ArevaEPRDCPEm Resource

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Sent: Friday, October 09, 2009 1:05 PM
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Subject: Draft - U.S. EPR Design Certification Application RAI No. 308 (3791), FSAR Ch. 4
Attachments: Draft RAI_308_SRSB_3791.doc

Attached please find draft RAI No. 308 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

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,
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Hearing Identifier: AREVA_EPR_DC_RAIs
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Request for Additional Information No. 308 (3791), Revision 1

10/9/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 04.04 - Thermal and Hydraulic Design
Application Section: 4.4

QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)

04.04-59

AMS Commissioning Testing

The AMS measurement software corrects the raw activation measurement for a number of factors to infer the neutron flux at each AMS stack location. Some of these factors include: (1) wait time for the ball stack at positions B, C and D, (2) bleed over from adjacent AMS detector locations, and (3) corrections for detector dead time, which affect the detection efficiency at the large expected count rates. The accuracy of some of these correction algorithms will be verified during AMS commissioning testing.

During presentations to the staff, the applicant suggested that these correction algorithms can be verified by the following tests:

(1) Altering the measurement order of the subsystems; i.e, measure first A, B, C, D, wait for a long enough period to allow for decay, and perform a similar measurement, but alter the order, i.e, D, C, B, A of the measurements. Both measurements should result in the same power shapes.
(2) Perform a standard AMS measurement for ~3 minute irradiation and compare the power shape with the one estimated for a ~15 minute irradiation. Since the Vd lifetime is of the order of 3 minutes, the ~15 minute irradiation will have a significantly higher count rate. Thus, this measurement will provide verification that the detector dead-time correction is correctly applied.
(3) Perform measurements of bleed over from one measurement location to another using a calibration source.

Provide a testing plan to verify the accuracy of the correction algorithms that are applied to the raw AMS activation measurements. This question is a follow-up to a public meeting on the AMS system held at the NRC headquarters on September 16, 2009.

04.04-60

Methodology to remove the ^{60}Co background from SPND measurements

The ^{59}Co SPNDs measurements can be divided in at least four components:

(1) Prompt response to neutron flux by neutron capture
(2) Prompt response to prompt fission gammas

(3) Prompt response to delayed fission gammas (decay heat)
(4) Delayed response by buildup of ^{60}Co in the detector.

In discussions with the staff, the applicant described that the ^{60}Co background is removed in European plants based on measurements during refueling outages and an extrapolation algorithm that is a function of burnup and is based on plant measurements. In principle, the ^{60}Co background could be updated every time a new AMS measurement is performed and new Cij calibration parameters are generated. The ^{60}Co background should be updated in both, the PowerTrax calculation as well as in the protection system where the measured current from the SPND is converted to a power level.

Provide the methodology to remove the ^{60}Co background from SPND measurements and how will this background will be treated by the Protection system and the AMS PowerTrax calculations. This question is a follow-up to an audit on SPNDs held at the AREVA Rockville Office on September 17, 2009.