

Memo

Date: March 13, 2015

To: RSC, A. Zaltsman & P. Bergh

From: D. Beavis 

Subject: Extending the Conditions for Testing the 9 MHz Cavity in Building 925

The RF group has asked for a review of necessary radiologic requirements to test the 9 MHz cavity in building 925 to an increased voltage of 40 kV and a maximum power of 3kW. This will be accomplished by changing the amplifier. The previous test was conducted to a maximum voltage of 20kV and a maximum power 0.5 kW. No radiation was detected from the device. Discussion of the device can be found in the previous¹ analysis.

The potential dose was evaluated using the MCNPX but with 40 keV electrons striking a copper surface rather than an Al surface. The 1 cm Al shell surrounds the HV capacitor that has vacuum. The dose rate at one meter is calculated to be 8,500 mrad/hr. This assumes that there are no internal structures providing shielding² and that the entire 3 kW goes to driving electrons across the 40 kV gap. In reality the amount of electron current across the gap should be essentially zero. However, a one Watt of power across the gap could produce 3 mrad/hr at a meter.

An RCT must be in the area measuring the potential x-ray dose rate as the device is incremented in voltage. The RCT will control access to the area while the measurements are made and stop testing if the area needs to have its classification changed. If levels are measured outside the 9 MHz device, then the survey results will be reviewed to determine the needs for long term testing before turned over to the control of the RF group. It is desired to test the cavity for about one week if the dose rates do not create a problem.

¹ D. Beavis, "Testing 9 MHz Cavity in Building 925", March 4, 2015; http://www.c-ad.bnl.gov/esfd/RSC/Memos/3_04_15_CavityBldg925.pdf

² The capacitor has vacuum and must have a housing to maintain structural integrity. This is not included in the calculation.