

Radiation**Safety Minutes of RSC Subcommittee Meeting - Feb. 16, 2012****Committee**

Subject: Blockhouse for Testing the RHIC 56 MHz Cavity

Present: D. Beavis, R. Karol, E.T. Lessard, G. Mc Intyre, P. Cirnigliaro, I. Ben-Zvi, S. Belomestnykh, R. Than, C. Folz, and P. Orfin

The 56 MHz cavity is planned for installation in RHIC during the shutdown of the summer of 2013. It is already planned to be tested in the VTF, but it is also desirable to test it in the horizontal orientation, which will be the orientation when installed in RHIC. In order to conduct the horizontal testing it is necessary to build a block house. The meeting discussed the radiation issues related to the blockhouse for the 56 MHz cavity.

The cavity can create potential gradients of 1-2 MV. The presently planned RF system will be capable of delivering 1 kW of RF power. The estimated x-rays¹ dose rate for 1 kW at 1 MV is 3000 rads/hr at 1 meter. At 2 MV the transverse dose is 5000 rads/hr at a meter with forward radiation about a factor of 3 higher. The light-concrete TVL² for 2 MeV electrons is 21.1 cm (50 gm/cm²). The side walls will be constructed with four-foot thick light-concrete blocks providing an attenuation of 1.8×10^{-6} . Using the concrete attenuation with a distance of 3 meters would suggest that the 5000 rads/hr is reduced to 1 mrad/hr outside the block house. Levels in the forward direction could be a factor of three higher.

The cavity is superconducting and is not expected to be able to sustain power losses of this magnitude for an hour. If the project team provides an estimate of the maximum load in an hour then the committee will reduce the expected maximum dose rates accordingly. The generation of dose rates at this level is not the routine expected operating level but rather the maximum possible fault scenario.

The blockhouse will have a concrete roof. The roof details were not discussed. If the roof is two-feet of light concrete then the maximum fault dose rates could be about 750 mrad/hr. The utilities will need to be delivered through penetrations. The penetrations and roof will require additional review. **(CK-FY2012-56MHz-796)**

The project would prefer to reduce the construction cost by not using interlocks. The access method requested is to have an opening that is blocked by a stack of three concrete blocks. The RF source would be RS LOTOed until the blocks are in place. The blocks

will have an RS LOTO device on the top blocks lifting fixture so that it cannot be inadvertently lifted with the crane. This may make the interior of the blockhouse to be considered as inaccessible. The RSC Chairman will contact RCD to see if they concur that the interlock standards of Appendix 3A of the BNL RADCON manual do not apply. **(CK-FY2012-56MHz-797)**

If there is no concurrence on this issue then the RSC will propose a waiver from the BNL RADCON requirements for a limited number of uses for this block house. The project was advised that if a waiver was given not to expect an extension so they should request a sufficient number of accesses to complete all work on the cavity. Although the project expects 2+- 1 to be sufficient they requested that we request a limit of ten. **(CK-FY2012-56MHz-798)**

The project has examined if other interlocked areas could be used for the testing of the 56 MHz cavity. The area at the 4 O'clock IR has schedule issues related to machine operations. The ERL block house is too limited in area. The project found no viable existing interlocked area. There is sufficient schedule time to install the interlocks but the estimated cost is \$100k. The cost was provided by the access control group leader as a copy of the small block house interlock system. The project would like to save these funds especially in view of tight budgets. To obtain a waiver the project would have procedures for securing the area, a locked gate, a Kirk-key system coupled with the RF power, and RS LOTO shield blocks.

It was noted that even if RCD concurs with the area being classified as inaccessible and not requiring interlocks, the RSC may not want to recommend that long term existence of such an area to the department.

The 56MHz cavity will be registered as an RGD for the testing phase. **(CK-FY2012-56MHz-799)**

ODH issues were discussed but not the focus of the meeting. The project will contact the ASSRC for reviews of ODH and conventional safety. If there is no interlock system then a section of the roof may be removed while the area is accessible and replaced in preparation of operation and placement of the blocks in front of the access port. This will be determined during the ODH evaluation.

References

- 1) See Figure 3.5 of NCRP Report No. 144, Radiation Protection for Particle Accelerator Facilities, National Council on Radiation Protection and Measurements, 2003.
- 2) Figure 4.1 NCRP Report No. 144.

CC: Present
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