

## Radiation

### Safety

Minutes of RSC Subcommittee of August 25, 2009

### Committee

Minutes of RSC Sub-Committee on Fault Dose Design Criteria for RHIC Intensity Upgrades of August 25, 2009

Present: D. Beavis, E.T. Lessard, and R. Karol

The sub-committee met to establish criteria for the potential dose to personnel in catastrophic beam faults at RHIC for potential upgrades that are in the planning stages. It is expected that these upgrades if completed could increase the potential dose by a factor of 2.6 for full beam losses over that estimated or calculated in the original RHIC authorization documents<sup>1,2</sup>. There are isolated sections near vents that can have 1000 mrem in a fault at the present allowed maximum beam energy and intensity. These areas and others would have unacceptably high dose potentials if the maximum operating conditions are raised. The basis for action is OPM 9.1.11.a where a fault to a Class IV area is possible (use walls or fences or interlocked gates).

Attached is a listing with links to archival radiation calculations for RHIC, and these documents will be re-examined in this analysis.

The criteria below were established to start the assessment of the radiological risk for RHIC beam faults if the proposed upgrades are approved. The criteria and analysis will be sent to the committee for review.

- 1) Use the same maximum beam fault assumptions (in %) as was done in the original analysis. If justified, other assumptions for specific locations can be used.
- 2) All open areas that have the potential to exceed 1000 mrem will be locked and posted. Access can be achieved by procedure as is presently done for similar locked areas.
- 3) An EWP will be written for RHIC and personnel trained on it. Areas that can exceed 100 mrem in a fault will require personnel to wear a TLD.
- 4) The areas near experimental IR will be designed not to exceed 100 mrem in a fault for personnel at ground level. Controls will be established for elevated regions in these areas in which the potential for exposure could exceed 100 mrem in a full beam fault. Personnel working at ground level will not be required to wear TLDs. Some exceptions

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<sup>1</sup> U.S. Department of Energy, Environmental Assessment, Relativistic Heavy Ion Collider at Brookhaven National Laboratory, Upton, New York, DOE/EA# 0508, January 1992.

<sup>2</sup> [RHIC Safety Assessment Document](#), Brookhaven National Laboratory, Brookhaven Science Associates, Upton, New York 11973, December 13, 1999.

may be allowed for areas where there is little access. Monitor TLDs should be placed in these areas to register any dose exposure in a fault.

- 5) Building 1005 will be reviewed as a non C-AD building.

CC:

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1. RHIC Archival Radiological Calculation Links

- 1.1.[RHIC Area Monitoring Report for CY 2000.](#)

- 1.2.[RHIC Design Manual](#), Collider-Accelerator Department, Brookhaven National Laboratory, Brookhaven Science Associates, Upton, New York 11973, Revised October 2000.

- 1.3.[RHIC Design Manual](#), Personnel Safety System Design, RHIC Project, Brookhaven National Laboratory, Associated Universities, Inc., Upton, New York 11973, January 1994.

- 1.4.[RHIC Note, MCNPX 2.1.5 Shielding Estimates in a Simple Tunnel Geometry](#), A. Stevens, no date.

- 1.5.[RHIC Note, Dose Estimates in the 4 o'clock Region](#), A. Stevens, no date.

- 1.6.[RHIC Note, Radiation Environment and Induced Activity Near the RHIC Internal Beam Dump](#), A. Stevens, AD/RHIC/RD-48, November 1992.

- 1.7.[RHIC Note, Shielding of Multi-Leg Penetrations Into the RHIC Collider](#), P. Gollon, AD/RHIC/RD-76, October 1994.

- 1.8.[RHIC Note, Radiation Safety Considerations Near Collimators](#), A. Stevens, AD/RHIC/RD-113, April 1997.

- 1.9. [RHIC Note, Estimates of Dose Equivalent Associated With Penetrations in the PHENIX Shield Wall](#), S. Kahn and A. Stevens, AD/RHIC/RD-120, June 1998.
- 1.10. [RHIC Note, Betatron Scraping at RHIC: General Remarks and Sample Calculations](#), A. Stevens, AD/RHIC/RD-45, September 1992.
- 1.11. [RHIC Note, Amendment to Shielding Multi-Leg Penetrations at RHIC Collider](#), P. Gollon, AD/RHIC/RD-76A, July 1996.
- 1.12. [RHIC Note, End Wall Dose Equivalent Estimates at 6 O'clock](#), A. Stevens, AD/RHIC/RD-91, June 1995.
- 1.13. [RHIC Note, Conceptual Design of RHIC Dump Core](#), A. Stevens, AD/RHIC/RD-94, September 1995.
- 1.14. [RHIC Note, Energy Deposition Downstream of the Internal Dump](#), A. Stevens, AD/RHIC/RD-97, December 1995.
- 1.15. [RHIC Note, Estimated Shielding Requirements for the PHENIX Detector](#), A. Stevens, RHIC DET Note 13, December 1994.
- 1.16. [RHIC Note, BRAHMS Shield Wall Calculations](#), A. Stevens, RHIC DET Note 24, October 1997.
- 1.17. [RHIC Note, Local Shielding Requirements for the STAR Detector](#), A. Stevens, RHIC DET Note 5, June 1992.
- 1.18. [RHIC Safety Assessment Document](#), Brookhaven National Laboratory, Brookhaven Science Associates, Upton, New York 11973, December 13, 1999.