**Subject: Design of NASA exposure Area at Tandem**

**Present:** D. Beavis, R. Karol, E.T. Lessard, A. Etkin, C. Theisen, N. Kling, P. Thieberger, J. Reich, B. van Kuik, C. Montag, P. Cirnigliaro, C. Carlson, and V. Castillo

An exposure area has been developed at the Tandem for NASA. This area is described in a note provided by C. Carlson and P. Thieberger. All machine requirements for the exposures have been vetted so that the facility is ready to be developed for users.

**Exposure area**

It is crucial that the vacuum window at the end of the beam line be very thin to avoid complete energy loss of the ion beam. A window has been developed and tested for use in target room four where the facility is being developed. The Tandem machines are protected from window failure by a fast acting valve located upstream in the beam line.

The window is 2.5 micro-meters thick and constructed from Havar.

The Committee Chair will request that the Chief Mechanical Engineer review the window design, the protection of the machine from window failure, and if samples outside the window will be dispersed by a window failure. Due to the thin design window failure is expected to occur during irradiations. *(CK-Fy2012-tandem-795)*

The exposure area is enclosed in a box. Light beams such a H and He will be prevented from exiting the box by a graphite disc at the rear of the enclosure. A large dose can be received only inside the box to hand and arms. The interlocks must meet the requirements for greater than 50 rem/hr, although the potential exposure is limited to a shallow depth of body tissue. The Chairman will contact RCD to examine if some of the interlock requirements are necessary for this type of exposure area. *(CK-FY-2012-tandem-796)*

Dose rates at a local work area are expected to be low but must be documented for running conditions. Dose will result from the upstream aperture, which will be monitored by a chipmunk and from the exposure area. *(CK-fy2012-tandem-797)*
The exposure area will have dual interlocks on the hand access doors and use dissimilar type of switches if practicable. There will be a warning indicator at the exposure area to inform the user of the exposure status. The access door will be lock if the area has the potential for beam. Timing issues and delays will be considered in the design of the system. The 30 second rule will be discussed with RCD as mentioned above along with the check station requirements. The beam stops will be checked that there are dual means to prevent hand exposure. The ions are expected to be delivered from either van de Graaff, so the interlocks must take this into account. (CK-FY-2012-tandem-798)

For light ions users will be excluded from the room. (CK-fy2012-tandem-799)

Most of the beam is lost on an aperture upstream of the exposure box. These losses are expected to contribute to the area dose that personnel may be in. A chipmunk will be placed near this aperture and the beam optics must be reviewed to ensure that the aperture is always a limiting aperture. If necessary upstream optics may need to be locked off if the beam can be focused past the aperture. The aperture has a radius of 1.5 cm. (CK-fy2012-tandem-800)

The user training will be examined by the C-AD training Manager. The training is expected to be similar to that provided for the chip exposure facility, which consists of five courses. The training will go over specific details of the process for using the interlock system to protect the hands and forearms from exposure. The training will cover the issues of potential activation and the process for shipping of materials off site that have been exposed to the beam. The RSC chair will communicate to the C-AD of the need to review the training program. (CK-fy2012-tandem-801)

The RSC Chair will notify the safety committee that they should consider reviewing this facility. (CK-fy2012-tandem-802)

References


CC:

Present
RSC
RSC Tandem file
RSC Minutes file
J. Alessi
J. Tuozzolo
H. Kahnhauser