U. S. NUCLEAR REGULATORY COMMISSION

REQUEST FOR ADDITIONAL INFORMATION FOR WCAP-18032-P, REVISION 0, AND WCAP-18032-NP, REVISION 0, "CALCULATION OF MIXED CORE SAFETY LIMIT MINIMUM CRITICAL POWER RATIO," TOPICAL REPORT

WESTINGHOUSE ELECTRIC COMPANY

1) For the following, provide specific variable names and where necessary a clarified variable description:

    a. Information pertaining to the Legacy fuel including:

        i. Define the legacy state points (e.g., P, m, Tin):
            1. What is the expected number of state points? What if the number of statepoints is below this expected number?
            2. What is the expected coverage of those statepoints over the application domain? What if the coverage over the application domain is smaller than expected?
            3. How would you justify a conservative safety limit minimum critical power ratio (SLMCPR) and operating limit minimum critical power ratio (OLMCPR) if either the number of statepoints or their coverage was less than expected?

        ii. Define the legacy fuel data (e.g., rod diameter, pitch).

        iii. Which other fuel parameters does Westinghouse need to predict to obtain a prediction of the critical power value?
            1. What process is used to calculate these values?
            2. Provide justification demonstrating that the Westinghouse procedure for calculating these values is accurate.

        iv. Describe where the legacy critical power values are generated.

    b. For VIPRE-W/MEFISTO predictions of legacy fuel critical power (CP):

        i. Confirm that these predictions are at the same state points as in 1.a.i.

        ii. Confirm that these prediction use the same fuel data as in 1.a.ii.

iii. Confirm that these predictions only need the additional calculations performed in 1.a.iii.
iv. Define the error term which represents the difference between the VIPRE-W/MEFISTO predictions of CP and those predictions directly from the legacy fuel, as in 1.a.iv.
    1. Provide a histogram of this error term
    2. Provide an example of plots of Error vs. input parameter (e.g., pressure, inlet mass flux, subcooling, R-factor, and any other relevant parameters).
    3. For an actual analysis, describe how Westinghouse Electric Company (Westinghouse) uses these plots.

c. For the training data generated by VIPRE-W/MEFISTO:

i. Define the statement points over which this training data will be generated. These statepoints should be defined similarly to the statepoints in 1.a.i.

ii. Define the origin of the fuel data which will be needed by MEFISTO to generate the training data.

iii. For any fuel data which does not come directly from the legacy fuel itself, what parameters does Westinghouse need to predict and how does Westinghouse make those predictions.

iv. Define a term for the critical power training data as predicted by MEFISTO.

d. For the training data used by the modified critical power correlation (e.g., D5), whether from the MEFISTO (1.c) code or the Legacy fuel data (1.a):

i. Define terms for the different ways Westinghouse is modifying the CP model (e.g., D5, modified using only MEFISTO training data, modified using MEFISTO and Legacy data, modified using only legacy data).

ii. Define the error term which represents the difference between the VIPRE-W/MEFISTO training data as generated by MEFISTO (1.c.iv) and those predictions from the modified D5 (1.d.i).
    1. Provide a histogram of this error term.
    2. Provide an example of plots of Error vs. input parameter (e.g., pressure, inlet mass flux, subcooling, R-factor, and any other relevant parameters).

3. For an actual analysis, describe how Westinghouse uses these plots.

iii. Define the error term which represents the difference between the legacy CP data (1.a.iv) and those predictions from the modified D5 (1.d.i).
   1. Provide a histogram of this error term.
   2. Provide an example of plots of Error vs. input parameter (e.g., pressure, inlet mass flux, subcooling, R-factor, and any other relevant parameters).
   3. For an actual analysis, describe how Westinghouse uses these plots.

2) Provide justification that the true error of either version of the modified D5 correlation (1.d.i) (i.e., modified D5 compared to reality) is conservatively predicted by error between the modified D5 and the legacy CP values.

3) For the modeling used in VIPRE-W:
   a. How is VIPRE-W thermal mixing applied? What is the magnitude of the coefficient and where is the data which supports the value?
   b. Provide the equation for drop deposition model in VIPRE.
   c. Provide a typical plot of the drop deposition variable vs. distance from the grid.
   d. **[**

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4) In discussions with Westinghouse, the NRC staff found Step 5 in Section 3.2 greatly clarified as compared to the description in the topical report (TR). Please provide a written clarification to this step which includes details on the development of the radial power shape and then how that shape is used as a state point.

5) Provide a set of data which would be an example of what would be submitted to the NRC with a license amendment request (LAR). This data should include:
    a. A description of the legacy data (1.a) and if there was “enough” data or if another process (1.a.i) was used.
    b. **[**

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    c. Provide trend plots of the modified critical power model vs input variables (consistent with Figures 5-1 – 5-4 from the D5 TR) to confirm appropriate model behavior.
    d. Provide any other information Westinghouse would find relevant to the LAR.