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C-A OPERATIONS PROCEDURES MANUAL

11.2.3 PHENIX Flammable Gas System Operating Procedure

Text Pages 2 through 4

Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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Approved: \_\_\_\_\_ *Signature on File* \_\_\_\_\_  
Collider-Accelerator Department Chairman      Date

R. Pisani

### 11.2.3 PHENIX Flammable Gas System Operating Procedure

#### 1. Purpose

The purpose of this procedure is to describe those safeguards and operations that are necessary for turning on flammable gas in the PHENIX gas system. This procedure also describes the response of the gas system to emergencies.

#### 2. Responsibilities

It is the responsibility of the Flammable Gas Operators to prepare PHENIX for operation with flammable gas. This can be accomplished with the help of the PHENIX Flammable Gas Checklist ([C-A-OPM-ATT 11.2.3.a](#)) they have assured themselves that PHENIX is ready to flow flammable gas, it is their duty to initiate the flow of flammable gas in a manner that is safe to personnel and equipment. The details of turning on the flammable gas to each of the PHENIX subsystems are contained in the subsystem specific Documented Work Procedures listed in Sec. 6.

It is also the responsibility of the Flammable Gas Operators to monitor the gas usage, making sure that PHENIX has uninterrupted access to gas supplies. When gas cylinders are emptied, it is the duty of the Flammable Gas Operators to change the supply cylinders.

When PHENIX has a long shutdown, it is the responsibility of the Flammable Gas Operators to turn off the flow of flammable gas.

The list of trained and approved Flammable Gas Operators is kept by the PHENIX Detector Group.

#### 3. Prerequisites

In order to operate the PHENIX Flammable Gas System, the following requirements must be met:

- 3.1 C-A Collider User Access Training
- 3.2 BNL Compressed Gas Training
- 3.3 PHENIX Flammable Gas System Checklist (see [C-A-OPM-ATT 11.2.3.a](#))

#### 4. Precautions

Before initiating flow of flammable gas, or after long shutdown periods when the flammable gas flow has been turned off, the following precautions must be taken:

- 4.1 There must be at least two people on shift at all times when there is flammable gas flowing or flammable gas in any subsystem.
- 4.2 All High Voltage (HV) to the subsystem receiving flammable gas must be off.
- 4.3 The PHENIX High Sensitivity Smoke Detector System (HSSD) in the Interaction Region (IR) must be operational and have passed the "Blue Sheet" procedure.
- 4.4 The Mixing House Smoke Detection System must be operational and have passed the "Blue Sheet" procedure
- 4.5 The IR Flammable Gas Detection System must be operational and have passed the "Blue Sheet" procedure.
- 4.6 The Mixing House Flammable Gas Detection System must be operational and have passed the "Blue Sheet" procedure.
- 4.7 The Safety Monitoring and Control System (SMCS) must be operational and have passed the "Blue Sheet" procedure.
- 4.8 The flammable gas supply and return piping and racks must be inspected visually and with a handheld gas detector to verify that they do not leak.
- 4.9 All subsystems receiving flammable gas must be purged with inert gas for at least four volume exchanges prior to the introduction of flammable gas.
- 4.10 The PHENIX Run Coordinator and Liaison Physicist must verify and sign the [C-A-OPM-ATT 11.2.3.a](#) Checklist to give approval to the Flammable Gas Operator before flowing any flammable gas.
- 4.11 The crane in the IR must be Locked Out/Tagged Out while there is flammable gas in the IR, unless a Work Plan has been approved and signed.

#### 5. Procedure

- 5.1 Inform the Main Control Room (MCR) that PHENIX is about to introduce flammable gas to the IR.
- 5.2 Execute the Document Work Procedures for the appropriate subsystem listed in Section 6.0.

**Note 1:**

**In the event of a PHENIX emergency such as:**

- **Flammable gas detected in the IR**
- **Smoke detected in the IR**
- **Flammable gas detected in the mixing house**
- **Smoke detected in the mixing house**
- **PHENIX Level 3 alarm**
- **Loss of power**

**The response of the PHENIX Flammable Gas System is to shut off all flammable gas flow at the manifolds where the gas enters the mixing house. This is accomplished by shutting off power to the mixing house. Each of the flammable gases must pass through a normally closed (NC) valve that will shut off gas flow whenever power is shut off. Verification of the gas flow status is provided by flow indicators that read out in the PHENIX counting room.**

**Note 2:**

**Each of the subsystems that use flammable gas have subsystem specific instructions for the monitoring and control of flammable gas. See the Documented Work Procedure for the appropriate subsystem listed in Section 6.0.**

**6. Documentation**

Each subsystem using flammable and non-flammable gas has its own procedure for start up, maintenance, monitoring, and emergency response.

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|-----|---|----------------|
| 6.1 | PHENIX DC Operations in the PEH         | PP-2.5.2.4-01  |
| 6.2 | PHENIX PC Operations in the PEH         | PP-2.5.2.5-04  |
| 6.3 | PHENIX TEC Operations in the PEH        | PP-2.5.2.6-02  |
| 6.4 | PHENIX RICH Operations in the PEH       | PP-2.5.2.7-06  |
| 6.5 | PHENIX RICH Gas Operations in the PEH   | PP-2.5.3.14-07 |
| 6.6 | PHENIX MuID Operations in the PEH       | PP-2.5.2.13-09 |
| 6.7 | PHENIX MuTracking Operations in the PEH | PP-2.5.2.12-07 |

**7. References**

- 7.1 PHENIX Gas Pad Schematic
- 7.2 PHENIX Gas Mixing House Schematic

**8. Attachments**

- 8.1 [C-A-OPM-ATT 11.2.3.a, "Flammable Gas Checklist"](#).