

C-AD

Issued: February 25, 2010

DB

Radiation

Safety

Minutes of RSC Subcommittee of February 19, 2010

Committee

Subject: Low Energy Operations and Upgrades for RHIC

Present: D. Beavis, R. Karol, E.T. Lessard, Michiko Minty, P. Bergh, J. Sandberg, C. Theisen, P. Pile, P. Sullivan, and L. Ahrens

The committee continued its review of the materials provided for low energy operations and upgrades of RHIC.

The process of getting approval to have a higher allowed estimated soil activation of ^{22}Na is proceeding through the approval process. Soon an Unresolved Safety Issue will be generated for approval for the low energy operations. This is the last meeting to review the planned low energy operations of RHIC this year.

The committee found that the recommendations made in the memos^{1,2} provided to the committee to be satisfactory. The committee added the following recommendation regarding the low energy run for this year:

(CK-fy2010-RHIC-low energy-689) Some monitor TLDs should be placed that are specifically coordinated to record the dose from the low energy operations only. The regular compliment of TLDs in the field will be changed at their regular scheduled time at the end of the quarter.

For the upgrades it is important to ensure that the design limits the exposure in an MCI to less than 500 mrem. The IR shield walls have several options that can reduce potential dose in a large beam loss event. The first is to keep personnel away from the shield walls while beam is in the machine. This may have impacts on the experiments. The LPs and LEs for the experiments should be consulted. The second is to increase the shielding thickness. This has both advantages and disadvantages. The third method was to examine the calculations coupled with the previous fault studies to see how conservative they were. Finally, it was noted that the shielding in the tunnel has changed, the detectors have changed, and the neutron quality factor has changed. Many of these changes will help to potentially reduce the risk of exposure outside the shield walls at the STAR and PHENIX IRs.

The committee recommends that new calculations be conducted for STAR and PHENIX to examine the shield walls taking into account the present configurations and the new 10CFR835

neutron weighting factors. The estimates should be done to establish the appropriate average weighting factor to be used for the other thick shield areas around RHIC. The factor of two used by the RHIC Project may be too conservative. **(CK-FY2011-RHIC-all-690)**

It was noted that in examining the RHIC fault studies that dose through the thick shield walls was lower relative to the dose through the labyrinths and other penetrations. Since this is a relative measure³ for the same fault it suggests that the labyrinths near the IRs could cause more exposure than the thick shield walls. The RHIC fault studies conducted near thick shields had dose measurements that were often an order of magnitude lower than the RHIC Project estimates. The dose measurements near penetrations were closer to the estimates of the RHIC Project.

An explicit example is that the estimated dose for an MCI at a typical location on the berm was 57 mrem. The fault study measurement⁴ scaled in energy gives 12 mrem or almost a factor of 5 lower.

The committee would like to see that the Department resources are used to provide protection where it is needed and not where estimates have been too conservative. A series of items have been identified in the past few RSC meetings for the Department to pursue. This includes the examination of what is appropriate maximum beam loss by location for an MCI, maximum amount of beam in an operating years, and maximum routine losses by location.

References

- 1) D. Beavis memorandum, "[Potential Dose near RHIC IRs](#)", Feb 5, 2010.
- 2) D. Beavis memorandum, "[Potential Dose Near Misc. Penetrations at RHIC](#)", Feb. 11, 2010
- 3) This removes many of the systematic errors and problems that can occur from a fault study.
- 4) The measurement was in rads. with a HPI-1010. A quality factor of 4.2 has been applied to get mrem. The recommendation that the committee accepted of 1.5 mrem/10⁸ lost Au ions was based on this quality factor.

CC:

Present
RSC
RSC RHIC file
RSC Minutes file
A. Pendzick
W. Fischer
A. Drees