Collider Accelerator Department

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***R**adiation*
***S**afety*
***C**ommittee*

Minutes of the Radiation Safety Committee Meeting on BAF

Meeting Date: 6-22-99

Attending: D. Beavis, C. Ceresko, A. Etkin, J. Geller, R. Marascia, A. McNerney, J. Mills, R. Prigl, C. Schaefer, A. Stevens, M. Zarcone, J. W. Glenn

In this meeting some initial radiation safety issues concerning the construction and operation of the Booster Application Facility (BAF) were presented to the Radiation Safety Committee.

1. Booster penetration

The main focus was on the penetration through the Booster tunnel shielding which is needed to transport the extracted beam out of the Booster into the tunnel. Construction on the Booster penetration is expected to start 8-15-99. The layout of the penetration and first section of the BAF beamline tunnel was distributed to the committee members together with the request for this meeting. This first construction phase includes the roughly 20 ft long, 1 ft dia. penetration and the first section of the beamline up to, but not including, the service alcove which will house two dipole magnets that bend the beam by 20 deg. The penetration and the upstream end of the beamline compromise the Booster lateral shielding and additional shielding inside the tunnel is required. A. Stevens presented calculations assuming a fault condition at the (future) BAF extraction septum (Booster section D6), which is the worst case scenario for radiation exiting the 1 foot dia. penetration. He also calculated faults downstream of this location, where the shielding is compromised by the presence of the BAF tunnel. The former was included in the package given to the RSC members prior to the meeting, the latter is discussed in a Memo by A.J. Stevens to R. Prigl which is attached to these minutes.

The result of the penetration calculations was that 10**14 p lost near D6 would result in a 10mrem dose at the end of a 12 ft long concrete beam plug. As for the case of a fault closer to the BAF tunnel where the lateral shielding is weak, A. Stevens argued that direct calculations are difficult and may not be accurate, but he presented an estimate for radiation levels based on arguments given in his Memo which resulted in a higher radiation level near the downstream end of the beam plug and pushed the 10mrem/10**14p line 15ft further down the tunnel.

Additional calculations will be done to get a conservative estimate of fault condition levels at the end of the first straight section, where a barrier will be installed to prevent access into this BAF tunnel section during Booster operation.

Action items regarding the Booster penetration (required prior to high intensity running in the Booster after the penetration has been constructed):

- Estimate radiation levels under worst case fault conditions at the Booster berm fence (we do not intend to change the existing fence around the Booster tunnel). This is also needed to determine whether the area outside the fence is fault class IV or III **(CK-BAF-1).**

- One (for fault class IV) or two (fault class III) chipmunks will have to be installed near the upstream end of the BAF tunnel and incorporated into the security system **(CK-BAF-2).**

- A fault study should be done at the beginning of the next high intensity proton running period to verify the validity of the estimates **(CK-BAF-3).**

2. Experimental Area Building and Labyrinth to the Support Building.

Dose calculations along the top of the shielding around the Experimental Area Building as well as along the labyrinth to the Support Building were done by A. Stevens and presented at the meeting. Copies of his notes had been distributed to the committee members prior to the meeting. For operating intensities of 10**10 nucleons/pulse, the highest dose on top of the Target Room and Beam Dump shielding is about 0.5 mrem/hr. The dose at the labyrinth entrance from the support building is less than 0.1 mrem/hr. Higher intensities upto 10**11 nucleons/pulse will be used for short exposures only. As a reference, the average intensity of the beam accelerated to full energy in the AGS during the latest NASA run in the A-line was about 1.5*10**10 nucleons/hr at E=1.0GeV (the calculations assumed E=3.07 GeV). The average intensity at the target was much lower.

The experimental area will undergo another review once the design has been finalized.

3. Miscellaneous topics.

The following topics, mostly relevant for BAF operation, were also briefly discussed in the meeting:

- Soil activation

  a) in the Booster shielding due to losses at extraction
  b) along the beamline (due to beam losses
  c) near the Target Room and Beam Dump

H3 and Na22 activation levels have been estimated by A. Stevens for case c) with a) and b) to be done. It is planned to cover the beam dump with a Geomembrane about 2ft into the soil. Depending on the result of the calculations near the upstream end, the existing liner over the former Booster beam stop, which covers the extraction septum, may have to be extended to also cover the penetration.

- Security System

  The Security System has not been designed yet but will be PLC based.

- Emergency Exits

  It needs to be checked whether the beamline section between the service alcove and the target room exceeds the allowed distance between emergency exits. After the meeting it was reported that the tunnel would have a sprinkler system, therefore the distance is not an issue.

- A file on BAF issues relevant to the RSC should be started and maintained by P. LoPresti.