

Prepared by Haixin Huang
 Date: February 1, 2007
 Reviewed by: [Signature]
 Date: 2/2/07
 Approved by: [Signature]
 Date: 2/3/07

AGS RING RADIATION SECURITY CHECK-OFF LIST
For Heavy Ions Operation
C-A Run Plan FY2007 -February 2007

Note: Extraction of heavy and light ions (beams generated at Tandem) from the Booster into the AGS is not allowed until this check-off list is completed. Beams from linac are not allowed by this check off list even when completed.

To prevent extraction of beam from the Booster the extraction septum (F6) and the bending magnets DH2 and DH3 in the BTA transfer line must remain off.

This is accomplished by locking and HOLD tagging the power supplies for the F6 septum and for DH2&3.

1a. _____ F6 septum
 _____ (tag #s)
 _____ (Date/time applied) _____ (Person)

and

1b. _____ DH2&3 HOLD tags
 _____ (tag #s)
 _____ (Date/time applied) _____ (Person)

OR

when either the Booster or AGS access control system has undergone re-certification, by locking and HOLD tagging of the Booster Extraction Key.

1c. ___ (ACG) Booster Access control system functional testing completed _____ (Date completed)
 or

1d. ___ (ACG) AGS Access control system functional testing completed _____ (Date completed)

1e. ___ (LPA) Booster extraction key
 Tag number: 6293
 November 17, 2006, 11:23 (Date/time applied) Haixin Huang (Person)

2. The following chipmunk monitors must be in place and have undergone their regular "re-verification".

- 2a. ____ (ACG) NMO54&55 Crossing of Cockcroft Road over AGS ring
- 2b. ____ (ACG) Trench EEA ramp
- 2c. ____ (ACG) NMO56 B fan house
- 2d. ____ (ACG) NMO57 C fan house
- 2e. ____ (ACG) NMO46 D fan house
- 2f. ____ (ACG) NMO47 E fan house
- 2g. ____ (ACG) NMO48 South plug door
- 2h. ____ (ACG) NMO22 North plug door
- 2i. ____ (ACG) NMO49 NCA labyrinth
- 2j. ____ (ACG) NMO77 NCA shield wall
- 2k. ____ (ACG) NMO31 South wiring tunnel
- 2l. ____ (ACG) NMO32 Target building north
- 2m. ____ (ACG) NMO76 Northwest corner of the target building

3. ____ (LEA) AGS ring penetrations and shielding visually inspected for physical integrity, i.e. without gaps, removal of shielding blocks, and other openings.

From the South gate that are counterclockwise: SEB beam line exit, South wiring tunnel, North wiring tunnel, North gate plug door, North gate man gate, FEB beam line exit, North conjunction area man gate, K7 escape hatch, Booster transfer line (BTA) entrance, Booster/AGS shield wall, Booster /AGS labyrinth gate, HEBT man gate, HEBT Injection line entrance, C14 escape hatch, old HITL penetration, South plug door, South man gate.

- 3a. ____ (LEA) Shielding inside the AGS ring near I-14, I-17 and I-19 back in place
- 3b. ____ (LEA) Shielding in the AGS ring near F-7 in place.
- 3c. ____ (LEA) Shielding in the aisle between the South plug and the AGS ring in place.
- 3d. ____ (LEA) Shielding in the aisle between the North plug and the AGS ring in place.
- 3e. ____ (LEA) Steel (buoy anchor) shielding in place in the North conjunction area.
- 3f. ____ (LEA) Shielding in the AGS ring towards the zero degree port of the U-line in place.
- 3g. ____ (LEA) Shielding in the AGS ring near A-20 for the cold snake cable penetration.

3.1. ____ (LES) Inspect for physical integrity: Target Building Shielding and North Conjunction / Area Shield Wall

4. ____ (MCR) The Ring Sweep Procedure(OPM 4.56 Att. A), Switchyard Sweep Procedure (OPM 4.56 Att. W.) and the procedure "Injecting into the AGS and granting clearance to accelerate" (OPM 6.1.9) have undergone their regular "re-verification".

5. ____ (LPA) Fences on the berm of the external perimeter of AGS ring in place.

6. ____ (LPU) AGS extraction into the U line. One of the following must be signed

____ (LPU) RSC No FEB check-off list satisfied

OR

____ (LPU) RSC Check-off list allowing AGS extraction (ion beams) into the U line satisfied

7. ____ (LPE) AGS extraction into Switchyard. One of the following must be signed:

____ (LPE) RSC check-off list preventing AGS extraction into the switchyard satisfied

OR

____ (LPE) RSC Check-off list allowing AGS extraction into the switchyard satisfied

***** See drawing D10-M-489-4 for Berm radiation boundaries *****

8. ____ (RCD) AGS Ring interior posted as Radiation Area except for :

1. Region posted as Controlled Area to allow access to building 928 (the building housing the Siemens Motor Generator). This means that Cockcroft Road (the road over the AGS ring berm), and the extension of that road to building 928 are posted as Controlled Areas.

Signs and postings in place – Radiation Area

9. ____ (RCD) At the AGS berm perimeter fences, including the North Conjunction Area and the fences between Bldg. 914 and Bldg. 919 and between the U-line and Bldg. 912.

10. ____ (RCD) Approaches to the South wiring tunnel from the Westinghouse area and from the MCR terminal room.

11.1 ____ (RCD) At the fence defining the radiation area at the South plug door.

11.2 ____ (RCD) At the area around the North Gate (or Bldg. 912).

11.3 ____ (RCD) The Ramp area from Bldg. 911 to Bldg. 912 (or Bldg. 912).

Signs and postings in place—High Radiation Area

12. ____ (RCD) At all the entrances of the AGS ring, i.e. at the South plug door and the South gate, at the North gate and North plug door, at the North conjunction area and at the entry hatch to the AGS ring from the South wiring tunnel.

13. ____ (RCD) Fences around the C14 and K7 escape hatches.

Sign and postings in place- High Radiation Area with beam on

14. ____ (RCD) Fan houses A, B, C, D and E
15. ____ (RCD) NW corner of exterior wall of target building
16. ____ (RCD) At the entrances of the South wiring tunnel, i.e. from the MCR terminal room, from the Westinghouse area and from the Target building
17. ____ (RCD) At the gates of the dual wiring trenches to the South wiring tunnel
18. ____ (RCD) At the fence at the tunnel from HITL to the AGS ring.
19. ____ (RCD) At the fence in the FEB tunnel, which locks the area of the spurs towards the AGS.
20. ____ (RCD) On the entry hatch of the North wiring tunnel.
21. ____ (RSC) UD1/2 allowed to be used as a critical device while review of potential scattering continues or the review complete.
22. ____ (MCR) Procedure exists for accessing and sweeping V primary blockhouse.

List of chipmunks relevant to AGS with their alarm and interlock levels.

| Location | NMO number | Unit number | Interlock level | Alarm level |
|-----------------------------------|------------|-------------|-----------------|-------------|
| Trench EEA ramp | 1 | 1 | 50 | 10 |
| AGS North Gate | 22 | 60 | 20 | 16 |
| South wiring tunnel | 31 | 76 | 20 | 16 |
| Target bldg North catwalk | 32 | 41 | 20 | 10 |
| D fan house | 46 | 70 | 50 | 20 |
| E fan house | 47 | 67 | 0 | 40 |
| South plug door | 48 | 102 | 2.5 | 2 |
| N. conjunction labyrinth gate | 49 | 26 | 2.5 | 2 |
| AGS ring road west | 54 | 94 | 2.5 | 2 |
| AGS ring road east | 55 | 152 | 2.5 | 2 |
| B fan house | 56 | 150 | 50 | 20 |
| C fan house | 57 | 57 | 50 | 40 |
| N'west corner of the target bldg. | 76 | 30 | 2.5 | 1.6 |
| NCA shield wall | 77 | 58 | 20 | 5 |

Given that the above list is complete:

23. ____ (LPA) Beam may be injected and accelerated in the AGS.

24. _____ (OC) Verified that the above list is complete.

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| OC | Operation Coordinator on Shift |
| MCR | Main Control Room (P.F. Ingrassia or designee) |
| RSC | Radiation Safety Committee (D. Beavis or designee) |
| RCD | Radiation Control Division (P. Bergh or designee) |
| ACG | Access Control Group (J. Reich or designee) |
| LEA | Liaison Engineer for AGS ring (J. Tuozzolo or designee) |
| LPA | Liaison Physicist for AGS ring (H. Huang or designee) |
| LPE | Liaison Physicist for Exp. areas (K. Brown or designee) |
| LPU | Liaison Physicist for U-Line (N. Tsoupas or designee) |
| LES | Liaison Engineer for target building shielding (A. Pendzick) |
| LEU | Liaison Engineer for U-Line (D. Phillips, C. Pearson) |