WCAP-16500-NP
Supplement 1
Revision 1
Addendum 1

March 2010

Application of CE Setpoint Methodology for CE 16x16 Next Generation Fuel (NGF)

(Follow-up Response to NRC RAI #1)

Westinghouse

WCAP-16500-NP Supplement 1 Revision 1
Addendum 1

Application of CE Setpoint Methodology for CE 16x16 Next Generation Fuel (NGF)

(Follow-up Response to NRC RAI #1)

March 2010

Author: W. L. Greene*

Verifier: S. F. Grill*

Approved: S. P. Rigby*

* Electronically Approved Records Are Authenticated in the Electronic Document Management System

NRC RAI #1

In the proposed setpoint methodology, [

] Please calculate
new addressable constants with these updated code versions and complete a thermal margin assessment.
Provide the thermal margin assessment at several nominal operating points as well as top peaked and
bottom peaked axial power distributions. Compare these thermal margins to identical state points
generated using the proposed approach. The U.S. Nuclear Regulatory Commission (NRC) requests this
work to assess the overall conservatism of the proposed approach and recognizes that updated versions of
the COLSIM and CPCSIM codes do not need to include a proper verification and validation.

Westinghouse Follow-up Response to NRC RAI #1

The WSSV-T and ABB-NV CHF correlations are [
]^{a,c} Therefore, implementing these correlations into the COLSIM and CPCSIM codes is very
difficult. Therefore, instead of implementing the NGF correlations into the current thermal hydraulics
algorithms in COLSIM and CPCSIM, Westinghouse has [
]^{a,c} These modified codes were used to calculate new
addressable constants and determine thermal margin for various time points over the most recent cycles of
[   ]^{a,c}
as well as for several top peaked and bottom peaked axial power distributions.

Cycle minimum DNBR thermal margins are listed in Table 1. Detailed COLSS time in cycle nominal ASI
margin results are shown in Figure 1 and Figure 2. Detailed CPC time in cycle nominal ASI, top peaked
and bottom peaked margin results are shown in Figure 3 and Figure 4. The values in Table 1 and the
figures are based on cases selected to illustrate the relative margins of setpoints methods and do not
necessarily represent actual plant margins. In fact, the cases which produce the minimum margins for
positive and negative Axial Shape Index (ASI) are based on axial shapes near or beyond the ASI trip
limits. Top peaked and bottom peaked calculations were not performed for COLSS since they would be
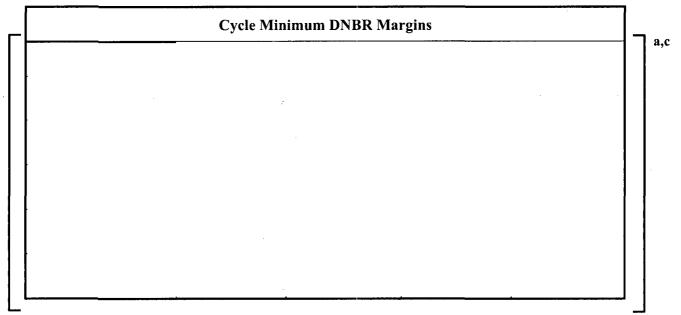outside the narrower COLSS ASI alarm limits.

The comparison of the results using the process described in WCAP-16500-P Supplement 1 Revision 1
(identified as 'WCAP') with the results using the [
]^{a,c} (identified as 'RAI') shows that the WCAP process produces lower more conservative DNBR
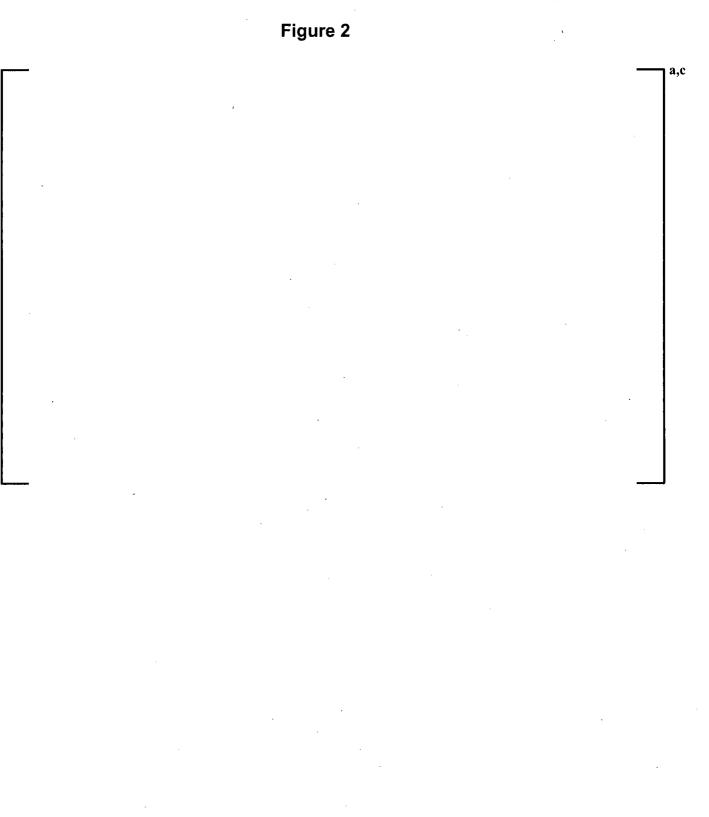margins in each case. [
]^{a,c}

These results demonstrate that the bias introduced by the proposed setpoint methodology is conservative
and that the interim 3.0 percent penalty imposed by the Limitations and Conditions of the Safety
Evaluation may be removed.

Table 1

Cycle Minimum DNBR Margins	a,c

Figure 1

$$\left[\right]^{a,c}$$

Figure 2

a,c

Figure 3

[

]a,c

Figure 4

a,c