

From: "Mazzaferro, Peter A" <Peter.Mazzaferro@constellation.com>
To: "Ngoc Le" <NBL@nrc.gov>
Date: 3/29/06 12:31PM
Subject: NMP2 Bioshield Fluence Calc Info

Tommy,

As a follow-up to yesterday's phone conversation with you and the NRC Staff regarding our March 23rd letter on the NMP2 Bioshield TLAA, the following provides additional information for further discussions. Please pass this along to the Staff reviewer and let me know when we can discuss this issue with you again. Thanks.

From: Inch, George B
Sent: Wednesday, March 29, 2006 9:52 AM
To: Fallin, Michael; Mazzaferro, Peter A
Subject: FW: MPM Fluence Calc

Please forward this to Lambrose. I think this is what he is looking for.

I will include this in our analysis and a validation step.

From: Dr. Michael P. Manahan, Sr. [mailto:MPManahan@MPMTechnologies.com]
Sent: Wednesday, March 29, 2006 8:23 AM
To: Inch, George B
Subject: RE: MPM Fluence Calc

George:

There is considerable azimuthal and axial streaming in going across the cavity. This results in a lower peak fluence at the bioshield due to transport away from the peak. In fact, as shown below, the drop at the peak comes remarkably close to $1/r^2$. At locations away from the peak, the fluence will decrease less going across the cavity and may actually increase. The following are fluence ($E > 1$ MeV) values extrapolated to 54 EFPY:

Peak fluence at the vessel OR: $1.016 \text{ E}17 \text{ n/cm}^2$

Peak fluence at the IR of the bioshield steel plate: $6.22 \text{ E}16 \text{ n/cm}^2$

Ratio of peak at plate to peak at vessel OR = 0.61

Radius of vessel OR: 338.138 cm

Radius of shield plate: 428.625 cm

Flux ratio using $1/r^2$: 0.62

Therefore, the calculated peak fluence decrease with radius is close to $1/r^2$. Fluence to shield plate at 54 EFPY is well below $1.0\text{E}17 \text{ n/cm}^2$.

Sincerely,

Mike

From: Inch, George B [mailto:George.Inch@constellation.com]
Sent: Tuesday, March 28, 2006 2:08 PM
To: Dr. Michael P. Manahan, Sr.
Subject: RE: MPM Fluence Calc

Mike, Lambrose asked if we stay below the threshold using a simple geometric based on vessel OD mean fluence. He did let me use a mean value. I did not find in the spreadsheets the vessel OD fluence a 54 EFPY used for the Bio shield fluence. Can you ask Parvin to do the following:

Mean vessel OD fluence at 54 EFPY. Assume geometrical actuation at at the bio shield ID based on the mean vessel OD.

I do not need QA at this time. I just want to give to Lambrose a quick estimate of the difference between DORT and this calc.

Lambrose is saying he does not consider the methods qualified for the shield wall because of streaming affects. The concern is that the DORT model does not consider or account for streaming and therefore methods may be conservative. I indicated no streaming effects were considered. He wanted to see a benchmark for the shield wall plate.

From: Dr. Michael P. Manahan, Sr. [mailto:MPManahan@MPMTechnologies.com]

Sent: Tuesday, March 28, 2006 9:03 AM
To: Inch, George B
Subject: RE: MPM Fluence Calc

George:

The NMP2 cavity was modeled with 11 mesh to cover the radial distance of 11.35 inches. The total drop in fast fluence across the cavity is about 14%. Since the cross section for nitrogen is not included in the BUGLE set, the air was approximated by an equivalent amount of oxygen.

The model was continued through the steel plate and concrete for a total distance of 10 inches. This resulted in a drop in fluence of about 20, which means that the effect of fast flux coming back from outside the model to the maximum fluence point on the shield is negligible. The outer boundary condition used was a vacuum boundary.

Sincerely,

Mike

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CC: "Dellario, David" <David.Dellario@constellation.com>, "Fallin, Michael" <Michael.Fallin@constellation.com>, "Inch, George B" <George.Inch@constellation.com>

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Subject: NMP2 Bioshield Fluence Calc Info
Creation Date: 3/29/06 12:30PM
From: "Mazzaferro, Peter A" <Peter.Mazzaferro@constellation.com>

Created By: Peter.Mazzaferro@constellation.com

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MESSAGE	3895	03/29/06 12:30PM
TEXT.htm	14177	
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Expiration Date: None
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Reply Requested: No
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Security: Standard