An Empirical Formula of the Residual Dose Rate of the Collimator Section of the J-PARC MR

K. Satou[1#], Y. Sato, M. Uota, M. Shirakata, and M. Yoshii

[1]*J-PARC Center, KEK, Tokai, Ibaraki 319-1195, Japan*

 # kenichirou.satou@j-parc.jp

We have been surveying residual dose rates along the beam line after beam operations to clear the activations of magnets, beam ducts, monitors, and so on, induced by beam losses. These suggest that the collimator section at the injection straight line is the most activated area. Taking into account a hands-on maintenance scenario, a residual dose rate at a working area should be controlled that is lower than 1mSv/h in typical. At the present, an acceptable beam loss at the collimator section is around 300W as a result of the present strong activations. Therefore, the dose rate at the collimator section will be one of the bottlenecks to achieve the designed beam power of 750kW. Severe control of the radioactivity is likely to be essential for a future beam intensity upgrade.

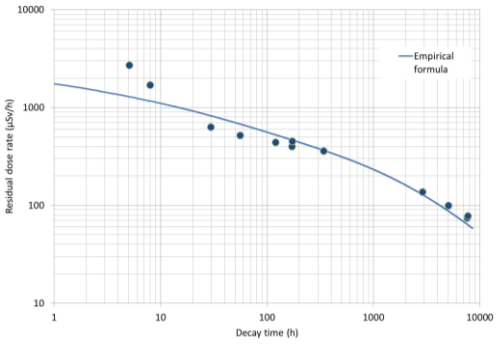

Fig. 1
On-contact measurements of the residual dose rate on the first collimator after beam stop. The solid line is the estimation using the obtained empirical formula.

To obtain the reasonable predictions of an acceptable beam loss power at the collimator section and required cooling time of a residual dose rate, an empirical formula was derived by fitting the measured data with the so called Sullivan-Overton formula [1, 2]. The Figure 1 shows the measured dose rates at the surface of the first collimator after beam stop and its estimations using the obtained empirical formula. We will present the details of the data analysis at this symposium.

References

[1] A. H. Sullivan and T. R. Overton, Health Phys. 11, 1101 (1965).

[2] A. H. Sullivan, Health Phys. 23, 253 (1971).