From: Beavis, Dana
To: Kusche, Karl
Cc: Fedurin, Mikhail
Subject: RE: dump
Date: Wednesday, January 14, 2015 5:04:00 PM

Here are my simple preliminary numbers for the beam stop:

Forward: I evaluated at 80 MeV.
Beam power 1.3 W
Photon dose is 3900 rad/hr at a meter.

forward wall is 2.5 TVLs so reduces dose to 11,700 mrads/hr.
forward wall is 10.5 meters away on outside. Reduces dose to 117 mrads/hr.
So to get 50 microrads need another 3.3 TVls of Pb which is 16.5 cm. 6 inches will do or for stacking 8 inches if necessary.

Sidewall has dose of 6500 mrads/hr at a meter.
Distance to outside of side shield is 3.9 meters so reduces dose by 0.06.
Side wall concrete is 2.5 TVLs so results in 1.3 mrads/hr. To reduce to 50 microrads/hr need 1.4 TVls=7.1 cm of Pb.
I suggest using 4 inches of Pb for ease.

Roof is 18 inches of HC which is 0.043 dose reduction.
Building roof is 4.1 meters away so 1/r**2 gives 0.06 reduction.
Thus have 16.8 mrads/hr.
If layer with 5cm of Pb will have a gamma dose of 1.7 mr/hr.

Reentrant cavity should extend to a back angle of 45 degrees.

To cover 30 MeV then the width needs to cover from 0 to 40 degrees for forward radiation.

If you come up with a design layout we can check.

Since there are no credited controls for limiting the beam intensity I have used 1.3 W rather than the current you want to use.
Based on the duty factor and building considerations I see no reason to play too much for higher energy. The forward beam of 120 is taken care of by the duty factor.
If this creates problems we can look tomorrow.
We need to cover the angles of the bend for the lowest energy which I recall as 30 MeV.

The neutrons are small enough not to worry about based on previous memos.
I can load into MCNPX tomorrow. An let it run for a few hours to check.

dana

From: Kusche, Karl
Sent: Tuesday, January 13, 2015 11:29 AM
To: Beavis, Dana
Cc: Fedurin, Mikhail
Subject: RE: dump

Dana,

1) Routine operation for this experiment is 50 MeV, 200 pC, 1.5 Hz with no experiment-induced beam modulation.
With modulation, the 200 pC will be spread horizontally over 40-110 MeV range on the spectrometer. Modulation only occurs during CO2 laser pulse (limited to 0.05 Hz, which is once per 30 unmodulated bunches).

2) Power supply for the temporary dipole is bipolar and limited to ±10 A. According to Mikhail's calculations, this gives a maximum bending angle of ±30 degrees at 40 MeV.
Magnet pole gap: vertical =1.25" , horizontal= 8" diameter (limited by vacuum chamber to 30 degree slice)

3) Magnet was received from Stony Brook over 20 years ago so finding prints will be challenging.

Karl

From: Beavis, Dana
Sent: Tuesday, January 13, 2015 10:37 AM
To: Kusche, Karl
Cc: Karol, Raymond C; Phillips, David B
Subject: dump

Karl,

Please prepare the following for the beam dump. I think you know what I am after for routine and beam faults.

1) What is the routine running conditions for the spectrometer.
2) What are the maximum possible bend parameters for the magnet
    a. Max PS current
    b. Max. bend angle for max. current at what energy
    c. Magnet gap vertical and horz.
    d. Possible polarity changes?
3) Do we have prints of the magnet so we can take credit for the return iron on the sides?

Based on these parameters we will design the beam dump.
Dave P. is getting me a print of the side wall shielding.

Thanks
dana