



**OPERATING PROCEDURES FOR THE ENGINEERING RUN , HIGH AND LOW VOLTAGE SYSTEMS FOR PHENIX BEAM/BEAM COUNTER**

procedure name

**PHENIX Procedure No. PP-2.5.2.2-01**

**Revision: A**

**Date: 5-10-99**

**Hand Processed Changes**

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**Approvals**

*[Signature]* 5/10/99  
PHENIX S E & I Date

*[Signature]* 5/10/99  
Cognizant Scientist/Engineer Date  
/Activity Manager

*[Signature]* 5/10/99  
PHENIX QA/Safety Date

\_\_\_\_\_  
RHIC ES&H Date

REVISION CONTROL SHEET

| LETTER  | DESCRIPTION   | DATE      | WRITTEN BY                            | APPROVED BY   | TYPED BY |
|---------|---|-----------|---------------------------------------|---|----------|
| A       | First Issue   | 5/10/99   | W. Stokes                             | W. Lenz, Other signatures illegible   | n/a      |
| RETIRED | This procedure is no longer relevant to PHENIX operations | 2/13/2007 | (Retirement note written by. D.Lynch) | Retirement approved by D. Lynch, R. Pisani and P. Giannotti for the PHENIX experiment | n/a      |

# **BBC in the PEH for the Engineering Run on 1999**

## **1.0 Purpose**

The purpose of this document is to define the plan for operation of the PHENIX BBC subsystem in the PEH(PHENIX Experimental Hall) during the Engineering run of 1999.

This plan will ensure:

- A. the safety of all personnel from risks associated with the operation of the high voltage systems required to power BBC photomultiplier tubes,
- B. the implementation of the appropriate emergency approaches,
- C. prompt notification of the appropriate RHIC and S&EP specialists,
- D. the maintenance of appropriate RHIC emergency status,
- E. the preservation and protection of the environment, and
- F. the preservation of BNL facilities and equipment.

## **2.0 Responsibilities**

During the Engineering Run, there will be two levels of responsibility for the oversight of the BBC subsystem.

The first level of responsibility will be the PHENIX Shift Crew. Prior to data taking, there will be a period of BBC commissioning when BBC is tested at high voltage before the IR is closed and the BBC is inaccessible. During the commissioning phase, the BBC HV&LV systems will be monitored primarily by the team of BBC Experts. A record of the performance of the BBC system will be kept by the experts.

During data taking, it will be the responsibility of the PHENIX Shift Crew to:

- 2.1 monitor the status and alarms for the BBC HV system according to a prescribed check off list at least once a shift(eight hours)
- 2.1 In the event of an alarm or irregularity, contact an expert from the Expert Call List given in Appendix A.

The second level of responsibility is the BBC Experts. It is the responsibility of the BBC Experts to:

- 2.2 maintain the BBC subsystem in a safe operating condition. This includes:
  - 2.2.1 setting, adjusting, and checking the HV&LV power supplies,
  - 2.2.2 setting, adjusting, and checking the cooling gas flow rate,

- 2.2.3 monitoring temperature of photomultiplier tubes,
- 2.2.4 position any special instructions or notifications as required, and carrying out any emergency action, as prescribed in the Procedures section of this document.

### **3.0 Prerequisites**

The BBC Experts shall have read or have training in the following areas:

- 3.1 RHIC Project Local Emergency Plan, RHIC-OPM 3.0,
- 3.2 RHIC Access & PHENIX IR Access Training,
- 3.3 BNL Radworker I & TLD,
- 3.4 BNL Electrical Safety I,
- 3.5 BNL Lock Out/Tag Out Authorized Training,
- 3.6 PHENIX BBC subsystem specific training,
- 3.7 Geographical layout of the experimental area (routes of egress, location of emergency equipment, phones and controls)

The BBC Experts shall train all personnel involved in the BBC running in the safe operation of the BBC HV&LV systems.

### **4.0 Precautions**

The safety of personnel is of primary importance. The BBC Experts and Shift Crew members shall take great care to ensure that the BBC subsystem will be operated in a way that does not place personnel at risk of physical harm.

#### **4.1 HV system precautions**

The HV power supplies are current limited at less than 12 milliamp per channel. All HV points are enclosed within the sector electronics enclosure in order to eliminate the danger to personnel.

#### **4.2 LV system precautions**

BBC utilizes high current low voltage (+/- 6V) power supplies to provide power required by FEM crates to operate. This power is delivered from the LV power supply rack to the detector and distributed among the crates via fuse-protected terminal blocks installed on the DIN-rails inside sector enclosure. Because the voltage is low, LV wires may stay energized while doors are open to allow test-work on FEM crates.

### **5.0 Standard Operating Procedures**

5.1 HV system Procedures: In normal operations the experimental hall will be closed to personnel making access to any HV point impossible. Under such conditions, follow this procedure for turning on the HV:

- 5.1.1 Before turning on the HV, check that four cooling gas flow meters are indicating 100 SLPM respectively. If not, call a BBC Expert. This procedure is crucial to avoid the melting of cables contained in the BBC subsystem.
- 5.1.2 Check that the appropriate current limits are in place for the power supply. Each subsystem shall maintain a HV logbook where the operating parameters of the HV settings are recorded. This shall include the current limits, target voltages, ramp rates, operating voltages and currents, and trip tolerances.
- 5.1.3 Check that the target voltage for each HV output line is appropriate (<200 volts). The first stage of bringing on the HV shall be a single increment in the ramp up. This is because the current trips are disabled during ramping, and in order to locate a short in the system, it is necessary to halt the ramping and check the current at the earliest possible stage.
- 5.1.4 Check that the ramp up rate for each HV supply is appropriate (<400 volts per step).
- 5.1.5 Begin ramping up the HV.
- 5.1.6 If any of the HV supplies trips, disable that channel until the reason for the trip is understood. Then begin the procedure again from 6.1.5
- 5.1.7 If there are no HV trips, verify that the operating currents are appropriate.
- 5.1.8 Change the target voltage to the correct operating voltage for each channel, as given in the operating log for each channel.
- 5.1.9 Continue ramping up the HV.
- 5.1.10 When ramping is complete, verify that the operating currents are appropriate, as given in the operating log for each channel.
- 5.1.11 Check that all of temperature sensors attached to photomultiplier tubes are well below 60 degree C during the first 2-3 hours. If any sensor exceeds the temperature limit, the HV supplies are automatically shut down. In such case,

call a BBC Expert.

5.1.12 HV is ready for BBC testing.

5.2 HV system Procedures: Turning off high voltage to BBC phototubes

5.2.1 Begin ramping down the HV.

5.2.2 Verify by the read back that the HV is off the system.

## 6.0 HV lock out procedure during maintenance

6.1 In the case where maintenance works are necessary during a long term shutdown, follow this procedure before you start any work to avoid working while the HV is on:

6.1.1 Plug out a BNC cable which is connected to the HV interlock line placed at the back plane of the HV crate which guarantees that neither a switch in the front panel nor software switches can turn on the HV.

6.1.2 Start the maintenance work.

5.1.2 Plug in the BNC cable to the original place after the maintenance.

## 7.0 Documentation

7.1 None

## 8.0 References

8.1 RHIC-OPM 3.0, "Local Emergency Plan for the Relativistic Heavy Ion Collider Project."

8.2 BNL ES&H Health Standard, December 18, 1991.

8.3 BNL Occupational Health and Safety Guide (interm).

## Appendix

### Call list for the BBC subsystem experts

|                 |       |
|-----------------|-------|
| Hiroaki Ohnishi | x4999 |
| Takeshi Kohama  | x8087 |
| Kensuke Homma   | x3838 |
| Toru Sugitate   | x3838 |

## **Documentation to Close the Action Item for the BBC System**

**Subject: Action Item 65**

**Submitted: June 16, 1999**

**From: Kensuke Homma / Hiroshima University / homma@hepl.hiroshima-u.ac.jp**

**To: The RHIC Safety Committee**

### **Description of the Action Item 65:**

Procedure should be in place to lock out the high voltage and avoid opening the canister while the voltage is on as the levels amount to "working hot" condition.

### **Actions:**

While our experiment is being executed with beams delivered from RHIC, we would never access the BBC frame inside the flowerpot, therefore this procedure is necessary only for the maintenance during a long term shutdown. For the maintenance, we will plug out a BNC cable from the back plane of the HV crate which guarantees that neither a switch in the front panel nor software switches can turn on the HV. By this lock out procedure, we can avoid opening canister under the "working hot" condition.