



Vacuum Group Procedure VA-008.18.1.3  
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Revision 01

**\*\*IMPORTANT\*\***

PRIOR TO THE PERFORMANCE OF ANY WORK WITHIN THE SCOPE OF THIS PROCEDURE, IT IS THE RESPONSIBILITY OF THE SUPERVISOR TO ENSURE THAT ***WORK PLANNING*** HAS BEEN REVIEWED FOR THE PROTECTION OF WORKERS, EQUIPMENT, AND THE ENVIRONMENT.

**1. PURPOSE:**

1.1 TO PROVIDE AN EFFECTIVE PROCEDURE FOR AGS VACUUM TECHNICIANS TO REMOVE AND/OR INSTALL A 5-FT. STRAIGHT SECTION.

**2. RESPONSIBILITIES:**

2.1 THE AGS VACUUM SUPERVISOR SHALL BE RESPONSIBLE FOR THE IMPLEMENTATION OF THIS PROCEDURE.

**3. DISCUSSION:**

3.1 THIS PROCEDURE IS WRITTEN SO THAT TRAINED AGS VACUUM TECHNICIANS WILL BE ABLE TO SUCCESSFULLY AND EFFICIENTLY REMOVE AND/OR INSTALL A 5-FT. STRAIGHT SECTION IN A SAFE AND PROPER MANNER. IN MOST CASES, A 5-FT. STRAIGHT SECTION IS INSTALLED WITHIN A QUAD OR A SEXTUPOLE MAGNET. SOME OLDER SECTIONS MAY STILL HAVE SECTOR GAUGING MOUNTED ON THEM. IN RARE INSTANCES, THE SECTION WILL SIMPLY BE MOUNTED ON STANDS WITHOUT ANY EXTRANEIOUS EQUIPMENT ATTACHED.

**4. PRECAUTIONS:**

4.1 THE TECHNICIAN SHALL BE AWARE OF RADIATION LEVELS IN THE AREA AND, WHERE REQUIRED, SHALL OBTAIN A RADIATION WORK PERMIT.

4.2 THE TECHNICIAN WILL ENSURE THAT HE IS IN FACT USING A SAFE AND PROPERLY FUNCTIONING GAS REGULATOR AND BOTTLE CART. THOSE FOUND TO BE UNSAFE SHALL BE RETURNED FOR REPAIR.

4.3 THE TECHNICIAN SHOULD BE AWARE OF WHAT CONSTITUTES A VACUUM SECTOR. FOR EXAMPLPE, SECTOR "AB" STARTS AT A14 AND ENDS AT THE B3 MAIN MAGNET. SECTOR "B" STARTS AT B4 AND ENDS AT THE B13 MAIN MAGNET. A SCHEMATIC REPRESENTING THE ENTIRE AGS LAYOUT IS POSTED IN THE VACUUM LAB.

4.4 THE TECHNICIAN SHALL NOT REMOVE ANY MATERIALS OR EQUIPMENT FROM THE AGS RING UNLESS THEY ARE FIRST CHECKED BY HEALTH PHYSICS.

4.5 CHECK COLOR CODE ON KIRK KEY & VERIFY THAT IT MATCHES THAT OF THE HV CABLES IN THE LOCKED OUT SECTOR.

**5. PREREQUISITES:**

5.1 THE TECHNICIAN WILL HAVE BEEN TRAINED IN THIS PROCEDURE.

5.2 LOCKOUTITAGOUT 15.17.00.02

5.3 ELECTRICAL SAFETY 15.17.00.04

5.4 AGS RING ACCESS TRAINING

5.5 ACTIVATION WORKER TRAINING (BNL OH&S GUIDE 3.5.0)

5.6 SAFETY GLASSES ARE REQUIRED DURING THIS PROCEDURE.

5.7 WHITE LINT-FREE GLOVES ARE REQUIRED DURING THIS PROCEDURE.

- 5.8 A HARD HAT IS REQUIRED DURING THIS PROCEDURE.
- 5.9 TECHNICIAN HAS BEEN TRAINED TO AT LEAST A LEVEL OF KNOWLEDGEABLE IN LO/TO AGS/HEBT VACUUM ION PUMP POWER DISCONNECT.
- 5.10 AFFECTED PERSONS TRAINING 15.12.00.01

**6. OPERATIONAL PROCEDURE FOR REMOVAL:**

- 6.1 ENSURE THAT A RADIATION SURVEY HAS BEEN DONE BY THE HP GROUP OF THE AREA TO BE WORKED IN.
- 6.2 CLOSE SECTOR VALVES AND DISCONNECT POWER TO THOSE VALVES U/S AND DIS OF SECTOR TO BE VENTED.
- 6.3 PERFORM LO/TO/ PROCEDURES FOR ION PUMP HV SUPPLIES
- 6.4 PERFORM LO/TO PROCEDURES FOR SECTOR CCG.
- 6.5 VENT SECTOR TO ATMOSPHERE AS PER PROCEDURE #8.18.1.1
- 6.6 CHECK WITH MAINT. COORDINATOR TO SEE IF SURVEY REQUIRED FOR THIS PROCEDURE.
- 6.7 REMOVE FLANGE R-C NETWORKS AND/OR SHORTING BARS.
- 6.8 REMOVE CLAMPS, RETAINERS AND SEALS.
- 6.9 PROTECT FLANGES BEFORE REMOVAL BY CRANE.
- 6.10 SCRAP SEALS IN "YELLOW RADIATION WASTE BARRELS IN RING.
- 6.11 WHERE NECESSARY, REMOVE SECTOR GAUGING CABLES.
- 6.12 WHERE NECESSARY, REMOVE P.U.E. ELECTRICAL CABLE. (ED GILL)
- 6.13 DISCONNECT WATER SUPPLY (WATER GROUP).
- 6.14 DISCONNECT POWER BUS (POWER GROUP).
- 6.15 WHERE NECESSARY, REMOVE MAGNET BRIDGE LADDER (BEAM COMPONENTS).
- 6.16 SPLIT MAGNET HALVES (WHERE NECESSARY) (BEAM COMPONENTS).
- 6.17 REMOVE UPPER MAGNET HALF (RIGGERS ASSIST).
- 6.18 REMOVE STRAIGHT SECTION FROM LOWER MAGNET HALF CAREFULLY.
- 6.19 TAKE RADIATION "SMEAR" OF CHAMBER AND TAG APPROPRIATELY (H-P).
- 6.20 COVER ENDS OF STRAIGHT SECTION WITH RUBBER BOOTS OR FOIL.
- 6.21 TRANSPORT STRAIGHT SECTION TO NORTH CONJUNCTION AREA OR BLDG.975
- 6.22 IF GOING TO BLDG.975, LOG OUT IN RING BOOK & INTO BLDG.975 BOOK.

**7. OPERATIONAL PROCEDURE FOR INSTALLATION:**

- 7.1 CAREFULLY PLACE STRAIGHT SECTION ON STANDS, ON GIRDER, OR LAY INTO LOWER MAGNET HALF.
- 7.2 INSTALL UPPER MAGNET HALF (RIGGERS & BEAM COMPONENTS).
- 7.3 SURVEY MAIN MAGNET (SURVEY GROUP).
- 7.4 INSTALL MAGNET BRIDGE LADDER WHERE NECESSARY (BEAM COMPONENTS).
- 7.5 RE-CONNECT WATER (WATER GROUP).

- 7.6 RE-CONNECT POWER BUS (POWER GROUP).
- 7.7 RE-CONNECT SECTOR GAUGING CABLES WHERE NECESSARY.
- 7.8 INSTALL NEW CLAMPS & SEALS AS PER PROCEDURE #8.18.1.6
- 7.9 CHECK STRAIGHT SECTION FOR SHORTS (EL GROUP).
- 7.10 START ROUGHING AND LEAK CHECK PROCEDURE #8.18.1.20
- 7.11 INSTALL FLANGE R-C NETWORKS & SHORTING BARS.
- 7.12 REMOVE RED TAGS FROM ION PUMP P.S. AND CCG.
- 7.13 PROCEED WITH SECTOR START-UP PROCEDURE #8.18.1.53

**8. ACCEPTANCE CRITERIA:**

- 8.1 STRAIGHT SECTION HAS BEEN REMOVED AND/OR INSTALLED AND SECTOR HAS ACHIEVED VACUUM INTEGRITY.

**9. FINAL CONDITIONS:**

- 9.1 WORK AREA HAS BEEN CLEANED AND ALL EQUIPMENT AND/OR TOOLS HAVE BEEN REMOVED FROM THE RING AFTER BEING CHECKED BY H-P PERSONNEL.
- 9.2 DOSIMETER READINGS HAVE BEEN LOGGED IN THE DOSIMETER LOG BOOK LOCATED IN THE VACUUM LAB.