D. Beavis DB 8/26/94

Minutes of AGS/RHIC Radiation Safety Committee Meeting

Meeting Held August 17, 1994

Subject: A3-E864

Present: D. Beavis, H. Brown, G. Bunce, A. Etkin, D. Lazarus, E. Lessard, A. McGeary, S. Musolino, E. Njoku, J. Spinner, A. Stevens, D. Trbojevic, P. Yamin

A3 Experimental Area Classification

There was substantial discussion on how to classify the A3 experimental area. Several of the considerations that were discussed are briefly presented. The conclusion was to classify the experimental area as Class I. The area would be swept by HP/EAG with qualified experimenters acting as the second person on the sweep team.

The A3 experimental area is fully enclosed. The liaison engineer will inspect that there are no means to gain access to the area (CK-A3-E864-1) and that the final shielding is properly documented (CK-A3-E864-2). The area must be protected with dual interlocks. A sub-committee of A. Etkin, D. Beavis, and D. Lazarus will review the implementation of the security logic. The RSC Chair must approve (sign) that the appropriate reviews have been completed on the interlocks (CK-A3-E864-4). The Security Group must sign that the interlocks have been installed, tested and that the as-built interlock logic has been given to the Committee for review (CK-A3-E864-5).

The heavy ion beam is enclosed inside a vacuum system in the experimental area except for two regions. The first region is before the experimental target and the second region is between the end of the vacuum tank and the beam stop. The dose for a 1 cm^2 area Au beam at 10^7 ions/spill is roughly 2 x 10^6 rads. Barriers to prevent access to the beam must be installed and approved by the liaison engineer (CK-A3-E864-6). The sweep team must check that the barriers are in place during the sweep, and the liaison physicist will ensure that the sweep procedure incorporates this check (CK-A3-E864-7).

The radiation levels have been estimated to be 70 rem/hour downstream of M2 underneath the vacuum tank assuming 10^7 Au/spill and a 20% interaction rate in the target (see memo by A.J. Stevens - Attachment #1).

The Committee waives the requirement that MCR Operators sweep this Class I area. With the safeguards to prevent access into the direct beam, the Class I interlocks, the lack of high induced radioactivity, and the fully enclosed shielding, the Committee felt that HP/EAG was qualified to supervise the resetting of this area. It is also felt that the use of MCR Operators was not operationally practical.

It is expected that items directly in the ion beam or close proximity will become activated. Experience from E878 suggests that the target may become activated to several 10s of mrem/hour. A.J. Stevens (memo ref. above) calculated a potential for the beam dump to be a few hundred mrem/hour at 1 foot. The experimental area should be posted by HP as an activation area (CK-A3-E864-8). The area of the beam dump which can become activated should be periodically checked and properly posted and barriered when induced levels in the dump warrant it.

It was not expected that the 10^7 ions/spill was sufficiently high to warrant the A3 area as a contamination area.

Intensity Control

The normal running intensity of 10^7 Au ions/spill at full energy is approved. NMCs are not expected to be practical for intensity limits at this beam rate. The Committee recommends that the external measurements be conducted and identify possible locations where chipmunks could be used to monitor/limit the intensity for the various running conditions. Various changes in the beam optics/targeting conditions must be carefully considered. Since the A3 area is Class I, the intensity limiting can vary by factors of two or more for the various running conditions. The chipmunks can also serve the purpose to protect adjacent areas. The intensity control scheme must be approved by the RSC Chairman or a designated subgroup prior to routine operations (CK-A3-E864-9).

Interlocks

The interlocks must be Class I and contain the following items which should be reviewed by the assigned subcommittee.

Dual critical devices to disable the beam	(CK-A3-E864-10)
Reset stations (min. of 2)	(CK-A3-E864-11)
Crash buttons	(CK-A3-E864-12)

Dual interlocks where appropriate	(CK-A3-E864-13)
Min. energy check on F10 and A1/A3	(CK-A3-E864-14)
Min. of 30 second delay on beam enable	(CK-A3-E864-15)
A1D7 in the A3 position	(CK-A3-E864-16)
Lights dim on reset	(CK-A3-E864-17)

Shielding Review

The sub-committee assigned to review the shielding inspected the existing shielding and previously reported their findings (Memo, D. Beavis, D. Lazarus, and A. Stevens - Attachment #2). The conclusion was that the shielding prints were an accurate representation of the "as-built" shielding. The shielding was incomplete on a section of the roof and the end wall at the time of the inspection.

Casim calculations and penetration estimates were made for portions of the as-built shielding (Memo, A.J. Stevens - Attachment #3) to address some of the shielding questions. The basic conclusions are that the radiation levels will be well within guidelines for the adjacent areas for 10^7 ions/spill. The end wall at the back of the experimental area is substantially thinner than requested in the conceptual design and should be checked carefully. Levels of less than 100 mrem/hour are expected at 10^{-7} ions/spill scaling from the conceptual design report. Additional comments of the shielding sub-committee have been previously reported (Memo, D. Lazarus - Attachment #4) in a summary of the sub-group.

The sub-committee concluded that a chipmunk should be placed on the west shield wall where the building structure has not allowed the installation of shielding. The location should be approved by the liaison physicist (CK-A3-E864-18).

The A3 beam line must be disabled for secondary beam until the shielding is reviewed for this running condition. This may be accomplished by locking and tagging or by interlocks (CK-A3-19).

The other concerns for the shielding will be discussed in the fault study section.

Fault Studies

Three fault studies have been requested for the A1 primary cave. The levels should be scaled to the maximum possible Au intensity.

Fault on A1C1. The primary areas of concern are the A2 experimental area, the roof, and the labyrinth (CK-A3-HI-20).

Fault on A3Q5. The primary areas of concern are the trench, the labyrinth, and the A1 beam line (CK-A3-HI-21).

Fault on A3D7 when it is in the A1 position. The primary area of concern is the A3 experimental area. This is an A1 fault study and should be conducted this year if they use the Au beam (CK-A1-HI-1995).

The radiation measurements and fault studies for the experimental area should be conducted with a minimum of experimental personnel around to prevent unnecessary exposure. The measurements should address the following concerns:

a. Normal running conditions.
b. Intensity limits and excursions.
c. Faults in the target area which could cause increased levels in upstream weak spots (such as the trench) and high levels out the end wall.
d. Bending the beam right and left the maximum deflection angle by the spectrometer magnets. Of particular concern is the right-hand side.
e. The end wall on the left hand side of the beam stop. This is the only area where the actual shield is much thinner than the conceptual design. A substantial area should be posted for fault studies around this end wall.
f. The beam dump and the adjacent power supply building. The thin section of the beam stop about 1-2 meters after the re-entrant cavity should be checked.
g. Levels in both the E864 counting house and the B2 test beam electronics room in the PS building should be checked for compliance for the expected personnel occupancy.
h. The labyrinth should be checked including where the two cable trays exit.

The fault study results should be reviewed and approved by the RSC Chair or designate (CK-A3-HI-22) before extended routine operation is allowed.

User Reset

The Committee discussed the request for the user to reset the area with lower beam intensity (10^5 ions/spill). The dose possible in the open air gaps are substantial. In addition, there is no well-defined means to provide a low intensity mode. These two facts lead the Committee to the conclusion that user rest of the area would be inappropriate at this time. The Committee suggests that the liaison physicist and the experimenter make arrangements with the AGS S&EP Representative to have additional coverage when frequent access is necessary. Increasing numbers of experimental areas

require HP reset. It was proposed that the Committee consider a scheme where a few well-trained and designated members of experiments be allowed to conduct the sweep/reset of their experimental area. This will be considered at a later date and tracked as an Action Item (ACT-64, K. Reece/E.T. Lessard).

Note: Some of the check-off list items were listed in the previous minutes of the A3 Area and are included here for completeness.

AGS Gates in Main Magnet Power Supply

It was noted that there was an operational problem related to the AGS gates interlocking the AGS main power supply for electrical safety. The Committee agreed that this could be removed from the interlocks if the electrical safety procedures do not use this. J. Spinner provided a brief memo that states that the lockout procedures provide electrical safety for the AGS ring (Memo, J. Spinner - Attachment #5). The actual interlock change will be reviewed by an appropriate sub-committee chaired by D. Beavis.

mvh
Attachments (file only):

#1 - Memo, A.J. Stevens.
#2 - Memo, D. Beavis, D. Lazarus, A. Stevens.
#3 - Memo, A.J. Stevens. (Same as #1
#4 - Memo, D. Lazarus.
#5 - Memo, J. Spinner.

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