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C-A OPERATIONS PROCEDURES MANUAL

8.23.2 Procedure for Beam Separator High Voltage Conditioning in C-Line

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Hand Processed Changes

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Collider-Accelerator Department Chairman Date

T. Russo

8.23.2 Procedure for Beam Separator High Voltage Conditioning in C-Line

1. Purpose

To provide instruction for the Separator Group to conduct safe, temporary high voltage conditioning of the Beam Separators located in C-Line with beam off. This operation should be performed via a PLC computer program which allows the operator to set level spark rates and current ramp voltage conditioning modes.

2. Responsibility

- 2.1 Only the Separator Operator, or the Separator Electrical Engineer, can operate the high voltage power supply to the Beam Separators.
- 2.2 The Separator Group Supervisor is responsible for the power supply when the separator is not being tested by maintaining LOTO of the Separator power supply switch and maintaining the group lock key.

3. Prerequisites

- 3.1 Beam Separator under vacuum ($P < 1 \times 10^{-6}$)
- 3.2 There shall be an operations log near the control racks at all times. All changes in operational status shall be recorded with time, date and responsible personnel.
- 3.3 All personnel in the area shall wear appropriate dosimetry.
- 3.4 The key to the test cave reset box shall be provided to the operator and Separator Group Electrical Engineer.
- 3.5 Any openings into the caves must be posted with flashing lights, H.V. warning signs and radiation signs.
- 3.6 Beam separator operator must attach a red tag and lock on the 208 volt power switch per [BNL ESH Standard 1.5.1](#) before locking cave or working on the power supplies. This switch is located upstairs on the wall adjacent to the main door. All other personnel entering the separator area shall apply their own lock to the 208V power switch. Red tag only for disassembly.

4. Precautions

- 4.1 When voltages either across the separator gap or from a plate to ground exceed 10 kV, the separator may produce x-rays. The amount of radiation produced is a function of the separator voltage and current. The x-rays produced are

negligible at low currents. The separator may spark at any time, however, and draw large currents. Therefore, the potential for radiation exposure is always present.

- 4.2 The peak radiation level near the separator during a high voltage spark may be as high as: 1000 mR/hr.

Warning

This is a VERY HIGH VOLTAGE SYSTEM (800 kV) and contact with cables and chassis should be kept to a minimum as a good operating practice.

- 4.3 All electrical hazards associated with the separators are isolated within grounded enclosures.

- 4.4 The voltage levels are as follows:

- All separator components 800,000 V dc Maximum
- Control Cabinets 208 V/1 phase/60 Hz
- Vacuum Pumps 208 V/1 phase/60 Hz

5. Procedure

- 5.1 The Separator Group Supervisor shall designate an operator or a Sweep Team to perform the following:

5.1.1 First sweep the upstream separator #1 cave, making sure that barriers and radiation warning signs are in place. Reset the H.V. Security Interlock for cave door #1.

5.1.2 Next sweep the downstream separator #2 cave. Make sure that the barriers and radiation warning signs are in place. Reset the H.V. Security Interlock for cave door #2 ONLY IF security for door #1 HAS NOT BEEN BROKEN.

5.1.3 Remove red tags and locks from 208 volt power switches #1 & #2 per [BNL ESH Standard 1.5.1](#), if required.

5.1.4 Close 208 volt switches.

- 5.2 Application (Turn-On) of High Voltage by Operator

5.2.1 Set the PLC control current to appropriate value (normal 5-50 uA).

- 5.2.2 Verify that vacuum pumps are on and valves are in the desired position for operation.
- 5.2.3 Verify that power supplies are in remote. Turn on the power to each of the high voltage supplies by closing breakers on the control chassis.
- 5.2.4 Verify that the ion gauge controls are on and the base pressure on the separator is $< 1 \times 10^{-6}$.
- 5.2.5 Set the high voltage to the desired value by inputting desired value in PLC. Press the "On" button on the PLC.
- 5.2.6 Fill out separator log with appropriate data.
- 5.3 Removal (Turn-Off) High Voltage by Operator.
 - 5.3.1 Push "High Voltage Off" button on PLC program.
 - 5.3.2 Press the H.V. OFF buttons on both supplies.
 - 5.3.3 Wait for high voltage to reduce to < 10 kV (approx. 1-2 min),
 - 5.3.4 Turn the power off to each supply (+ and -). Open breakers on control chassis.
 - 5.3.5 Make appropriate entry into separator logbook.
- 5.4 Lock Out of power supplies
 - 5.4.1 The Operator shall open and LOTO the 208 volt power switch, per [BNL ESH Standard 1.5.1](#).
 - 5.4.2 Inform the Separator Group Supervisor so that the Supervisor can apply a group LOTO to the 208 V power switch.
 - 5.4.3 Give the key to the gate reset key lock to the Supervisor.

6. **Documentation**

- 6.1 Separator Logbooks #1 and #2.

7. References

7.1 H.V. Power Supply Operating Manual Universal Voltronics 93-103M, dated 12/93.

7.2 [BNL ESH Standard 1.5.1.](#)

8. Attachments

None