Photon Sciences Directorate

Building 745
P.O. Box 5000
Upton, NY 11973-5000
Phone 631 344-7524
Fax 631 344-5059
schitra@bnl.gov

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http://www.bnl.gov/nsls2

Radiation Safety Memo

To: Wah-Keat Lee, Lead Beamline Scientist, 18ID-FXI, NSLS-II
Cc: Robert Lee, ESH Manager, NSLS-II
Mo Benmerrouche, Radiation Physicist, NSLS-II
From: Sunil Chitra, Associate Radiation Physicist, NSLS-II

Subject: **Radiation Survey Procedure NSLSII-18ID-PRC-001**
Date: October 24, 2017

In the IRR meeting of the 18ID-FXI beamline held on 18 October 2017, the radiation survey procedure of the beamline was discussed for inclusion of the Pink Beam Slits (PBSL), White Beam Fluorescent Screen (WBFS) and the Pink Beam Fluorescent Screen (PBFS) as additional scattering targets. A separate set of STAC8 (a synchrotron radiation (SR) shielding calculation code) calculations were carried out to ascertain the difference in the dose rates outside the side wall of the FOE due to these scattering targets. For this calculation, a Cu target of 10 mm thickness and a Graphite target of 0.3 mm thickness were considered to mimic the White Beam Stop (WBS)/Pink Beam Stop (PBS) and the fluorescent screens respectively. The details of the techniques of the SR calculations are described in the NSLS-II Technical Note No. 266. The dose outside the side wall of the FOE was estimated when the white and pink beams are scattered from these targets. The results indicate that the dose rates due to scattering from Cu are consistently higher than that obtained from the Graphite target, for both white and pink beams. The maximum dose rate outside the FOE side wall due to the synchrotron radiation is estimated to be 3.E-08 mrem/h when the white beam scatters off the Cu target. The maximum dose rate outside the FOE with gas bremsstrahlung (GB) as the source of radiation is estimated to be 3.E-02 mrem/h (NSLS-II Technical Note No. 266), which is 6 orders of magnitude higher.

Both the GB photons and the GB produced neutrons are much more penetrating than the SR photons and will dominate the dose outside the FOE. Graphite of 0.3 mm thick is not sufficient for the development of an electromagnetic shower. In addition the EPS logic precludes the beam hitting the thicker solid holders of the screens.

Further, when the beam is incident on the DCM, it is also automatically incident on the TM and the PSH. The DCM, TM and PSH are therefore included as scattering targets in one step.

In conclusion the radiation survey procedure is modified to include the PBSL and excluding the WBFS and PBFS as scattering targets. The screens may be used to ensure that beam is present at the desired location during the execution of the radiation survey procedure. They are therefore referenced in the procedure.