STAR Fixed Target Proposal, C-AD impact statement - 10 June 2013 (P. Pile)

The specifications for the gold target are:

(1) Location: ~2.1 meters west of IR inside the 3" ID aluminum vacuum pipe (where the beam pipe transitions from 3" ID aluminum pipe to the 4 cm ID Be pipe).

(2) Thickness = 30 mils.

(3) Size: OD = 3" holder with target material (partial disk) at bottom of pipe with target extending ~ 1mm (to be determined) into the 4 cm ID of the Be pipe.

(4) Yellow beam is steered so to hit edge of target, fraction of beam required to intercept target is to be determined.

Some issues:

(1) The target holder mechanism has to be inserted into the 3" ID beam pipe a distance of about 0.7 meters and fixed in place. The target and holder must be bakeable and suitable for ultra-high vacuum.

(2) The target and mounting system must be robust since a failure could result in significant down time should debris intercept the beam (an unlikely event). Once engineered, the target/holder will be reviewed by the C-AD Accelerator Safety Committee for possible impact to the accelerator should the target holding device fail, reviewed for impact of the vacuum system (e-cloud etc), reviewed for possible impact by the beam (melting). Preliminary considerations of a 10 mil gold target a year ago did not reveal any showstoppers.

(3) The Yellow beam is to be shifted down toward the gold target to optimize trigger rates from beam/target interactions. We do not see a way to guarantee that the beam cannot be miss-steered such that we lose all of it in the target at once, or within a very short amount of time (~1second). This issue will require some thought and may result in the need for a fast interlock (beam abort) triggered on excessive loss rate in the IR.

Costs and effort:

Costs for the target, target holder and insertion device, designer labor and shops labor will be charged to the project. Other C-AD labor cost will not be charged to the project. The estimated cost and effort is:

		Cost	Charged to project
Engineering	120 hrs	$19.9K	$0
Designer	100 hrs	$13.4K	$ 13.4K
Shops	80 hrs	$11.3K	$11.3K
C-AD Techs	20 hrs	$ 2.5K	$ 0
Materials		$ 1K	$1K
Total	320 hrs	$ 48K	$26K

We presume we can get the gold foil from the US Precious Metal Inventory at no charge. The total time required to engineer, review and install the target will be about 4 months.