

Vacuum Group Procedure VA-008.18.1.66
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Submitted by: [Signature]
Reviewed/Vacuum Supervisor: [Signature]
Approved/AGS Cognizant Engineer: [Signature] 7/1/91

AGS DIPOLE MAGNET VACUUM CHAMBER CUTTING PROCEDURE

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1. PURPOSE

- 1.1 To provide a safe and effective procedure for the removal of bellows, flanges, pick Up Electrode (PUE) feedthrough assemblies and ion pump conduits (hereafter: components) from AGS dipole magnet chambers removed from the AGS. This is done to prepare a straight, burr-free welding surface for replacement components.

NOTE: This work must be done in a radiation work area.
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2. RESPONSIBILITIES

- 2.1 The Saw Operator(s) (hereafter: operator) shall be responsible for the implementation of this procedure.

3. DISCUSSION

- 3.1 This procedure is written such that the operator(s) will be able to remove old and/or leaking components in a way which is efficient and safe. Fixturing has been designed and built to aid in both safety and efficiency. All cutting shall be done in the confines of the fenced boundaries of the cutting area of Building 975.

4. PRECAUTIONS

- 4.1 The operator(s) shall be aware of radiation levels of the chambers as indicated on the "traveler" sheet attached to each. The operator(s) shall work in a manner which keeps their radiation dose as low as reasonably attainable.
- 4.2 The operator(s) shall not enter the fenced cutting area without being properly protected for radiation work. Properly protected is defined as wearing gloves, job-appropriate goggles/glasses, buttoned shop coats, long pants and shoes/rubbers. All protective items listed above will be worn in the cutting area and will not be taken beyond the dressing area, adjacent to the cutting area.
- 4.3 The Operator(s) shall position their protective shoes in the dressing area so they can step out of their street shoes and into their protective shoes while crossing from the general work area into the dressing area. The converse will be true when traveling from the dressing area.
- 4.4 Only Operator (s) are allowed in the cutting area. Anyone leaving the cutting area intending to enter the general work area must frisk themselves with the Ludlum Model 177 provided in the dressing area for this purpose. Any reading twenty (20) counts/minute above "established" background will require a more intense frisking, perhaps with Health Physics assistance, to locate and remove any contamination.
- 4.5 Since the cutting will be done on radioactive materials, the workers are reminded that once in the cutting area they should not touch any unprotected body area (e.g.: the face). Similarly, gloves must not be removed, once in the cutting area, except to wipe the hands clean before exiting into the dressing area. Hands will be washed using waterless soap and paper towels dispensed in the cutting area. Clean-up refuse will be put into radioactive waste containers in the cutting area.

5. PREREQUISITES

- 5.1 The operator(s) will have been trained in this procedure. This includes working knowledge of the safe operation of both types of saws in the cutting area. This procedure gives no machine operation specifics, requiring instead the assurance from the operator(s)/ helper(s) assigned to this program that they have the required knowledge of the equipment to provide a high quality finished product in an efficient and timely manner.
- 5.2 Activation Worker Training (BNL OH&S Guide 3.5.0) is required for all operator(s)/helpers.
- 5.3 Safety/protective clothing and wearing of a film badge and self-reading dosimeter are required for this procedure. (See 4.2)

- 5.4 The only cutting fluid used throughout this procedure shall be Blaso-Cut. The coolant will be inspected daily and filled, if necessary, to the proper level.
- 5.5 All vacuuming in the cutting area will be with a vacuum cleaner with approved HEPA filters. Vacuuming of the saw tables, floor mats and chip collection areas will occur anytime the area is unmanned for more than thirty (30) minutes (i.e.: lunch periods, the end of a shift, etc.).

6.0 OPERATIONAL PROCEDURE

- 6.1 Chambers, with the "travelers" attached, will be handed over the cutting area fence to the operator(s) in the cutting area. A chamber may be fixtured in the saw or placed on the chamber abeyance rack.
- 6.2 The ion pump conduit will be removed first. The chamber will be placed on the upper fixturing table such that the 5.225 inch diameter ceramic coated flange abuts the aluminum angle as shown in Figure 1. Properly aligning this small coated flange with the angle assures the conduit will be cut to the correct length. The rotatable bolted flange will be moved down the conduit so it falls in to the cutout in the upper plate.
- 6.3 The elliptical portion of the chamber, must rest on the upper fixturing plate and the rear chamber-rest as shown in Figure 2
- 6.4 With the small flange aligned the two (2) De-Sta-Co #603 inline clamps will be pushed towards the front of the saw and locked.
- 6.5 With the clamps locked in place the saw blade must be inspected and adjusted, if necessary, to insure a straight cut. A bubble level or comparable device will be placed on the conduit to assure the plane of the cut is 90° to the conduit centerline.
- 6.6 With paragraphs 6.2 through 6.5 complete, the saw may be powered on and the cut made. The saw blade should pass only through the conduit and the saw stopped.
- 6.7 Once the blade has stopped moving completely, both sides of the cut and any other portion of the chamber to where the coolant/chips have migrated must be vacuumed and wiped free of any coolant and debris. Once this is completed, the removed portion will be logged and placed in the outdoor radiation container. Any chips and the wipes must be placed in the radioactive waste containers situated in the cutting area.
- 6.8 The chamber's traveler must now be inspected for any further work to be performed. If no work remains, go to paragraph 6.20. If one or both of the 9.500 inch diameter flange/bellows assemblies must be removed go to paragraph 6.9. If only the PUE feedthrough remains to be removed go to paragraph 6.15.

- 6.9 The 9.500 inch diameter flange will be removed by cutting through the bellows with a hand held hacksaw. The cut will be made as close to the flange as possible. This operation must be done over the designated radioactive waste container such that all debris caused by this operation will fall into the container. The hacksaw will be fastened by chain or cable to the container and will not be removed from the interior of the container at anytime.
- 6.10 After the flange(s) have been removed, wiped for chips and logged, it is to be placed in the outdoor radiation container. The bellows will be wiped for chips. The used wipes and any chips will be disposed of in the radioactive waste containers in the cutting area.
- 6.11 The chambers will then be fixtured to the lower plate to remove the remainder of the bellows and to cut the chamber to the proper length. The operator(s) will be instructed by the chamber factory supervisor /leadman where to cut each chamber for bellows removal. The operator(s) will verify this dimension with the print on the back of the "traveler". The operator(s) will place the chamber, with the bellows to be removed towards the saw, against the retainers indicated in Figure 3. The other end of the chamber will then be captured in the chamber vise as seen in Figure 4. with the saw switched off, the saw blade carriage will be moved forward until the blade is within .25" of the chamber. At this point the chamber will be positioned such that the blade is in line with the cut coordinates.
- 6.12 With the chamber properly aligned and the blade adjusted for a straight cut, the plunger-type clamps will be slid into contact with the chamber and locked in place. The chamber vise will then also be locked in position.
- 6.13 A bubble level or comparable device will be placed on the chamber to assure the plane of the cut is 900 to the chamber centerline. If necessary, the height of the chamber vise will be adjusted.
- 6.14 When paragraphs 6.9 through 6.13 have been completed the saw may be powered on and the cut made. Once the cut is complete return to paragraph 6.7.
- 6.15 For PUE feedthrough removal the chamber will placed in the PUE cutoff fixture within the cutting area. The chamber will be fixtured in the saw such that the conduit stub is facing away from the wall.
- 6.16 The conduit will rest upon the stepped section of the fixture plate. The chamber will be in contact with contoured retainers bolted to the fixture plate. The chamber's opposite end will rest on the contoured fixture fastened to the support table. The chamber will slide along the fixture plate and contoured fixtures until the non-flanged side of the PUE can abuts the fixture plate. This point of contact assures the PUE feedthrough will be removed one (1) inch from the can.
- 6.17 With the chamber properly positioned, the plunger type clamps will be slid in to alignment and locked.

- 6.18 The saddle will be placed under the feedthrough and pushed into contact with the back of the PUE can. The hold down bar is swung in to place over the feedthrough such that the feedthrough tube rests in the radiused portion of the bar. The bar is then locked in place with the wingnut sandwiching the feedthrough tube.

- WARNING -

Forcing the blade too quickly through the tube can break the carbide-tipped saw blade. Injury to the operator and the workpiece can result.

- 6.19 The saw will be powered on. with the coolant flowing, the control handle of the saw will be brought down slowly in to contact with the tube. The operator will then proceed with "measured" pressure until the cut is complete. The saw will be switched off. Go to paragraph 6.7.
- 6.20 The chamber will be unclamped and inspected again for debris. The chamber will be wiped clean of any and all remaining coolant and chip residue. The chamber will now be placed in the "work complete" rack for pickup and transport to the steam cleaning area.

7. ACCEPTANCE CRITERIA

- 7.1 All cut surfaces will smooth and free of burrs and nicks. The finish of these surfaces must conducive with the welding of components to these surfaces.
- 7.2 The chambers will be free of all coolant and chip debris before being placed in the "work complete" rack for pickup.
- 7.3 All chambers will be measured to assure the final dimensions agree with the requirement listed on the "traveler sheet". Any discrepancies will be noted on the "traveler".