Collider-Accelerator Department

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for the U.S. Department of Energy

Memo

date: *January 28, 2013*

to: *RHIC IR Shielding Subgroups*

from: *D. Beavis* DB

subject: *Review of IRs at RHIC for Upgraded Beam Intensity and Energy*

I have discussed a plan with the appropriate division heads to systematically review the RHIC IR's before FY13 operations with upgraded beam energy and intensity. The IR's will be examined for the potential dose in an MCI by subgroups. The subgroups written conclusions and recommendations for a particular IR will be provided to the RSC for review. A work planning system is in place for work at RHIC. The final results of the RSC reviews will determine the work restrictions near each IR or other weak locations around the RHIC facility. Subgroup members are encouraged to conduct field inspections but caution should be used if accessing the berm. The RSCC considers the health risk due to ticks and chiggers bites on the RHIC berm to be greater than that of the potential exposure in an MCI. Please see P. Cirnigliaro regarding the appropriate precautions for accessing the RHIC berm.

The subgroup for each IR will be composed of:

- RSC Chair (D. Beavis)
- ESSHQ (R. Karol)
- RHIC Facilities Liaison Physicist (A. Drees)
- IR specific LP (or an alternate provided by P. Pile)
- C-AD Shielding Physicist (K. Yip)

Potential radiation exposure at each IR falls into two area classifications. The first is potential exposure to the personnel working at the IR for the experiment. The LP for the IR is expected to help expedite acquiring information necessary to examine the potential exposure to experimenters in the event of an MCI. The Liaison Engineer for the area can help provide shielding prints and perimeter maps to aid the evaluation of the IR. The second area is the potential exposure from an MCI in the regions on the berm and adjacent non-experimental areas near the IR. For these areas the RHIC Facilities Liaison should expedite provide information for the subgroup review. It may be that the most efficient means to proceed is to have the two LPs work together to gather an appropriate set of prints for the evaluations. The subgroup should have several paper copies, one of which will be archived for an appropriate time period.

I would like to begin the reviews of 6 O'clock and 8 O'clock IR during the week of Jan 28 and send the written report to the RSC during the week of Feb. 4. The review of the 10 O'clock and

12 O'clock IR should follow about one week behind. Finally the reviews of 2 O'clock and 4 O'clock will be completed.

There is a set of generic documentation for RHIC as well as documentation that is specific to each IR. The listed materials below are not necessarily a complete set of documentation. Those documents that are not provided by links will have the documents scanned and then provided. The list contained in this document will be updated as the reviews occur. The documents below also contain a large number of references. Most members of the subgroup are not expected to be experts on the detailed shielding discussions found in the references below. They should examine the notes for assumptions and conclusions that will then be adjusted for the upgraded beam conditions, new analysis, help ensure locations are not missed, check any scaling, and assist in acquiring documentation for the reviews.

Shielding Design for MCI at RHIC

- http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app08.pdf
- http://www.c-ad.bnl.gov/esfd/RSC/Minutes/8_25_09Minutes.pdf
- http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app01.pdf

Fences

- RSC Minutes of Oct. 19, 1998; http://www.c-ad.bnl.gov/esfd/RSC/Minutes/10_19_98minutes.pdf
- RSC Minutes of Feb. 8, 2000; http://www.c-ad.bnl.gov/esfd/RSC/Minutes/02-8-00%20Minutes.pdf

6 O'clock IR (STAR)

- RSC Reviews
  - http://www.c-ad.bnl.gov/esfd/RSC/Minutes/03_06_98Minutes.pdf
  - http://www.c-ad.bnl.gov/esfd/RSC/Minutes/17_Sept_97Minutes.pdf
  - http://www.c-ad.bnl.gov/esfd/RSC/Minutes/08_20_96Minutes.pdf
  - http://www.c-ad.bnl.gov/esfd/RSC/Minutes/05_09_12Minutes.pdf

- SAD Appendices
  - http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app37.pdf
  - http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app38.pdf
  - http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app39.pdf
  - http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app44.pdf
    http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app45.pdf

- End Wall Dose at 6 o'clock; AD/RHIC/RD-91
- Memorandum (mainly from A.J. Stevens)
  - Roof Thickness (laby); April 19, 1995

- Verification of Backwall thickness; May 2, 1996
- Cable penetrations; June 6, 1995
- Additional Labyrinth calculations; July 26, 1995

8 O'clock (PHENIX)

- RSC Reviews
  - http://www.c-ad.bnl.gov/esfd/RSC/Minutes/10_24_12Minutes.pdf
- AD/RHIC/RD notes
  - Note-128, Sept. 1999, Improved Estimates of Fault Dose Exterior of Phenix South Side…
- Memorandum (mainly from A.J. Stevens)
  - "Magnet Access Penetration at 8 O'clock…", July 19, 1995
  - "Evaluation of current Counting House Shielding…",Sept. 19, 1996
  - " Calculation of Neutron Dose in Vicinity of Crane opening…", Feb. 10, 1999
  - "Radiation Doses at PHENIX due to Various Faults, Sept. 8, 2012; http://www.c-ad.bnl.gov/esfd/RSC/Memos/Kin_Phenix_9_8_12.pdf
- SAD Appendices
  - http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app41.pdf (RSC Minutes)
  - http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app42.pdf (note 13)
  - http://www.c-ad.bnl.gov/ESSHQ/SND/RHICSAD/appendices/app43.pdf (note 120)

10 O'clock

- RSC Minutes of Oct. 19, 1998; http://www.c-ad.bnl.gov/esfd/RSC/Minutes/10_19_98minutes.pdf

12 O'clock

- RSC Minutes of July 29, 1998; http://www.c-ad.bnl.gov/esfd/RSC/Minutes/07_29_98Minutes.pdf
- AD/RHIC/RD Note 121; July 1998;

2 O'clock

- RSC Minutes of Oct. 22, 1997; http://www.c-ad.bnl.gov/esfd/RSC/Minutes/10_22_97Minutes.pdf
- RSC Minutes of April 24, 1997; http://www.c-ad.bnl.gov/esfd/RSC/Minutes/04_24_97Minutes.pdf

- RHIC/DET Note 24; Oct. 1997

4 O'clock

- RSC Minutes of April 1, 1998; http://www.c-ad.bnl.gov/esfd/RSC/Minutes/04_01_98Minutes.pdf
- Memorandum Feb. 8, 1995; "Estimate of Fault Levels Exterior to the 4 O'clock Enclosure"
- Memorandum April 18, 1995, "Holes"
- Memorandum of March 25, 1998, "Dose Estimates in the 4 O'clock Region"
- Memorandum Nov. 9, 2005, "Modification of the Shielding at 4 O'clock IR"

Distribution:

- IR Subgroups
  - A. Drees
  - W. Meng
  - Y. Makdisi
  - R. Karol
  - K. Yip

CC:

- P. Pile
- W. Fischer
- T. Roser
- RSC
- A. Pendzick
- D. Phillips
- C. Folz