

## Radiation

## Safety

## Committee

Minutes of meeting held 9/14 on 18 GeV/c positive beam for E941 in the A3 beamline

Attendees: Beavis, A., Etkin, A., Glenn, W., Lessard, E., Lazarus, D., Reece, K., Stevens, A., Thern, R., Zarcone, M.

The committee was updated on the methods that were employed to prevent secondary beam faults with low energy secondary beams in the A3 cave (ck-941-a3-9 from last meeting). The existing interlocks on the magnets A3D5, A3D6, and A3D7 were used to require a minimum secondary beam energy of 10 GeV/c for the 12 GeV/c operations. In addition, new interlocks were installed on the spectrometer magnets, A3D9 and A3D10, to limit the current in these magnets and therefore the bend of the secondary beam. D. Lazarus and J. Sandwiess examined where the secondary beam would strike the A3 beam stop (Attachment). Surveys were conducted with the secondary beam bent in both directions and negligible levels were detected. The interlock drops permission to the beam switch if either magnet is over the current limit. This allows the experiment to put the magnets through a hysteresis loop with the beam off.

D. Lazarus provided the committee with raytrace calculation if the primary beam energy were to drop to 22 GeV/c. Under normal operating conditions no beam reaches the a3 beam port in the A cave. A fault condition was examined where A1D2 goes off and a portion of the beam enters the A3 pipe aperture in the A cave but none comes through to the A1 primary cave. None of the examined faults allow the primary beam to get to the A1 primary cave.

Beavis noted that with the expected operating current in A3Q3 and A3Q4 a parallel beam 2.5 inches to beam right in these quads would receive sufficient bend to clear all apertures and enter the A1 primary cave. The committee felt that it was highly unlikely that any appreciable portion of the primary beam could be put into these conditions. It would most likely take substantial efforts at retuning the primary transport upstream of the A target if at all possible.

The dose rate at chipmunk above the A3C1 collimator is about 5 mrem/hr with the hottest spot being 20 mrem/hr. Estimates have about  $10^{10}$  secondary particles striking the collimator. The levels are higher than expected. It was predicted that  $10^{13}$  would produce about 1000 mrem/hr so there appears to be a discrepancy of a factor of 10 or more. However, it was noted that there is substantial background that may not be in the secondary beam estimate and this could be the reason for the present levels. At 18 GeV/c, the secondary beam intensity is expected to increase a factor 3. Levels on the roof would be expected to be 60 mrem/hr at the hottest location. The surveys indicate that this chipmunk is sensitive to the beam striking the collimator which has the horizontal jaws RSC LOTO to an aperture of 4.8 mm. Any fringe of the primary beam that could be transported to the collimator and striking it under fault conditions would be detected by the chipmunk. This interlock level of this chipmunk should be set to allow 18 GeV/c running but prevent higher amounts of beam from striking the collimator.

The committee recommends that a chipmunk be placed at the end of the A3 area to detect any unforeseen conditions which allow high intensity beam reaching the back of the A3 area. The location should be chosen so that it is sensitive to any locations in which the beam is deflected by the spectro-meter magnets. A likely location is the back or top of the A3 beam stop. (CK-941-10:D. Lazarus) 126

The committee recommend a fault study be conducted. After initial surveys with the 18 GeV/c beam tune are done, the beam should be setup for the maximum expected excursion which is the setting tolerance on D3 and D4 (5%) and the tolerance on the F10 energy limit (5%). Beam at this higher energy should be cleanly transported to the A3 dump with the spectrometer magnets off. After survey, faults with q12 off and A2D1 off should be examined. Appropriate areas along the transport and experimental area should be cleared of personnel. Attention should be given to the weak areas on the right side of the transport shield wall. (CK-941-11:D. Lazarus) 127

The committee recommends approval of the 18 GeV/c positive beam for this immediate operation of E941 but not blanket approval for the indefinite future.