ArevaEPRDCPEm Resource

From: Getachew Tesfaye
Sent: Thursday, May 21, 2009 9:40 AM
To: Pederson Ronda M (AREVA NP INC)
Cc: 'WELLS Russell D (AREVA NP INC)'; Jason Carneal; Joseph Colaccino; Shanlai Lu; Christopher VanWert; ArevaEPRDCPEm Resource
Subject: Draft Fourth RAI ANP 10285P, Fuel Assembly Mechanical Design TR
Attachments: DRAFT FOURTH REQUEST FOR ADDITIONAL INFORMATION REGARDING ANP 10285P (2).rtf

Ronda,
Attached please find a draft of the fourth round of RAIs for the Fuel Assembly Mechanical Design Topical Report (ANP-10285P). We will have our technical Staff available to discuss them with you as soon as you are ready. Please call me with a proposed date and time for the telecon.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP

Hearing Identifier: AREVA_EPR_DC_RAIs
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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.

The 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 please 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

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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 40 GWd/MTU with 95/95 confidence.

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.

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 7 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.

DRAFT