June 23, 2009

Mr. Ronnie L. Gardner
AREVA NP Inc.
3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935

SUBJECT: FOURTH REQUEST FOR ADDITIONAL INFORMATION REGARDING ANP-10285P, "FUEL ASSEMBLY MECHANICAL DESIGN TOPICAL REPORT" (TAC NO. MD7040)

Dear Mr. Gardner:

By letter dated October 2, 2007, which can be accessed through NRC's Agencywide Documents Access and Management System (ADAMS) Accession No. ML072840180, AREVA NP submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Topical Report (TR) ANP-10285P, "Fuel Assembly Mechanical Design," ADAMS ML072840180. The first set of request for additional information (RAI) was issued by the NRC on April 29, 2008 (ML081080360), and the AREVA NP responses were received on May 29, 2008 (ADAMS ML081560318) and June 13, 2008 (ML081690558). The second set of request for additional information (RAI) was issued by the NRC on June 24, 2008 (ML081640135), and the AREVA NP responses were received on July 24, 2008 (ML082100438). The third set of request for additional information (RAI) was issued by the NRC on January 15, 2009 (ML083330034), and the AREVA NP responses were received on April 6, 2009 (ML090960483).

The NRC staff's review has determined that some areas of this report require additional information in order to complete the review. The specific information requested is contained in the enclosure to this letter. The draft RAI was discussed with your staff in meetings on April 24, 2009. AREVA NP has agreed to provide a response within 30 days of receipt of this letter.

If you have any questions regarding this matter, I may be reached at 301-415-3361.

Sincerely,

/RA/

Getachew Tesfaye, Sr., Project Manager
EPR Projects Branch
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-020
Enclosure: Request for Additional Information
cc: DC AREVA – EPR Mailing List

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ADAMS ACCESSION NO.: ML091380286 **NRO-002**

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4th REQUEST FOR ADDITIONAL INFORMATION (RAI)

ANP-10285P, "U. S. EPR FUEL ASSEMBLY MECHANICAL

DESIGN TOPICAL REPORT"

DOCKET NO. 52-020

RAI-46.

AREVA proposed upper bound growth curve for the EPR fuel assembly (based on the Mark B-HTP data) appears to be based on the following four assumptions: (1) the Mark B-HTP growth data is applicable to the EPR fuel design, (2) the four data points at 50 GWd/MTU is the mean of the EPR growth, (3) there is a linear dependence (or a lesser dependence) of growth with fluence at high burnup, and (4) the variability of the growth data for the Mark B12 and B11 designs represents the upper tolerance bounds of growth for the EPR fuel design. Provide the Mark B12 and B11A data above an assembly burnup of 47 GWd/MTU used to determine the upper tolerance for the EPR fuel design. Provide justification for each of these four assumptions and identify the uncertainty band of the calculated stress history versus exposure presented in Figure RAI-38-5 for each fuel design in this figure.

RAI-47.

The following questions are intended to provide a better understanding of the different stress histories for the different fuel designs that are used to justify the use of the Mark B-HTP design for application to the EPR fuel design.

a) Provide the guide tube stresses induced by each of the following components as a function of fluence/burnup; stresses induced by assembly holddown springs, flow induced stresses, and stresses induced by fuel rod growth that produced the stress versus fluence curve in shown in Figure 38-5 for Mark B12, Mark B-HTP and EPR designs. Separate out the different stress components for each of these design differences. Are there any other stresses considered in this calculation? If so, define these stresses and their differences between the different designs.

b) Provide the uncertainty for each of the stress components in part (a) above for each fuel design.

c) Define the space grid spring relaxation history along with the spring friction coefficients, how they were determined, and uncertainties in both of these parameters for each fuel design.

d) What other design features related to fuel pin design, grid spacer design, top and bottom nozzle design, hold-down leaf-spring design, and guide tube design that impact assembly growth and their relative impact on guide tube stresses (if related to stress). If not related to guide tube stress but are assumed to impact assembly growth, please provide details of how the design feature impacts assembly growth.

e) Based on the above comparisons discuss and demonstrate why only Mark B-HTP design is relevant to EPR.

RAI-48.

Explain why only four data points at 50 GWd/MTU from Mark B-HTP represents the mean and provide 95/95 confidence to bound the EPR fuel assembly growth at that exposure level or above. Please justify why there is sufficient growth data from Mark B-HTP fuel family to justify the linear dependence of growth above 30 GWd/MTU with 95/95 confidence. Provide details on each of the Mark B-HTP data points including reactor, cycle number and whether the fabrication lot is similar between data points. Fabrication lot can vary depending on the material, or composition ingot from which the guide tube and grid spacer are fabricated, as well as the tooling setup used to make the guide tubes and grid spacers. Define fabrication lots in these terms.

RAI-49.

It appears that the scatter in the Mark B12 and B11 data is used to define the 95/95 tolerance of the Mark B-HTP fuel and EPR fuel. Provide the Mark B12 and B11A data above an assembly burnup of 47 GWd/MTU used to determine the upper tolerance for the EPR fuel design. Provide details on each of the Mark B12 and Mark B11A data points including reactor, cycle number, and whether the fabrication lot is similar between data points.

RAI-50.

The following question is a follow-up of the staff's evaluation of the response to RAI-42: The response describing the FEA analysis of the top nozzle was inadequate. Provide the ANSYS input files for the top nozzle FEA and describe all conservative assumptions inherent in the analysis, such as un-modeled fillets.

RAI-51.

The following question is a follow-up of the staff's evaluation of the response to RAI-40: The hydrogen levels of the M5 mechanical data used to demonstrate adequate ductility are more than a factor of seven less than the hydrogen limit imposed for M5 cladding. Therefore, the proposed hydrogen limit is not justified for M5 cladding. A revised limit on hydrogen needs to be proposed that is consistent with the mechanical data that exist for fully recrystallized and irradiated M5.

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