By letter dated March 16, 2012 (Accession No. ML12079A111), FirstEnergy Nuclear Operating Company (FENOC) submitted a response to a Nuclear Regulatory Commission (NRC) information request made pursuant to 10 CFR 50.54(f) for Beaver Valley Power Station, Unit Nos. 1 and 2 (Accession No. ML120400672). By letter dated May 4, 2012 (Accession No. ML121150501), the NRC requested additional information (RAI) to complete its review of FENOC's March 16, 2012 response. The NRC staff requests are presented below in bold type, followed by a nonproprietary version of the response. The Westinghouse Electric Company LLC proprietary information that would have otherwise been contained within the brackets, has been removed from this attachment so that it may be decontrolled.

1. **For BVPS, Unit 1, provide a table of data that includes the following Automated Statistical Treatment of Uncertainty Method (ASTRUM) inputs for the Analysis of Record (AOR) and integrated analyses: (1) AOR Run #, (2) TCD Run #, (3) PCT, (4) Time of PCT, (5) heat flux hot channel factor (Fq), (6) enthalpy rise hot channel factor (FdH), (7) Cycle Burnup, (8) PCT, and time of PCT, for Cases A and B.**

Table 1: Beaver Valley Unit 1 thermal conductivity degradation (TCD) Evaluation Run Data

a, c

a, c

a, c

Table 2: Beaver Valley Unit 1 AOR Run Data

a, c

a, c

a, c

a, c

2. **For BVPS, Unit 1, please highlight the limiting cases in the ASTRUM run matrices and explain how these cases were chosen. Provide details and explain the approach used to estimate: (1) the effects of TCD, and (2) the compensating model changes. Justify the selection of the number of WCOBRA/TRAC cases that were re-executed, as opposed to a larger number of cases.**

The cases from the Beaver Valley Unit 1 ASTRUM run matrix that were chosen to assess the effects of TCD are highlighted in the response to NRC RAI question 1.

From the AOR, [

] a,c As described in Reference 1, three sets of calculations were performed:

- Case A: Execute [ ] a,c with reduced peaking factors.
- Case B: Execute [ ] a,c with the reduced peaking factors assumed in Case A, and TCD fuel parameters. [ ] a,c A total of 24 WCOBRA/TRAC runs was performed.
- Case C: Execute [ ] a,c with TCD fuel parameters and all offsetting margins (reduced peaking factors as assumed in cases A and B, reduced SGTP, and increased containment pressure). [ ] a,c A total of 24 WCOBRA/TRAC runs was performed.

The effect of TCD on PCT was estimated as the difference between the maximum PCT result of the Case B runs and the maximum PCT result of the Case A runs:

$$\Delta PCT_{TCD} = PCT_{Max,B} - PCT_{Max,A}$$

For Beaver Valley Unit 1, ΔPCT_{TCD} = 156°F as reported in Reference 1.

The effect of the margins assumed in the evaluation on PCT was estimated from the maximum PCT result of the Case C runs which included all margins, the AOR PCT, and the PCT effect of TCD:

$$\Delta PCT_{Margin} = PCT_{Max,C} - PCT_{AOR} - \Delta PCT_{TCD}$$

For Beaver Valley Unit 1, ΔPCT_{Margin} = -485°F as reported in Reference 1.

As noted above, run117 [

] a,c Selected comparison plots for this case are shown below.

[ ] a, c

In this evaluation, engineering judgment was applied to select a small subset of limiting cases for the purpose of evaluating the effects of the design input margins and TCD on the Beaver Valley Unit 1 large break loss-of-coolant accident PCT. The evaluation of TCD and peaking factor burndown supports the full life of the fuel operation.

a, c

Figure 1: Beaver Valley 1 TCD Evaluation, AOR Run117 WCOBRA/TRAC Peak Cladding Temperature, 0-500 Seconds After Break

a, c

Figure 2: Beaver Valley 1 TCD Evaluation, AOR Run117 WCOBRA/TRAC Peak Cladding Temperature, 0-100 Seconds After Break

a, c

Figure 3: Beaver Valley 1 TCD Evaluation, AOR Run117 Lower Plenum Collapsed Liquid Level

a, c

Figure 4: Beaver Valley 1 TCD Evaluation, AOR Run117 Total Vessel Fluid Mass

3. For BVPS, Unit 1, justify the containment pressure changes made to obtain margin. Provide reference to excerpts from the applicable methodologies to clarify the response.

For Beaver Valley Unit 1, WCOBRA/TRAC containment pressure boundary condition input changes were made to obtain margin consistent with the other design input updates. With the reduction in maximum SGTP assumed (from 22 percent to 5 percent), the mass and energy releases to the containment correspondingly increased. The COCO code (Reference 2) was used to develop conservatively low containment pressure input in accordance with WCAP-16009-P-A (Reference 3) Sections 11-3-1, 11-4-11, and 12-3-4. WCAP-16009-P-A Section 12-4-2 references application of the COCO code in an ASTRUM analysis. For Beaver Valley Unit 1, the COCO code was used to generate the conservatively low containment pressure response considering first the mass and energy releases from [

] a,c The final WCOBRA/TRAC containment pressure input used in the evaluation is conservatively low considering the reduced level of steam generator tube plugging.

4. For BVPS, Unit 2, justify the evaluation of reduced peaking factors at beginning-of-life conditions to obtain analytic margin to offset the TCD effect. Show that peaking factor reductions affect PCT in a manner that is substantially independent of fuel burnup.

The maximum peaking factors considered in the Large Break LOCA (LBLOCA) analysis exceeded the allowable operating values documented in the core operating limits report (COLR). As such, a reduction of the peaking factors to the plant operation limits was readily available margin to offset the impact of fuel pellet TCD since the plant could not operate at the analyzed power peaking.

The effect of peaking factors is integral to the burnup of the fuel, due to the decrease in maximum peaking that can be achieved by an assembly with increasing burnup. Beginning with the AOR, the maximum peaking factors were reduced (values shown in Reference 1) to establish a baseline for estimation purposes. The estimate of effect for fuel pellet TCD then considered continuous functions of peaking factors versus burnup (values shown in Reference 1), starting at the reduced values for beginning-of-life (BOL). This approach was used to explicitly and appropriately consider the peaking factor limits as a function of burnup, rather than treating the peaking factor reductions independently of burnup.

5. **The submittal dated March 16, 2012, references a March 7, 2012, letter sent by Westinghouse Electric Company (Westinghouse) to the NRC[1]. Regarding this letter, please answer the following:**

   a. **The final paragraph on Page 2 of 9 of the Enclosure (LTR-NRC-12-27 NP[P]-Enclosure) refers to small differences in fuel characteristics that were claimed to be compared. The paragraph also discusses confirmatory evaluations concluding that other operating characteristics were acceptable. Provide the results of this comparison for BVPS, Units 1 and 2, including the relevant conclusions and the technical basis supporting those conclusions. For any conclusion that differences in a particular fuel or operating characteristic are offset by other conservatisms, list those conservatisms and provide a quantitative estimate of each conservatism, as well as a brief description of the rigor associated with that estimate.**

The key fuel parameters used for fuel temperature analyses were compared to a TCD analysis of a representative rod type. [

] a,c The specifics of the comparison for Beaver Valley Units 1 and 2 are as follows.

Table 3: Beaver Valley Units 1 and 2 Comparison of Plant B and Beaver Valley PAD Data Parameters

[ ] a, c

1 The Westinghouse letter, and a non-proprietary version of its enclosure, may be found at ADAMS Accession No. ML12072A035.

[ ] a, c

b. Please provided the values for the coefficients used in the PAD 4.0+TCD uranium dioxide thermal conductivity equation.

The functional form used to model TCD [

] a,c is as follows:

[

] a, c

c. **Please explain any error corrections, code improvements, and miscellaneous code cleanup between the WCOBRA/TRAC and HOTSPOT code versions used in the TCD evaluations and those used in the plant's AOR.**

Responses to questions 5c and 5d are provided together.

d. **What is the thermal conductivity model impact of code version changes in HOTSPOT, as described on page 5 of 9 of the Enclosure (LTR-NRC-12-27 NP-Enclosure)?**

Responses to questions 5c and 5d are provided together.

For Beaver Valley Unit 1, the WCOBRA/TRAC and HOTSPOT code versions used in the evaluation of fuel pellet TCD do not include any error corrections, code improvements, or model changes from the AOR code versions.

For Beaver Valley Unit 2, the error corrections, code improvements, and miscellaneous code cleanup between the WCOBRA/TRAC and HOTSPOT code versions used in the AOR versus the evaluation of fuel pellet TCD are described in Table 4. The addition of a fuel conductivity model appropriate for the TCD evaluations was incorporated into WCOBRA/TRAC and HOTSPOT as discussed in LTR-NRC-12-27 (Reference 4).

For Beaver Valley Unit 2, the error corrections and code improvements referenced in the prior paragraph do not impact the thermal conductivity model. It is more appropriate to estimate the effect of TCD using code versions with these changes because the impact of TCD on the PCT may be affected by the corrections in the updated code versions (for example, the fuel relocation model correction in HOTSPOT).

Table 4: Beaver Valley Unit 2 Error Corrections and Code Improvements

	Background	Estimated Effect
1	WCOBRA/TRAC allows metal structures to be modeled as either a heated conductor in which axial conduction is calculated or as an unheated conductor in which axial conduction is assumed to be relatively unimportant. The geometry of either conductor can be a wall, a tube, or a rod. In PWR models, heated conductors with rod geometry are used for fuel rods only. Other metal structures are modeled using unheated conductor types. It has been discovered that no heat is transferred to the inside channel of a heated conductor if it is modeled with a tube geometry. This was determined to be a non-discretionary change as described in Section 4.1.2 of WCAP-13451.	Best Estimate WCOBRA/TRAC calculation models do not use heated conductors with tube geometry. This error does not occur for unheated conductors using the tube geometry type. Therefore, no estimated PCT effect is required to be assessed. This information was originally provided in a Westinghouse report dated April 8, 1998.

	Background	Estimated Effect
2	A coding error has been identified in the initial outside oxidation thickness array used for fuel rods. The error was an incorrect index for storage of the oxide thickness for each fuel rod. Coding used the rod number index instead of the rod type index. This issue was determined to be a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451.	The error was found to have no effect for standard BELOCA analyses that follow the published guidance material for input of this variable. The error also did not affect any test simulations performed to support the licensing of the BE Evaluation Model. Thus, there was found to be no instance of use of erroneous oxidation thickness and there is no PCT impact for this error. This information was originally provided in a Westinghouse report dated March 13, 2002. The error has since been corrected.
3	An error was discovered in WCOBRA/TRAC whereby power used in normalization of moderator density weighting factors was double-accounted for channels with multiple simulated rods. The error biases the average moderator density to be slightly higher, resulting in slightly higher power generation in the hot rod. The error is qualitatively conservative, however, quantitatively insignificant. This issue was determined to be a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451.	At the beginning of the transient calculation, the difference in weighted density is less than 1% for all plant types. This difference is similar to the density difference between (2250 psia, 586°F) and (2250 psia, 588.8°F) thermodynamic state points. The difference in average moderator density affects the reactivity. The difference in reactivity at the beginning of the transient is negligible. As the transient progresses, with voiding of the core, the strong negative reactivity dominates. Therefore, it was estimated that the error has 0°F PCT impact on plant calculations. This information was originally provided in a Westinghouse report dated March 13, 2002.
4	Section 6-3-6 of WCAP-12945-P-A indicates that the minimum film boiling temperature calculation for one-dimensional components is calculated as the maximum of the homogeneous nucleation temperature and that predicted by the Iloeje correlation. The comparison of these two correlations is made if a flag (ITMIN) is set greater than zero. Otherwise, the homogeneous nucleation temperature is used. It was found that ITMIN was not initialized, resulting in the Iloeje correlation not being considered. This error has the potential to affect the heat transfer calculations in the steam generator tubes of the STGEN component. The coding was corrected to be consistent with the description in Section 6-3-6. This coding change was determined to be a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451.	The homogeneous nucleation temperature exceeds the minimum film boiling temperature predicted by the Iloeje correlation for pressures less than about 100 psia. Therefore, this error could only potentially have an effect until the system pressure drops below about 100 psia, which typically occurs within 20-30 seconds. Examination of a typical PWR transient indicated that the transition boiling regime occurs in the steam generator tubes for only a few seconds during blowdown. Given the short period of time in the transition boiling regime, and relatively small difference between the homogeneous nucleation temperature and the Iloeje correlation results during this time period, it is concluded that the

	Background	Estimated Effect
		effect of the error is small enough to be considered negligible. Therefore, the estimated effect of this error correction is 0°F. This information was originally provided in a Westinghouse report dated March 7, 2003.
5	Section 5-3-5 of WCAP-12945-P-A indicates that condensation in specified one-dimensional components is suppressed if the pressure drops significantly below the containment pressure, using Equation 5-95a. This ramp was erroneously applied to the interfacial heat transfer for superheated liquid, affecting the evaporation process as well as the condensation due to subcooled liquid. The coding has been corrected, so that it is applied to condensation conditions only. This coding change was determined to be a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451.	Superheated liquid is not expected to be present in the affected components for any significant portion of a large break LOCA. A sensitivity study was performed using a PWR model in which the condensation ramp was applied. It was confirmed that the effect of the error correction on the peak cladding temperature was negligible. Therefore, the estimated effect of this error correction is 0°F. This information was originally provided in a Westinghouse report dated March 7, 2003.
6	The cladding axial thermal expansion enters into the calculation of the fuel rod internal pressure, via the time-dependent gas plenum volume (Equation 7-46 of WCAP-12945-P-A). Equation 7-39 shows how the cladding axial thermal expansion over the length of the rod is calculated. Table 7-1 shows that the cladding axial thermal expansion is based on a linear interpolation scheme over a temperature range of 1073-1273°K. The CALL statement for the interpolation subroutine had a typographical error in one of the arguments, such that the axial thermal expansion was evaluated incorrectly. The error was corrected. This coding change was determined to be a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451.	Rod internal pressures vary on the order of several hundred psi prior to burst, primarily as a result of changes in the temperatures of the various gas volumes (plenum, pellet-clad gap, effective porosity, and so forth). Correction of the cladding axial thermal expansion error affects the rod internal pressure transient by only a few psi. This change is considered negligible, and the estimated effect on plant calculations is 0°F. This information was originally provided in a Westinghouse report dated March 7, 2003.
7	Equation 8-45 of WCAP-12945-P-A shows the neutron capture correction factor specified by the ANSI/ANS 5.1-1979 standard. The time after shutdown term, t, was incorrectly programmed to use the total calculation time, including the steady state calculation. The coding has been corrected so that it is defined as the time after initiation of the break. This coding change was determined to be a non- discretionary change in accordance with Section 4.1.2 of WCAP-13451.	The neutron capture correction factor is a multiplier slightly larger than unity, which increases with time after shutdown. The error resulted in a longer time after shutdown, which is slightly conservative. The effect of the error correction was estimated by evaluating Equation 8-45 of WCAP-12945-P-A, using typical analysis values. The results indicated that the G multiplier is reduced by about 0.4% with the correction, which would cause the total decay heat energy to be reduced by about 0.4%. This change is considered negligible, and the estimated effect on

	Background	Estimated Effect
		plant calculations is 0ºF. This information was originally provided in a Westinghouse report dated March 7, 2003.
8	While modeling a pump suction leg break, it was discovered that a divide by zero can occur if the pump speed goes to zero during the reversal. Logic was added to branch to the reverse flow coding if the speed is zero. Cold leg breaks, in which the flow is always forward, are considered in design basis analyses. Therefore, this coding change was determined to be a discretionary change in accordance with Section 4.1.1 of WCAP-13451.	Design basis analyses are performed for the most limiting break location, which is in the cold leg, between the pump and the vessel inlet nozzle. The rotation of the pump is in forward direction for cold leg breaks, such that the rotation is not reversed. Therefore, this error has no effect on PWR large break LOCA design basis analyses. This information was originally provided in a Westinghouse report dated March 7, 2003.
9	WCOBRA/TRAC contains an option to apply a built-in decay heat uncertainty based on the ANSI/ANS 5.1-1979 Standard. Use of this option resulted in the application of the uncertainty to the prompt fission energy in addition to the decay heat energy. The built-in decay heat uncertainty option is not used in the current Westinghouse Best Estimate Large Break LOCA Evaluation Models (1996 and 1999 versions). However, it will be used in a future methodology improvement. Therefore, this coding change was determined to be a discretionary change in accordance with Section 4.1.1 of WCAP-13451.	As noted above, the built-in decay heat uncertainty option is not used in the affected evaluation models. Therefore, this error has no effect on PWR large break LOCA design basis analyses. This information was originally provided in a Westinghouse report dated March 7, 2003.
10	Entrainment during downward flow is calculated as described in Section 4-6-4 of WCAP-12945-P-A. An orifice entrainment model is used if the void fraction is greater than 0.8, and if there is an area expansion of greater than five percent in the downflow direction. There was a coding error that would result in the orifice entrainment model being bypassed if there was channel splitting (one channel above two or more channels below). This error was corrected. A review of the nodalization used in PWR analyses and test simulations indicated that only the G-2 test predictions were potentially affected by this error. The G-2 test predictions were not used to establish any of the uncertainty distributions used in the methodology. Therefore, this coding change was determined to be a discretionary change in accordance with Section 4.1.1 of WCAP-13451.	The nodalization used in PWR analyses and the test simulations used to establish code and model uncertainties precluded this error from occurring. Therefore, this error has no effect on PWR large break LOCA design basis analyses. This information was originally provided in a Westinghouse report dated March 7, 2003.

	Background	Estimated Effect
11	Input parameter MSIM identifies the last cell number in each simultaneous solution group for the three-dimensional vessel component. A survey of WCOBRA/TRAC input decks identified two plant models and one test simulation model in which the MSIM input value was less than the total number of cells in the vessel. This resulted in an incomplete solution matrix. An input diagnostic check has been added to prevent future occurrences. This input correction was determined to be a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451.	Plant specific calculations were performed to estimate the PCT effect of this error for the two analyses affected. It was confirmed that the fundamental LOCA transient characteristics (for example, blowdown cooling and reflood turnaround timing and behaviors) were unchanged by the error correction. The reference double-ended guillotine break was used to develop the PCT assessments for each plant. The test simulation model affected by this error was also corrected, and the transient calculation repeated. It was found that the error correction had no significant effect on the calculation results, and the prior validation conclusions remain valid. This information was originally provided in a Westinghouse report dated March 25, 2004.
12	Westinghouse submitted a revised treatment of uncertainties for its Large Break LOCA evaluation models, for NRC review and approval. The Automated Statistical Treatment of Uncertainties Methodology is described in WCAP-16009-P. As part of the implementation of the revised methodology, enhancements were introduced that help to automate convergence of the steady state solution to the desired set of conditions, as well as automating the restart process for beginning the LOCA transient. These changes were determined to be discretionary changes in accordance with Section 4.1.1 of WCAP-13451.	At the time the error was identified, it was determined that it had no effect on existing analyses. This information was originally provided in a Westinghouse report dated March 25, 2004.
13	A number of coding changes were made as part of normal code maintenance. These include improvements in user flexibility for non-standard (non-design basis) analyses, and enhancements in the information available via output edits or for plotting purposes. All of these changes are considered to be discretionary changes in accordance with Section 4.1.1 of WCAP-13451.	None of these changes affect the results of design basis analyses. Therefore, the estimated effect is zero. This information was originally provided in a Westinghouse report dated March 25, 2004.

	Background	Estimated Effect
14	Correction of modeling inconsistencies and input errors in the LOFT input decks have resulted in a change in the predicted peak cladding temperature transients. Revised analyses of the LOFT and ORNL tests were performed using the current version of WCOBRA/TRAC. As a result of this re-analysis, revised blowdown heatup heat transfer coefficients were developed and the revised cumulative distribution function (CDF) was programmed into a new version of HOTSPOT. The revised CDF was previously reported to the NRC on February 3, 2004. The overall code uncertainty for blowdown was also recalculated and programmed into a new version of MONTECF. The overall code uncertainty for reflood was not affected. These corrections were determined to be Non-Discretionary changes in accordance with Section 4.1.2 of WCAP-13451.	An estimate of the PCT effect of the revised blowdown heatup CDF was performed for the 1996 and 1999 evaluation models by calculating the impact on the reference transient for representative 2-, 3-, and 4-loop plants. The estimates bound all of the 95th percentile HOTSPOT results. Estimates of the effect of the revised overall code uncertainty for blowdown were made on a plant-specific basis by repeating the MONTECF analysis for those plants that track the blowdown period. This information was originally provided in a Westinghouse report dated April 11, 2005.
15	The HOTSPOT code was modified to be compatible with the Automated Statistical Treatment of Uncertainty Methodology (ASTRUM, described in WCAP-16009-P-A). An option is used to trigger the ASTRUM HOTSPOT technique (single iteration mode) or the Monte Carlo mode used in the previous Best Estimate Large Break LOCA evaluation models. These changes were considered to be discretionary changes in accordance with Section 4.1.1 of WCAP-13451.	None of these changes affect the results of design basis analyses performed with these evaluation models. Therefore, the estimated effect is 0°F. This information was originally provided in a Westinghouse report dated April 11, 2005.
16	A number of coding changes were made as part of normal code maintenance. Examples include correction of debug plots not used in design analyses, and improved consistency between the HOTSPOT nominal PCT (not used in the uncertainty analysis) and WCOBRA/TRAC PCT. All of these changes are considered to be discretionary changes in accordance with Section 4.1.1 of WCAP-13451.	None of these changes affect the results of design basis analyses. Therefore, the estimated effect is 0°F. This information was originally provided in a Westinghouse report dated April 11, 2005.
17	Under certain conditions, the iteration scheme to calculate an average fuel temperature in HOTSPOT converged slowly, exceeding the maximum iteration count. This led to an average fuel temperature calculation that was inconsistent with the WCOBRA/TRAC temperature for calculating the stored energy in the fuel. A revised iteration scheme, based on a combination of a secant method and a parabolic interpolation with a bracketing scheme, was implemented to resolve the non-convergence issue. This change is considered to be a discretionary change in accordance with Section 4.1.1 of WCAP-13451.	The prior inconsistencies between the WCOBRA/TRAC temperature and the HOTSPOT average fuel temperature always resulted in a higher HOTSPOT average fuel temperature. Therefore, a 0°F impact is conservatively assigned for 10 CFR 50.46 reporting purposes. This information was originally provided in a Westinghouse report dated March 16, 2006.

	Background	Estimated Effect
18	The radial power profile of fuel pellets was previously assumed to be uniform when setting up the conduction network over the fuel pellet in HOTSPOT. However, the accuracy of this approximation decreases for highly burned fuel since the radial power profile tends to increase from the center towards the outside of the fuel pellet at higher burnups. As such, an option was added in HOTSPOT to use a non-uniform radial power profile consistent with the WCOBRA/TRAC code. These changes were considered to be discretionary changes in accordance with Section 4.1.1 of WCAP- 13451.	At the time the error was identified, it was determined that it had no effect on existing analyses. This information was originally provided in a Westinghouse report dated March 16, 2006.
19	A number of coding changes were made as part of normal code maintenance. Examples include more descriptive file naming, improved automation in the ASTRUM codes, and improved input diagnostics in the WCOBRA/TRAC code. All of these changes are considered to be discretionary changes in accordance with Section 4.1.1 of WCAP-13451.	None of these changes affect the results of design basis analyses. Therefore, the estimated effect is 0°F. This information was originally provided in a Westinghouse report dated March 16, 2006.
20	A number of coding changes were made as part of normal code maintenance. Examples include additional information in code outputs, improved automation in the ASTRUM codes, increased WCOBRA/TRAC code dimensions, and general code cleanup. All of these changes are considered to be discretionary changes in accordance with Section 4.1.1 of WCAP-13451.	The nature of these changes leads to an estimated PCT impact of 0°F. This information was originally provided in a Westinghouse report dated May 15, 2007.
21	In the axial node where burst is predicted to occur, a fuel relocation model in HOTSPOT is used to account for the likelihood that additional fuel pellet fragments above that elevation may settle into the burst region. It was discovered that the effect of fuel relocation on local linear heat rate was being calculated but then cancelled out later in the coding. This change represents a non-discretionary change in accordance with Section 4.1.2 of WCAP-13451.	1996 and 1999 BELOCA evaluation models analyses were assessed on a plant-specific basis, via the HOTSPOT reanalysis of a representative WCOBRA/TRAC case using the corrected code version at the burst elevation/burst model enabled sub-case. The HOTSPOT 95% probability PCT results were used to establish the plant-specific PCT penalty. This information was originally provided in a Westinghouse report dated May 15, 2008.

e. Explain the differences between the HOTSPOT and PAD thermal conductivity models and the impact of those differences. The NRC staff requests that graphs or other quantified descriptions that aid in explanation be provided.

For the fuel TCD evaluation, PAD 4.0+TCD was used to generate the initial maximum fuel average temperature input into WCOBRA/TRAC and HOTSPOT. The PAD 4.0+TCD fuel thermal conductivity equation, for fuel at a nominal density of 95 percent theoretical density is

given in LTR-NRC-12-27 (Reference 4) with the coefficients provided in response to part b of this RAI and repeated below.

[ ]a, c

For the TCD evaluation, WCOBRA/TRAC and HOTSPOT used a fuel thermal conductivity model based on [ ]a,c For fuel at a nominal density of 95 percent theoretical density, the model in WCOBRA/TRAC and HOTSPOT is given in LTR-NRC-12-27 (Reference 4) and repeated below.

[ ]a, c

The functional form and units between the two models are different. For ease of comparison, the degradation terms (*f(Bu)* in both equations) are compared in Figure 5 at burnups of 20, 40 and 65 GWD/MTU. As seen from Figure 5, [

] a,c

Figures 6 through 9 compare the overall fuel thermal conductivity models at burnups of 0, 20, 40 and 65 GWD/MTU, respectively. Also included in the figures is a comparison with the FRAPCON 3.4 thermal conductivity model (Reference 5). As seen from the figures, [

] a,c

For a given maximum fuel average temperature and burnup, the differences between the PAD 4.0+TCD and WCOBRA/TRAC and HOTSPOT fuel thermal conductivity models [

] a,c

Figure 5: Fuel Thermal Conductivity Degradation Model Comparison

[ ] a, c

Figure 6: Fuel Thermal Conductivity Model Comparisons – 0 GWD/MTU

a, c

Figure 7: Fuel Thermal Conductivity Model Comparisons – 20 GWD/MTU

a, c

Figure 8: Fuel Thermal Conductivity Model Comparisons – 40 GWD/MTU

[ ] a, c

Figure 9: Fuel Thermal Conductivity Model Comparisons – 65 GWD/MTU

[ ] a, c

f. **Please provide additional detail concerning the steady-state ASTRUM/CQD [Code Qualification Document] initialization process. In particular, please explain what fuel characteristics are adjusted within the applicable models to obtain convergence among HOTSPOT, WCOBRA-TRAC, and PAD 4.0+TCD.**

The following parameters in WCOBRA/TRAC are used to determine steady-state convergence, as discussed in Section 20-5 of WCAP-12945-P-A (Reference 6) and Section 12-4-1 of WCAP-16009-P-A (Reference 3).

a, c

a, c

[ ] a, c

Table 5: Initial Gap Thickness and Average Fuel Temperature Comparison for Sample 17x17 Plant

a, c

Table 6: Initial Gap Thickness and Average Fuel Temperature Comparison for Sample 15x15 Plant

a, c

Table 7: HOTSPOT and WCOBRA/TRAC Steady-State Gap Heat Transfer Coefficient and Average Fuel Temperature Comparison for Sample 17x17 Plant

a, c

Table 8: HOTSPOT and WCOBRA/TRAC Steady-State Gap Heat Transfer Coefficient and Average Fuel Temperature Comparison for Sample 15x15 Plant

a, c

Figure 10: WCOBRA/TRAC and HOTSPOT Cladding Temperature Comparison for 17x17 Plant

a, c

Figure 11: WCOBRA/TRAC and HOTSPOT Cladding Temperature Comparison for 15x15 Plant

a, c

6. Please explain how the changed design values will be verified during operation of the plant, i.e., Technical Specification limits, Surveillances, etc. Also, explain what compensatory actions will be taken if a value is found to be outside of the limits assumed in the analysis.

As described in Reference 1, the following input parameter changes were included in the integrated evaluation to determine the impact of TCD for Beaver Valley Unit 1:

- reduction in transient FQ, including uncertainties, from 2.52 to 2.4
- reduction in steady-state FQ, without uncertainties, from 2.2 to 1.8
- reduction in FDH, including uncertainties, from 1.75 to 1.62
- corresponding reduction in hot assembly average power, including uncertainties
- reduction in upper bound steam generator tube plugging from 22 percent to 5 percent
- increase in the conservatively low assumed containment pressure boundary condition to address the decrease in steam generator tube plugging and existing margin

For Beaver Valley Unit 2, the following input parameter changes were included in the integrated evaluation to determine the impact of TCD, as described in Reference 1:

- reduction in transient FQ, including uncertainties, from 2.52 to 2.4
- reduction in steady-state FQ, without uncertainties, from 2.1 to 1.8
- reduction in FDH, including uncertainties, from 1.75 to 1.62
- corresponding reduction in hot assembly average power, including uncertainties

As stated in the response to RAI question 4 for Beaver Valley Unit 2 and applicable also to Beaver Valley Unit 1, the maximum peaking factors considered in the Large Break LBLOCA AOR exceeded the allowable operating limits of transient FQ equal to 2.40 and FDH equal to 1.62 documented in the COLR for each Beaver Valley Unit. As such, a reduction of the peaking factors to the plant operation limits was available margin used to offset the impact of TCD since the plant could not operate at the analyzed power peaking. Therefore, no changes to the COLRs were required to support these input parameter changes.

Of the fuel peaking factor design values, the transient FQ and FDH parameters have specific limits specified in the applicable COLR and Technical Specification surveillance requirements. If the surveillance limits were determined to not be met, the applicable action statements would be followed. This may involve a reduction in core power and reactor trip setpoints.

The steady-state FQ and hot assembly average power parameters do not have associated COLR limits or surveillances but are confirmed to be met during the reload process. If any of these peaking factor limits were determined to be not met during the reload process, either an evaluation would be performed to determine the impact on the safety analyses or the core design would be changed to meet the limits.

An additional assumption regarding core design peaking factors was included in the evaluation of the impact of TCD. Since the TCD impact increases at higher core burnup conditions, it was necessary to evaluate the impact at burnups associated with those beyond the AOR conditions analyzed. The range of burnups evaluated encompasses that expected for higher power assemblies well into the second cycle of operation. At higher burnup conditions, the associated capability of the hottest assemblies to reach maximum peaking factor power levels is diminished due to the loss of reactivity in the fuel at high burnup conditions. Therefore, burnup limits were reduced as described in Reference 1 (peaking factor versus rod burnup) at the higher burnup conditions and used in the evaluation of the impact of TCD. These reduced peaking factors at high burnup conditions constitute a core design constraint and will be confirmed to be met during the core design process similar to other limits.

Reactivity and power distribution measurements are performed periodically during the cycle as required by Technical Specifications 3.1.2, "Core Reactivity," 3.2.1, "Heat Flux Hot Channel Factor $F_Q(Z)$," and 3.2.2 , "Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)," to verify that core reactivity and peaking factors are within their respective design limits. Measured power distributions and core reactivity are also compared against predicted power distributions and core reactivity. These comparisons, when coupled with startup physics testing results following refueling, are used to verify the core design model and to demonstrate the core is operating as designed. This confirmation provides confidence in the predictive capability of the core design model used to verify LBLOCA accident analysis input assumptions and its ability to predict core performance. If the core is determined to not be operating as designed, an evaluation would be performed to assess analysis margins, understand the reasons for the deviation, and make appropriate adjustments on a case-by-case basis to plant operations or setpoints to ensure operation within LBLOCA analysis limits.

For Beaver Valley Unit 1, the maximum upper bound steam generator tube plugging assumption was changed. This input parameter has no associated Technical Specification limit or surveillance requirement. Technical Specification 5.5.5, "Steam Generator (SG) Program," addresses steam generator tube structural integrity and leakage criteria only. Adherence to safety analysis assumptions regarding the number of tubes plugged is confirmed during the core reload process. At the beginning of each reload design cycle, the Westinghouse core design team issues a questionnaire to FENOC that includes a request for information regarding plant changes planned for the upcoming cycle. One of the parameters requested is the anticipated steam generator

tube plugging levels for the specific design cycle. A response is provided by FENOC and reviewed by Westinghouse during the reload process for impact on the LOCA analyses. If the steam generator tube plugging was projected to exceed the analyzed limits, then additional analyses may be required to support the core reload safety evaluation for that and future cycles. Additionally, the steam generator tube plugging limits are documented on the steam generator tubesheet drawings that track which tubes are plugged and the total number of tubes plugged. The drawings contain a reference to identify the basis for the tube plugging limit.

Also for Beaver Valley Unit 1, the containment pressure boundary condition was changed (increased) for the integrated evaluation. The containment boundary condition in the AOR contained margin from the actual COCO containment code output. Since increasing the containment pressure boundary condition has a beneficial effect on PCT, it was decided to recover a portion of this margin for this evaluation to show a more realistic result. Additionally, the assumption of lower steam generator tube plugging also has the effect of increasing the containment pressure profile and this was also included in the evaluation as discussed in the response to RAI question 3. There are no associated Technical Specification limits or surveillance requirements for containment pressure boundary conditions other than initial conditions in Technical Specifications 3.6.4, "Containment Pressure," and 3.6.5, "Containment Air Temperature," and associated surveillance requirements. In addition to containment initial conditions, there are many parameters that make up the conservative back pressure analysis, which provides input to the LBLOCA analyses. Control of the inputs is maintained through design control processes, which require interface between design organizations for all plant changes. Changes, for example, which may impact the inventory of structural heat sinks in the containment and impact LBLOCA pressure boundary conditions, would be evaluated by FENOC to determine if a re-analysis is needed. Typically, these types of changes would only result from planned plant changes during refueling outages and no periodic surveillance is warranted.

7. At the bottom of Pages 1 and 5 of Attachment 2 to the letter dated March 16, 2012, it is stated that "FirstEnergy Nuclear Operating Company and its vendor Westinghouse, utilize processes which ensure that the LBLOCA [Large Break Loss-of-Coolant Accident] analysis input values conservatively bound the as-operated plant values for those parameters." Please explain these processes.

FENOC and its vendor, Westinghouse Electric Company LLC, ensure the LOCA analysis input values conservatively bound the as-operated plant values for the relevant parameters via the fuel reload process. The purpose of the fuel reload process is to evaluate the plant changes resulting from the loading of different or new fuel into the core. As described in WCAP-9272-P-A (Reference 7), the evaluations performed for the fuel reload support a licensing approach under the regulation of 10 CFR 50.59.

Safety analyses generally analyze the relevant parameters in a bounding direction compared to the expected operational values. The generic fuel reload evaluation approach relies upon the bounding approach in which safety analyses are performed to accommodate the plant changes resulting from different or new fuel in the core without requiring new safety analyses.

As part of the reload evaluation, the LOCA analyst generates a list of important parameters to the LBLOCA analysis that show a fuel reload dependency and identifies the values of those parameters supported by the LBLOCA licensing basis analyses and evaluations. The parameters are confirmed to support the reload core design or are evaluated with respect to the LBLOCA analysis.

Separate from the fuel reload process, plant changes that may impact the LBLOCA analysis are identified to Westinghouse as needed, and 10 CFR 50.46 evaluations are performed as necessary. During the reload process, a summary of plant changes that have occurred since the previous cycle and changes planned for the upcoming cycle is provided by FENOC to Westinghouse. Westinghouse reviews those changes identified by FENOC to ensure the non-reload related parameters analyzed in the LBLOCA analysis, and therefore the LBLOCA analysis, remain applicable. For example, steam generator tube plugging level is one such non-reload related parameter reviewed as part of the reload analysis to ensure that the LBLOCA analysis remains applicable.

8. **Based on the NRC's review of the March 16, 2012, submittal it appears that the licensee has revised inputs to a method of evaluation as described in the final safety analysis report (as updated) used in establishing the design bases or in the safety analyses.**

   Revision 1 to [Nuclear Energy Institute] NEI 96-07, "Guidelines for 10 CFR 50.59 Implementation," Section 3.8, "Input Parameters," provides clarifying information concerning whether an input parameter is considered to be an element of a methodology for the purposes of addressing the applicable requirements found at 10 CFR 50.59, "Changes, Tests, and Experiments." Address whether the methodology permits the licensee to establish how to select the value of an input parameter to yield adequately conservative results and whether the revised value is more conservative than that required by the selection method.

   Also, address whether any of the changes (i.e., to the UO2 thermal conductivity equation) constitutes a change in the calculation framework used for evaluating behavior or response of a system, structure or component. Explain whether, and how, 10 CFR 50.59(c)(4) might apply to such a change.

Westinghouse currently employs two best estimate Evaluation Model (EM) methodologies for analysis of the LBLOCA in pressurized water reactors (PWRs) at Beaver Valley:

- 1996 Westinghouse Best Estimate LBLOCA Evaluation Model (Code Qualification Document (CQD) EM, Reference 6)
- 2004 Westinghouse Realistic LBLOCA Evaluation Model using ASTRUM (Automated Statistical Treatment of Uncertainty Method) (ASTRUM EM, Reference 3)

In application of a Westinghouse best estimate large break LOCA methodology to a plant analysis, Westinghouse works with the licensee to establish several parameter values input to the specific analysis per the NRC – approved evaluation model requirements (including applicability restrictions specified by the NRC in their safety evaluation reports (SERs)). The licensee is permitted to establish the values of these parameters on the basis of plant-specific considerations; as such they are input to the methodology and not part of the methodology, as defined in NEI 96-07 Revision 1 (Reference 8) Section 3.8. The input parameter values may be selected conservatively in order to support current plant operation, as well as accommodate expected future changes or otherwise at the discretion of the licensee. Table 9 summarizes the selected design input changes evaluated in conjunction with the execution of the TCD evaluation(s) performed as described in the Reference 1 submittal, and relevant governing topical report references identifying how these values are to be selected.

In the evaluations of design input changes performed as described in the Reference 1 submittal, the changes to design input values were made to more closely represent current plant operation. Selection of the revised input parameter values was made in accordance with the approved EM. Therefore, the design input changes reflect reduction in the conservatism of these values and are considered an input parameter change and not a change to the methodology, consistent with Reference 8 Section 3.8. As such, the design input changes have been evaluated under 10 CFR 50.59 and are being processed for inclusion in the UFSAR. As described in response to RAI question 7, Westinghouse and FENOC utilize processes that ensure the LBLOCA analysis input values conservatively bound the as-operated plant values for these parameters.

In the evaluations of TCD and design input changes for Beaver Valley Unit 1, as described in the Reference 1 submittal, analysis input conservatism in the containment pressure input was reduced in order to recover PCT margin. The as-approved ASTRUM EM specifies that a conservative containment backpressure will be used. The degree of conservatism is not specifically defined by the EM or constrained by the NRC SER. The magnitude of the conservatism may vary between analyses due to (1) different plant operating parameter ranges considered in each analysis (such as

steam generator tube plugging and vessel average temperature), (2) different licensee requirements to accommodate expected containment changes, (3) and/or different engineering judgment during the analysis execution regarding the need to reduce the input conservatism and recover associated PCT margin in the analysis. This discretionary input parameter conservatism may be recovered while remaining in accordance with the as-approved EM.

This type of analysis conservatism in the containment backpressure input was not evaluated for Beaver Valley Unit 2.

Fuel pellet TCD and peaking factor burndown were not explicitly considered in the as-approved Westinghouse best estimate LBLOCA EMs. In order to evaluate the PCT effect of TCD and peaking factor burndown as described in the Reference 1 submittal, evaluation techniques were used that are outside of the as-approved EMs. This was necessary to explicitly consider the fuel performance effects of TCD, and to adequately evaluate the burnup-dependent aspects of the fuel performance changes considering TCD. Specifically, the following aspects of the TCD evaluation(s) were outside of the as-approved best estimate LBLOCA EM:

a, c

[ ] a, c

10 CFR 50.46 establishes criteria for reporting and for action regarding changes or errors involving methods for loss-of-coolant analyses. For the estimation and reporting of PCT impact, the changes to the LBLOCA EM to explicitly consider the fuel performance effects of TCD and to adequately evaluate the burnup-dependent aspects of the fuel performance are governed by 10 CFR 50.46. Consistent with 10 CFR 50.59(c)(4) and Reference 8 Section 4.1.1, the provisions of 10 CFR 50.59 do not apply for the LBLOCA EM changes for estimation and reporting of PCT impact because the 10 CFR 50.46 regulation establishes more specific criteria for reporting and action for changes involving methods for loss-of-coolant accidents.

In summary, in the estimation of PCT impact of TCD and design input changes as described in the Reference 1 submittal, two types of changes were made:

- Design input values were changed to more closely represent plant operation, or analysis input changes were made to reduce conservatism in as-analyzed values. The licensee is permitted to establish the value of these parameters on the basis of plant-specific considerations; as such these are changes to the input of the methodology and are not part of the methodology. Therefore, the design input changes reflect reduction in the conservatism of these values and are considered an input parameter change and not a change to the methodology. As such, the design input changes have been evaluated under 10 CFR 50.59 and are being processed for inclusion in the UFSAR.

- Techniques to appropriately account for the burnup-dependent effects of TCD were used in the estimations, which are outside of the as-approved EMs. These changes to the calculational framework (as defined in 10 CFR 50.46(c)(2)) were required to assess the TCD phenomena that are not explicitly accounted for in the as-approved EMs. The provisions of 10 CFR 50.59 do not apply for the LBLOCA EM changes for estimations and reporting of PCT impact because the

10 CFR 50.46 regulation establishes more specific criteria for reporting and for action for changes involving methods for loss-of-coolant accidents.

Table 9: Applicable Evaluation Model Reference(s) for Selection of the Design Input Parameters Modified in TCD Evaluations for Beaver Valley Units 1 and 2

Design or Analysis Input Change	Relevant Section(s) of ASTRUM Topical Report (Reference 3) Applicable for Beaver Valley Unit 1 Only	Relevant Section(s) of CQD Topical Report (Reference 6) Applicable for Beaver Valley Unit 2 Only
Specification of peaking factors	Section 1-2-11 Table 1-10	Section 21-2-1 Section 26-3-2 Section 26-4-2-2 Section 27-1-1
Steam generator tube plugging range	Section 1-2-11 Section 11-3-1	Not applicable
Containment pressure input	Section 11-3-1 Section 11-4-11 Section 12-3-4	Not applicable

References:

1. Letter from Paul A. Harden (FENOC) to NRC, "Response to Nuclear Regulatory Commission Information Request Pursuant to 10 CFR 50.54(f) and Associated 10 CFR 50.46 Report for Evaluation of Fuel Pellet Thermal Conductivity Degradation (TAC No. M99899)," March 16, 2012, Accession No. ML12079A111.
2. WCAP-8327 (Proprietary), WCAP-8326 (Non-Proprietary), "Containment Pressure Analysis Code (COCO)," 1974.
3. WCAP-16009-P-A (Proprietary), "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," January 2005.
4. LTR-NRC-12-27, "Westinghouse Input Supporting Licensee Response to NRC 10 CFR 50.54(f) Letter Regarding Nuclear Fuel Thermal Conductivity Degradation (Proprietary/Non-Proprietary)," March 7, 2012.
5. NUREG/CR-7022, Volume 1 / PNNL-19418, Volume 1, "FRAPCON-3.4: A Computer Code for the Calculation of Steady-State Thermal-Mechanical Behavior of Oxide Fuel Rods for High Burnup," March 2011.
6. WCAP-12945-P-A (Proprietary), Volume 1 (Revision 2) and Volumes 2 through 5, Revision 1, "Code Qualification Document for Best Estimate LOCA Analysis," March 1998.
7. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985.
8. NEI 96-07 Revision 1, "Guidelines for 10 CFR 50.59 Implementation," November 2000.

Enclosure A to FENOC Letter L-12-287

10 CFR 2.390 Affidavit for Westinghouse Electric Company, LLC

(Five Pages Follow)

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

B. F. Maurer, Manager
ABWR Licensing

Sworn to and subscribed before me
this 1st day of AUGUST 2012

Renee' Giampole
Notary Public

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Renee Giampole, Notary Public
Penn Township, Westmoreland County
My Commission Expires September 25, 2013

(1) I am Manager, ABWR Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

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

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 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 should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse 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 application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in First Energy Nuclear Operating Company Letter L-12-287 Attachment 1, "Supplement to Response to Nuclear Regulatory Commission Request for Additional Information Regarding the Estimated Effect on Peak Cladding Temperature Resulting from Thermal Conductivity Degradation in the Westinghouse-Furnished Realistic Emergency Core Cooling System Evaluation (TAC Nos. ME8409 and ME8410)" (Proprietary), for submittal to the Commission, being transmitted by First Energy Nuclear Operating Company Letter L-12-287 and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as prepared by Westinghouse is that associated with fuel thermal conductivity degradation, and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Assist customers in providing responses to RAIs dealing with the 10 CFR 50.46, 30-day report.

Further this information has substantial commercial value as follows:

(a) Provide licensing support with respect to thermal conductivity degradation.

(b) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar fuel design and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.