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C-A OPERATIONS PROCEDURES MANUAL

8.1.12 LINAC Shutdown

Text Pages 2 through 4

Hand Processed Changes

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Approved: _____ *Signature on File* _____
Collider-Accelerator Department Chairman Date

V. LoDestro

8.1.12 Linac Shutdown

1. Purpose

To provide instructions to Linac staff on how to shut down the Linac. This procedure should be followed at the end of a Linac running period.

2. Responsibilities:

- 2.1 The Linac staff is responsible for the execution of this procedure.
- 2.2 The Head of the Accelerator Division is responsible for informing the Linac staff on when to begin shutdown of the Linac.

3. Prerequisites

- 3.1 All personnel involved in working on any electrical system or equipment in the C-A shall be familiar with BNL ES&H Standards 1.5.0, 1.5.1 and 1.5.2. C-A will provide on-site/work specific training to individuals in the electrical safety aspects of their job functions and assignments.
- 3.2 Trained and qualified Linac staff.

4. Precautions

None

5. Procedure

- 5.1 The Head of Accelerator Division shall have officially requested that the Linac be shut down.
- 5.2 Inform all Linac experimenters (Booster, BLIP, PP) that the Linac will be shutting down.
- 5.3 Close the Tank 1 beam stop, 0-9 beam stop, and High Energy (tank 9) beam stop. The switches are located in ICR rack F2.
- 5.4 From the vacuum control rack in the Pit 1 area, close the vacuum valve at the entrance to the RFQ.
- 5.5 Turn off all quadrupoles and dipoles from the Linac Control Room (ICR):
 - 5.5.1 Turn off all tank quadrupoles (ICR rack F7).
 - 5.5.2 Turn off the HEBT quads, BLIP quads, and LEBT quads (rack F7).
 - 5.5.3 Turn off bending magnets 1 (rack F7), and BM4.
 - 5.5.4 Turn off HEBT steering.

- 5.6. Turn off each tank rf system from its Local Control Station (LCS):
 - 5.6.1 Push the Volts Zero button on the Allen Bradley Redi-Panel.
 - 5.6.2 Turn off Pulsing, at the Pulsing Turn-On Bucket, wait for the Cap Bank voltage to reach zero.
 - 5.6.3 Turn off the 50 KV PS at the LCS Panel View Screen. Select the 50 KV PS page touch F1, off.
 - 5.6.4 Turn the Driver HV off at the Master High Voltage Bucket or if the system is fully converted to PLC controls, on the Panel View Screen Driver Page touch F2.
 - 5.6.5 Turn off the filaments for the Modulator, 7835 PA and Driver at the Master Filament On Bucket or at the Panel View Main Screen.
 - 5.6.6 Shut off the RF Monitor Panel oscilloscope.
 - 5.6.7 Place the Capacitor Bank Mechanical Grounding Switch in the Shorted position.
- 5.7 Turn off the RFQ at its LCS, Rack 5
 - 5.7.1 Turn off pulsing and rf Drive on RFQ Pulsing Lock Bucket.
 - 5.7.2 Push the "Test Fire" button in the HV Crowbar bucket, and then turn off the high voltage at the Panel View screen RFQ1 H.V. Lock Screen Touching F1.
 - 5.7.3 Turn off the filament power Panel View RFQ1 AC Logic Screen Touching F1.
 - 5.7.4 Shut off the oscilloscope.
- 5.8 Turn off each of the three bunchers locally:
 - 5.8.1 Turn off Buncher 1 RFQ LCS Rack 4. Buncher 2&3 Mod 0 LCS.
 - 5.8.2 From the Panel View Main Buncher Screens touch HV Off, then AC Off for each Buncher.
 - 5.8.3 Shut off the oscilloscope.
- 5.9 In the Pit 1 area, turn off the two solenoids supplies by switching off the two main charging supplies from the LEPT Solenoid Turn-on panel Rack 5. Wait 30 seconds for the capacitor banks to pulse down, and then switch the cap bank switches to discharge. Turn off the Pulser Power Block 60 Vdc supplies, and then turn off the ac switches on the Power Block chassis.
- 5.10 In the Pit 1 area, turn off the 35 and 750 keV steerers from the LEPT Steering Turn-On panel in Rack 3.
- 5.11 In the LEPT II area, turn off the 750 keV beam chopper supply.

- 5.12 If the shutdown is at the end of a running period, the tank 1 rf HV power supply shall be locked off. Shut off power at the 50 kV power supply breaker, located in the lower equipment bay, behind the air handler between the Mod 3 and Mod 4 quad pulsers (breaker labeled FDS Rec. Pl. Xfmr. No.1). Lock off the breaker, remove the Kirk key, and place a red Lock-out tag on the breaker (the tag should be obtained from MCR, since they have a special log for radiation safety red tags). Place the key in the lock in the security panel by the tank 1 gate. Log this lockout of the tank 1 rf on the "Linac Radiation Security System Check-off List" in the Main Control Room.
- 5.13 If the shutdown is at the end of a running period, the HEBT BM1 and BM2 power supplies must be locked off. Lockout and red tag these supplies (the red tag shall be obtained from MCR, coming from their radiation safety related red tags). Log this lockout on the "BLIP Radiation Security Check-off List" in the Main Control Room.
- 5.14 Notify the Water Systems Group Leader that the Linac has been shut down, so that water systems can be shut down.
- 5.15 Consult with the Linac Operations Coordinator to determine if the ion source should be shut down. If the ion source is to be shut down, do the following:
 - 5.15.1 At the Extractor Modulator, lower the extractor voltage to zero using the voltage control on the Glassman HV power supply. Wait 1 minute, and then turn off the Glassman supply. Turn off the main circuit breaker for the Extractor Modulator and remove the kirk key for the cage door.
 - 5.15.2 Open the source cage door, and apply the ground stick to the HV equipment rack. Turn off the four heater power supplies. Turn off the discharge power supply and arc pulser. Let the gas valve pulse for ½ hour prior to turning off the gas valve pulser supply.
 - 5.15.3 Close the hydrogen bottle, located under the source vacuum chamber.
- 5.16 All vacuum systems are maintained during shutdown periods unless for maintenance.

6. Documentation

Completion of Linac shutdown should be entered in the Linac Operations Log book.

7. References

None

8. Attachments

None