

## NRR-PMDAPEm Resource

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**From:** Saba, Farideh  
**Sent:** Thursday, August 09, 2012 5:31 PM  
**To:** Murray, William R. (Bill)  
**Subject:** Brunswick Units 1 and 2- RAIs Regarding TSs 2.1.1.2 and 5.6.5 and revising a license condition (ME8135 and ME8136)  
**Attachments:** ME8135-6-BSEP RAIs \_SNPB.docx  
**Importance:** High

By letter dated March 6, 2012 (Agencywide Documents Access and Management System Accession No. ML12076A062), Progress Energy (the licensee) submitted a license amendment request to (1) revise Technical Specification (TS) 5.6.5 to replace AREVA Topical Report (TR) ANF-524(P)(A), "ANF Critical Power Methodology for Boiling Water Reactors" with AREVA TR ANP-10307PA, Revision 0, "AREVA MCPR Safety Limit Methodology for Boiling Water Reactors," (2) revise TS 2.1.1, "Reactor Core SLs [Safety Limits]" by updating the SL minimum critical power ratios (SLMCPR) per TR ANP-10307PA, and (3) revise the license condition in Appendix B, "Additional Conditions," of the operating licenses regarding an alternate method for evaluating SLMCPR values.

In the course of the review, the NRC staff determined that additional information was necessary in order to complete its review. The first set of the NRC's staff's request for additional information (RAIs) were emailed to Mr. Turkal on July 30, 2012. During a conference call on 08/09/12, these RAIs were discussed with the licensee to have a better understanding of the NRC staff's questions. Questions 1, 2 and 4 from first set of RAIs remains the same. However, Question 4 is revised as follows: Provide information to demonstrate that the channel bow database is specifically applicable to Brunswick predicted core operating conditions. (Enclosure 1, Page 5, Last Paragraph). To review your responses to these RAIs, please provide your responses by August 30, 2012, as it was requested in the July 30<sup>th</sup> email.

The NRC second set of RAIs are attached to this email. Please let me know if you have any questions or comments regarding these RAIs by 08/16/12. Also, I would like to discuss with you a due date for providing responses to these RAIs.

Thanks,

Farideh

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REQUEST FOR ADDITIONAL INFORMATION  
BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2  
ADDITION OF ANALYTIC METHODOLOGY TOPICAL REPORT  
DOCKET NOS. 50-325 AND 50-324  
(TAC NUMBERS ME8135 AND ME8136)

Second Set of RAIs

1. Page 6 of the Enclosure 1 states that "The method described in AREVA Operability Assessment CR 2011-2274, Revision 1 to assess SLMCPR values determined using the ANF-524(P)(A) methodology may not always remain appropriate to assess SLMCPR values determined using the ANP-10307PA methodology." Describe briefly the reasons why ANF-524(P)(A) is inappropriate to assess the SLMCPR values determined using ANP-1037PA.
2. Appendices A and B of ANP-10249PA provide details of the development of ACE/ATRIUM-10 correlation and the K-Factor examples, respectively. Provide a summary of the changes in the modified K-factor methodology that was implemented in response to deficiencies found in the axial averaging process. The Staff would like to have the licensee's response similar to what is presented in the Appendices A and B, i.e., changes in analytical treatment.
3. Section 3.0, "Revised Correlation" of ANP-3086(P) indicates that the assumption that the K-factor ( $k(z)$ ) appearing in equation 3.1 could be replaced by a single axially averaged K-factor value. This assumption was stated to be found inappropriate because of the two reasons, i.e., (1) it allows downstream conditions above the location of dryout to non-physically influence the critical power and (2) it provides equal weighting to all axial locations. Both these assumptions were found to be capable of influencing the predicted results in a non-conservative manner. Describe how the non-conservatism is removed in the modified methodology, by providing a typical analytical treatment and a calculation.
4. ANP-3086(P) indicates that only 80% of the CHF database was used to develop the critical power correlation, according to EMF-2022(P) which is not available to the NRC staff. What criteria, if any, are used for this selection of database? With the remaining 20% of the database unused, is there a loss of accuracy or increase in statistical error/uncertainty in the correlation?
5. Section 3.3 of ANP-3086(P) states that additive constants can be considered as flow/enthalpy redistribution characteristic for given bundle and spacer design. The questions below are with reference to Figure 3-5 of ANP-3036(P):
  - (a) What are the physical significances of positive and negative additive constants?
  - (b) Figure 3-5 lists rod position, ACE/ATRIUM 10XM additive constants and ATRIUM 10XM SLMCPR Operability Assessment Correlation additive constants. The operability assessment correlation additive constants are derived using the improved K-factor

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methodology for rods observed to dryout, for rods not observed to dryout and for part length rods. The staff could not find any trend in the change of additive constants from the ATRIUM 10 XM to the new additive constants for the BSEP operability assessment. If there is a trend, please explain. If there is no trend, explain why not.

6. On several locations in ANP-10307PA, it is mentioned that the ACE critical power correlation uses more detailed power distribution than required for previous correlations. Explain what is meant by “detailed power distribution” and how this new detailed power distribution is used to revise the SLMCPR methodology.
7. Apart from using 3D core nodal power distribution (core nodal power) obtained from MICROBURN-B2 code system, what other improvements are implemented through the “expanded coupling with MICROBURN-B2” in the SLMCPR methodology.
8. (a) Should indications of “abnormal channel bow” be experienced by Brunswick nuclear plant Units, describe how the channel bow model will be applied for the SLMCPR methodology as prescribed in ANP-10307P.  
  
(b) For a “mixed core” such as BSEP units, what programs could be in place to minimize or prevent abnormal channel bow.
9. The NRC staff is currently reviewing two supplements to AREVA’s topical reports for critical power correlations; They are (1) ANP-10249PA, Revision 1, Supplement 1P, Revision 0, “Improved K-factor Model for ACE/ATRIUM-10 Critical Power Correlation,” and (2) ANP-10298PA, Revision 0, Supplement 1P Revision 0, “Improved K-factor Model for ACE/ATRIUM 10XM Critical Power Correlation.” These supplements to the TRs describe the improved K-factor methodology similar to what is described in ANP-3086P. What is the licensee’s plan and schedule to incorporate these supplements into its list of analytical methods for determining core operating limits, if these supplements are approved by the NRC?

Enclosure