

## Memo

*date:* January 25, 2012

*to:* RSC and C. Montag

*from:* D. Beavis 

*subject:* Limits for Scrubbing the RHIC Ring in Run12

The request has been made to establish limits for the amount of beam that can be used for scrubbing the RHIC ring if it is found to be necessary. A previous analysis<sup>1</sup> will be used to recommend limits for this year and if not sufficient can be reviewed for additional margin.

It is recommended that **beam losses in a local unshielded tunnel portion be limited to  $3 \cdot 10^{14}$  protons at 25 GeV**. This provides margin for other losses during the run. Portions of the tunnel where there are concrete walls can have higher values but would need to be considered on a case by case basis. This limit is a factor of three higher than in reference 1. C-AD is now allowed to use the tritium limit for beam losses rather than Na-22.

Losses from scrubbing are discussed in reference 1. Assuming the scrubbing operation will follow similar lines the injection area should not be a problem. Most of the losses occurred at the dumps and abort kickers. A. Stevens<sup>2</sup> performed an estimate of the limit for losses on abort kickers. The half-width of the liner over the kickers is 16 feet instead of the 22 feet for the dumps and collimators. Therefore, there is a limit to the amount of beam that can be lost at the kickers. **The estimate is that  $5 \cdot 10^{15}$  protons at 24 GeV can be lost at the kickers in each ring**. This allows margin for losses during other operations and routine running.

It is suggested that the collimators be used to remove beam losses at the abort kickers and injection areas if practicable.

It is also recommended that **high intensity bunches up to  $4 \cdot 10^{11}$  protons can be transferred to RHIC**, for scrubbing or special tests. **This requires that Thompson Road be closed and the area posted as a Controlled Area**. Approximately a one week notice of the closing must be given to the laboratory for proper notifications. The RSC minutes<sup>3</sup> of June 14, 2011 note that an entire transfer of 120 bunches at  $4 \cdot 10^{11}$  protons lost directly under the road would result in 7.3 mrem. This is well below the 100 mrem allowed in such an area in one year. The RSC minutes note that the monitor TLDS indicate that the dose at Thompson Road is consistent with zero run after run. The conditions to operate with the road uncontrolled have not been completed which is why the road needs to be closed (i.e. made a Controlled Area) for these high intensity transfers.

**During high intensity transfers MCR is expected to be vigilant for keeping beam losses in the ARCs well monitored and small.**

CC:

A. Dress

A. Pendzick

RSC RHIC File

D. Phillips

RSC Memo online folder

## **References**

1. D. Beavis memorandum, May 21, 2009, "Estimate for the Second Beam Scrubbing of RHIC", [http://www.c-ad.bnl.gov/esfd/RSC/Memos/Scrubbing\\_2009\\_2.pdf](http://www.c-ad.bnl.gov/esfd/RSC/Memos/Scrubbing_2009_2.pdf)
2. A. Stevens memorandum, Oct. 24, 2001, untitled preliminary draft. Final memo is in the RSC files.
3. RSC Minutes of June 14, 2011, [http://www.cad.bnl.gov/esfd/RSC/Minutes/6\\_14\\_11\\_Minutes.pdf](http://www.cad.bnl.gov/esfd/RSC/Minutes/6_14_11_Minutes.pdf)