July 9, 2009

Mr. Ronnie L. Gardner, Manager
Site Operations and Regulatory Affairs
AREVA NP, Inc.
3315 Old Forest Road
Lynchburg, VA 24501

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RE: AREVA NP, INC. TOPICAL REPORT ANP-10298P, REVISION 0, "ACE/ATRIUM 10XM CRITICAL POWER CORRELATION." (TAC NO. ME0344)

Dear Mr. Gardner:

By letter dated December 29, 2008, (Agencywide Documents Access and Management System Accession No. ML090050026), AREVA NP, INC. (AREVA) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Topical Report ANP-10298P, Revision 0, "ACE/ATRIUM 10XM Critical Power Correlation."

Upon review of the information provided, the NRC staff has determined that additional information is needed to complete the review and is included as enclosure to this letter. The NRC staff requests that AREVA provide the response within 30 days from the date of this letter.

If you have any questions regarding the enclosed request for additional information, please contact me at 301-415-1478.

Sincerely,

/RA/

Ram Subbaratnam, Project Manager
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 728

Enclosure:
RAI

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AREVA NP, Inc.
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REQUEST FOR ADDITIONAL INFORMATION

TOPICAL REPORT-10298P

"ACE/ATRIUM 10XM CRITICAL POWER CORRELATION," REVISION 0

AREVA NP, INC.

PROJECT NO. 728

1. Figure 3-2 shows part-length rods (PLR) adjacent to the water hole. Were any PLR driven into dry-out? Could these rods be driven into dry-out during normal operation or transient events? Will they ever be located in a limiting location in a bundle?

2. The second paragraph on page 5-2 alludes to the importance of spacer location, spacer deposition enhancement factors, and spacer coefficient, on dry-out, assembly power, etc. Are all these parameters impacted by the spacer design?

3. Page 5-5, following equation 5.5, it is stated that the parameter, L_s, is now a variable in the ATRIUM 10XM design. Provide additional information regarding this parameter. i.e., is the variability of this parameter utilized to obtain optimum spacer separation?

4. Table 6-8 on page 6-18 has columns that need further clarification. Please be prepared to elaborate. For example, there are wide variations between the values for the ATRIUM-10XM and the ATRIUM 10. In addition, the paragraph below the Table on the same page, states that these parameters are generally smaller for the ATRIUM-10XM than they are for the ATRIUM 10 design, but no explanation is given as to why. Please explain.

5. Figures 5-12 through 5-15 address the chopped cosine power profile. Are there similar plots for other power profiles?

6. Page 7-17, Section 7.5 addresses the issue of "Inlet-sub-coolant" bounds. In this section, reference is made to the inclusion inlet sub-coolant data and to the reference of exclusion of data. Please be prepared to discuss and provide additional clarification to this section on a qualitative and quantitative technical basis.

7. Page 7-18, the first paragraph in this section states that, it is an accepted industry standard in Boiling Water Reactor (BWR) transient methodology that steady-state developed dry-out correlations are conservative when predicting transient behavior. Please provide reference(s) to this end.

8. Page 7-19, section 7.5, the second paragraph from the bottom alludes to the prediction of boiling transition by the ACE/ATRIUM-10XM correlation. The paragraph also alludes

to the same correlation under and over predicting the boiling transition state within the range of “defined uncertainties”. What are these ranges of defined uncertainties? How are they defined? Why are they defined as such?

9. Page 8-1, the last paragraph addresses axial power profiles tested. Has the AREVA staff investigated double-hump power profile prediction with the ACE/ATRIUM-10XM correlation?

Statistical Concerns

1. Page 2-3, Table 2-1: Range of Applicability, the ranges of the parameters are lower than those presented in Table 4-2 for the development range. Please explain.

2. Page 6-2, Figure 6-1 (repeated Page 2-3, Figure 2-1). The prediction becomes less precise at higher critical power. Explain and show boundaries of this prediction. Also, what are the characteristics of the 4 (or 5) points at the very top of the chart (critical power about 15)?

3. Page 6-26, claims that “no trend is observed” for Figure 6-2. Yet, in almost every individual test (pages 6-27 through 6-37) there is a hint of a pattern.

    a. Provide technical justification for the various trends in these series of plots.

    b. Is it possible that combining the tests camouflages such trends?

    c. Also, provide similar plots for pressure and inlet sub-coolant.

4. Page 7-3, the first sentence of the 2nd paragraph states that no significant bias exists with respect to the dry-out spacer elevation. How does one determine bias in this case?

5. Page 7-10, first paragraph: Why was the level of significance chosen at the 1percent level?

    a. Pages 2-1, (last 3 lines), and pages 7-17 and 7-18, allude to the exclusion of high inlet data being included in the defining data base of the correlation. Why resort to extrapolation when you have the data covering the operational range of the correlation?

    b. Figures 7-4 and 7-12 indicate that the behavior of the ECPR with Inlet sub-coolant for the 0.100Mlb/h is not as linearly behaved as that for the 0.05Mlb/h. Please provide technical justification for the discrepancy in behavior.

6. As mentioned in the opening paragraph of Chapter 2, the impact of local spacer effects and assembly geometry on critical power is very important. To fully assess the impact of

spacer design on CHF, sufficient statistics must be collected to enable one to perform statistical analysis. As such, justify the use of only 60 points as an experimental design data base to provided adequate "cover-to-cover", (i.e., normal and transient), range of all applicable input parameters: mass, pressure, subcooling and power.