

Date: March 9, 1993

Minutes of the AGS Radiation Safety Committee

Subject: SEB "Switch", Ring Shielding Changes, & Procedure Changes.

Meeting Date: March 2, 1993

Present: D Beavis, H Brown, A Etkin, C Flood, JW Glenn, E Lessard, A McGeary, S Musolino, E Njoku, K Reece, J Spinner, K Woodle, P Yamin, R Frankel, P Ingrassia, & W VanAsselt.

Summary

A method to secure SEB with beam in the AGS was presented. There was not enough time to fully digest this proposal. Further discussion will take place next week.

Ring shielding changes at the HITL and FEB penetrations were presented. Final review will take place next week.

The replication of data between procedure bodies, prints and check off lists is now discouraged. System test, sweep and clearance procedures will be made more concise over the next year.

Meeting Minutes

- A new SEB "Switch"

The AGS has operated for the last few years without a "switch" that, when "off", would assure only an insignificant number of protons enter the SEB with beam in the AGS. This lack requires the SEB be secured whenever beam is injected into the AGS, necessitating the securing of the switchyard and A target for any AGS operation. Locking out F10 with a Red Tag and allowing a safety bypass have been used in the past to allow access to the A cave during studies. This process needs formalizing into the logic of the Access Control System.

H Brown presented the proposed new SEB "switch", securing both the F10 ejector and the first dipole in the line (CD1) in Attachment #1. The amount of beam scattered out of the AGS off of F10 is expected to be a part in a thousand. The fraction of those that get out, which re-scatter into the switchyard cave, is expected to be a part in 400, for an over all attenuation of 2.6×10^{-6} . With 6×10^{13} protons per pulse accelerated in the AGS, 1.5×10^8 protons could enter the switchyard cave. This is much less than the 1.5×10^{11} nucleons per pulse that are dumped in the switchyard during Silicon operation when the Access Control System allows access to the A cave. Fault studies would measure the amount of escaping protons.

W Glenn pointed out three levels of "switch" are required:

- 1) A factor of 400 reduction in beam to assure the potential many rem levels in the A cave from lost beam in the Switchyard is reduced to a few 10's of mrem.
- 2) Less than $2 \times 10^5 / \text{cm}^2 / \text{sec}$ can be transported to a target cave, allowing its "switch" to remain on if the SEB is off.
- 3) Less than 5 rem/hr and less than $2 \times 10^5 / \text{cm}^2 / \text{sec}$ to the switchyard cave allowing access here with beam in the AGS.

Only approval for the first level of switch is requested for now until fault studies are done and reviewed.

Committee questions included:

How could AGS orbits affect the scattering angle. One member felt that the AGS department "should certify the minimum scattering angle off F10" [relative to the extraction line]. How does energy affect this angle?

How does a change in energy effect the quasi-elastic cross sections?

What intensity muon beam may exist?

Comments were varied:

The suggestion that a beam plug be installed was felt to be difficult due to lack of space.

It was noted powering CD1 in the reverse polarity would greatly reduce acceptance, though this may add in complexity and reduce reliability. At present this is not felt necessary.

Red Tagging off all the devices assumed off in H Brown's calculations will be required until Fault Studies show this is not necessary.

The classification (Radiation or Hi-Radiation) of the upstream end of the A Cave will not be determined until the veracity of the SEB switch is confirmed.

The lack of time before the meeting to review the description of this switch was lamented by some - The chairman will endeavor to distribute notes a couple of days before meetings in the future.

It was agreed to hold a follow-up meeting next week to address these questions and hold off beam in the AGS until they can be resolved.

- Changes to AGS Penetrations.

These calculations were done for future "full beam" of 3×10^{13} 24 GeV/c protons per second lost at a location. Mitigation of chipmunks were not considered for "full beam" levels.

FEB Tunnel - The last dipole in the AGS (UD3) which partially blocked the 12" pipe to the U line was removed this summer and replaced by three feet of iron and a foot of concrete fully blocking the pipe. Also the two foot wall around the U line at the entrance to tunnel spurs toward the AGS (@U170) has been replaced by a fence and a Chipmunk. This fence continues to limit access to these spur tunnels when the AGS is on. The Chipmunk will interlock the AGS on levels exceeding 20 mrem/hr. See sketch - Attachment #2. Glenn calculates that full beam lost on H18 would cause ~1.3 rem/hr at the fence until the Chipmunk interlocks the AGS. Calculations assumes the 8 degree production causes a factor of a hundred increase in radiation over the 90 degree expectations, and the levels at the end of the 8' diameter 70' long spur tunnel will defuse by the 64 in "pipe" areas.

D Beavis will replicate this calculation. A McGeary will determine if the gate at U170 has redundant micro switches. Agreed: a fault study will confirm calculations. Further discussion was tabled.

HITL spur toward the AGS at C17 - The large 69 degree dipole in the AGS ring that partially obscured the 20" pipe into the HITL tunnel was removed and replaced with 4' of sand bags in the pipe and 3' of concrete in the HITL spur tunnel toward the AGS. This spur will also be upgraded to a Hi-Radiation area, with a gate 40' up the spur tunnel. See sketch - Attachment #3. Glenn calculated the expected levels for full beam lost are: HITL spur tunnel end, 22 rem/hr; and Gate 30 mrem/hr (and latter calculated, 4 mrem/hr at PS house labyrinth). The pipe does not directly point at the AGS beam tube, thus a factor of ten reduction reduction from line of sight levels is assumed. The Chipmunk in Fan House D "looks" at the same part of the ring, is expected to read 55 rem/hr for a full beam loss, and is set trip the AGS off at 20 mrem/hr. This chipmunk should thus limit levels in the HITL line to one-thousandth of the full beam fault levels or ~20 mrem/hr in the tunnel near the AGS.

There was no volunteers to replicate these numbers. McGeary was asked to determine if interlock lines still exist to this area. A fault study will also confirm these calculations. Further discussion was tabled.

SEB Cave - Levels in the upstream end of the switchyard cave were calculated to indicate the level of problems associated with allowing access to this cave with beam in the AGS. See sketch, Attachment #4. Levels from full beam crash on F10 are ~7.5 rem/hr and from full beam crash on ~G3 is 35 rem/hr. A Chipmunk would be required to protect workers here.

As there was no agreement on a SEB switch, there was no further discussion.

- Acceleration Clearance

Time did not allow this subject to be covered, it will be brought up at the next meeting.

- Procedures

Interlock checks - Glenn reported that he has found errors creeping in revisions of security system checkout procedures. Some come from transferring data from the prints to the Procedure and some in the "word processing". He suggested the drawings, with minor additions, be used to define the test and a record of what was checked. He hopes to start this system next year.

The committee agreed that replicating drawing information into procedures was unnecessary and detracted from safety. The Procedure should define how the checkout is to be done and the use of drawings for the "information base" of the checkout is acceptable, but a "log sheet" to record the checkout was required. It was suggested that this log could be a "print" generated from the drawings database.
ACT#042

Sweeps - Glenn noted the same type of problem exists in sweep procedures where the details of a sweep are redundantly given in the body and in the checklists.

The committee agreed that the body should define how the sweep is to be done, while the checkoff list gives the details. ACT#043

Clearances - The same problems exist in some procedures, again the committee agreed to details only in the checkoff lists. ACT#044

Outstanding Items:

The SEB "switch" and changes to AGS penetrations need a further meeting.

The need for Acceleration Clearance needs discussion.

Action Items:

ACT#042 - Revise Security System Test Procedures, J Ryan A McGeary
ACT#043 - Revise Sweep Procedures, R Zaharatos P Yamin
ACT#044 - Revise Clearance Procedures, P Ingrassia W Glenn

Attachments (RSC & file only):

- #1 - Brown to RSC of 2-26-93
- #2 - Sketch of FEB - AGS penetration
- #3 - Sketch of HITL - AGS penetration
- #4 - Sketch of upstream end of Switchyard cave.

Distribution: Radiation Safety Committee and guests
Department Administration
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