WCAP-16072-P-A SER Compliance Update Results of MTC Test at Peak RCS Boron

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Results of MTC Test at Peak RCS Boron

This letter is being provided to satisfy the Condition 3 of Section 4 of the SER to topical report WCAP-16072-P-A[1] for MTC testing in the first CE-OEM plant to use ZrB_2 burnable poison. The results of this test demonstrate that the methodology described in Reference 1 is adequate for predicting MTC behavior in CE type cores containing ZrB_2 IFBA.

Although the NRC accepted the Westinghouse responses to RAIs, the SER specifically requested that a measurement of the MTC at peak boron conditions be performed for the first startup of a CE plant using ZrB_2 IFBA. As discussed in Reference 2, the intent of this letter is to fulfill that obligation based on the recently completed measurement at [ ]^{a,c}.

The specific requirement defined in Condition 3 of the SER to Reference 1 reads as follows:

> "Plant TS SRs on MTC validate the physics predictions and ensure that plant operations remain within allowable limits. In addition to current SRs, licensees shall confirm that the peak positive HFP MTC is within the TS limits at the highest RCS soluble boron concentration predicted during full power operation. The peak positive HFP MTC shall be derived by adjusting the measured MTC at HFP BOC conditions to the maximum HFP soluble boron concentration expected during the cycle. In order to ensure a conservative adjustment, a direct measurement of MTC is required at the highest RCS soluble boron concentration predicted during full power operation. This direct measurement is only required for the first application of ZrB_2 IFBA in a CE 14x14 or 16x16 fuel assembly design. During the first cycle implementation, Westinghouse shall provide the staff with a letter containing the following information:
>
> v. Measured HFP BOC MTC (TS SR)
> vi. Measured HFP MTC at highest RCS soluble boron concentration,
> vii. Calculated HFP MTC at highest RCS soluble boron concentration,
> viii. Demonstrated accuracy of the calculate HFP MTC within current analytical uncertainties."

This letter documents the information outlined above as excerpted from Item 3 of Section 4.0 of the topical report Safety Evaluation.

The table below shows the results of the [ ]^{a,c} test together with the prediction obtained from the Westinghouse approved nuclear design code ANC[3].

Parameter	Value
MTC (HFP, BOC, Measured)	
MTC (HFP, BOC, Calculated)	
MTC (HFP, Peak Boron, Measured)	
MTC (HFP, Peak Boron, Calculated directly by ANC)	
MTC (HFP, Peak Boron, Calculated by Adjusting BOC Measured MTC per SER)	
MTC Error, Absolute difference between Measurement and Calculation	

a, b, c

The calculation of the MTC for Technical Specification compliance at the peak RCS soluble boron concentration was performed using the method described in Condition 3 of the SER to Reference 1. [

]^{a,c}:

[ ]a,c
[ ]a,b,c
[ ]a,b,c

The measured and calculated values of the peak boron MTC were as follows:

[ ]a,b,c
[ ]a,b,c

The absolute difference between measured and calculated best estimate coefficients is:

[ ]a,b,c

This difference is well within the design uncertainty allowance of [ ]a,b,c established in Reference 4. [

]a,b,c.

References:

1. "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs," WCAP-16072-P-A, Rev.0, August, 2004.

2. Letter from J. A. Gresham (Westinghouse) to J. S. Wermiel (USNRC), "Westinghouse's Response to Item 3 of Section 4.0 (CONDITIONS AND LIMITATIONS) of the Final Safety Evaluation for Topical Report WCAP-16072-P-A, Revision 0, "Implementation of Zirconium Diboride Burnable Absorber Coatings in CE Nuclear Power Fuel Assembly Designs," LTR-NRC-04-52, September 8, 2004.

3. "ANC, A Westinghouse Advanced Nodal Computer Code," WCAP-10965-P-A, September 1986.

4. "Analysis of Moderator Temperature Coefficients in Support of a Change in the Technical Specifications End-of-Cycle Negative MTC Limits," CE NPSD-911-A and Amendment 1-A, September 15, 2000.