, we do not calculate a need for a DNBR penalty until an assembly burnup of 36,300 MWD/tU is attained at which exposure the 50% gap closure value is reached. We require that Westinghouse confirm our calculations and verify that no other changes in fuel design variables (i.e., grid spring preload, degree of cladding cold work, etc.) are significant to the rod bowing extrapolation for the Millstone, Unit 2 reload fuel.

6. The Combustion Engineering supplied fuel for Millstone, Unit 2 was designed according to a specific set of Specified Acceptable Fuel Design Limits (SAFDLs). Please list all of the Westinghouse SAFDLs for the Millstone reload fuel and provide the bases for omissions or additions to the original Combustion Engineering set of SAFDLs.

7. Some of the accident analyses described in the BSR were performed with the computer codes FACTRAN (WCAP-7908, "FACTRAN, A Fortran IV Code for Thermal Transients in a UO_2 Fuel Rod") and LOFTRAN (WCAP-7907, "LOFTRAN Code Description"). Our review of these topicals has progressed to the point that there is reasonable assurance that the conclusions based on these analyses will not be appreciably altered by completion of the analytical review, and therefore that there will be no effect on the decision to issue a license amendment. If the final approval of these topical reports indicates that any revisions to the analyses are required, Millstone Unit 2 will be required to implement the results of such changes.

8. Please either reference or provide a thorough description of the Westinghouse Computer Analysis Code (WECAN), which was used to perform the stress analyses of fuel assembly components.

9. Comparisons of power peaking in fuel pins adjacent to CEA water holes using TURTLE (diffusion theory) and KENO (Monte Carlo) have shown an underprediction by diffusion theory, as expected. Please provide additional information, such as comparisons between KENO calculations and experimental measurements of water hole power peaking, to justify the KENO calculational uncertainty used.

10. The fuel rod support grid for Cycle 4 will be Inconel-718 rather than Zircaloy-4 as used in Cycle 3. What are the effects of this material change on power distributions and other physics parameters?

11. Power distributions calculated by TURTLE appear to underpredict the power in the peripheral assemblies while overpredicting the power in the center assemblies. In view of the large errors in predicting CEA worth near the core periphery due to these power distribution inaccuracies, justify the use of TURTLE without some type of baffle correction scheme.

12. The CEA drop analysis was performed without automatic rod control (CEA motion inhibit) or turbine load reduction. Is this the operational plan for Cycle 4?

13. The parameters used in the analysis of the CEA ejection accident appear to be representative of Westinghouse cores and differ from the previous Millstone, Unit 2 fuel supplier in several areas such as ejected rod worths, ejection time, delayed neutron fraction, feedback reactivity weighting, and power peaking (F_q). Please provide a comparison between the Cycle 3 and Cycle 4 values of these rod ejection initial assumptions and discuss the reasons for and effects of any differences.