Collider-Accelerator Department

BROOKHAVEN NATIONAL LABORATORY

Building 911B – P.O. Box 5000
Upton, NY 11973-5000
Phone 631 344 7124
Fax 631 344 5568
beavis@bnl.gov
www.bnl.gov

managed by Brookhaven Science Associates
for the U.S. Department of Energy

Memo

Date: *August 18, 2016*

To: *RSC, D. Phillips, J. Tuozzolo, and A. Fedotov*

From: *D. Beavis* DB

Subject: *External Dose Rates for LEReC Gun Test*

The external dose rates out penetrations are being evaluated for the LEReC Project. The initial gun test is being planned as an exempt accelerator. A few of the results from the analysis are provided that are relevant for the gun tests.

The LEReC beam was assumed to be lost anywhere along the beam transport. The maximum voltage that the power supply can provide is 0.6 MV. The nominal gun energy for beam tests is expected to be 0.4 MeV with the gun HV conditioned to 0.5 MV. For examining the penetrations for leakage of x-rays it will be assumed that a 0.5 MeV electron beam strikes a copper target with a current of 0.1 Amperes, the maximum gun current.

The results for the dose outside the shielding penetrations are:

Penetration	**Dose Rate (mrad/hr)**	**Comments**
2GE1 Labyrinth Gate	9.	Chipmunk moved to gate
Cryoport-high above shielding	1.5	Not accessible
Cryoport at head level	0.01	accessible
Laser Port	1	Not constructed yet-averaged over a 10 cm radius around the laser tube
Cableway-at top of chimney	<< 1	2.5 MeV beam at 130 kW
704 MHz coaxial waveguide	<<2	Not constructed 2.5 MeV at 130 kW Inside shielding chimney

The cableway and the coaxial waveguide have acceptable dose rates for the full LEReC beam and were not calculated for 0.5 MeV. The results in the table are for 2.5 MeV. The dose rate in the laser tube is 11 mrads. The chipmunk, MNO265, is being moved to the gate from the outside location near the north cable port. It will have an alarm level of 5 mrads/hr or less. The chipmunk is being moved in anticipation of the full LEReC beam.