



**ETHANE GAS SUPPLY OPERATING PROCEDURE**

**PHENIX Procedure No. PP-2.5.5.4-35**

**Revision: B**

**Date: 6/23/2016**

**Hand Processed Changes**

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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**Approvals**

[Signature] 6/23/16

Cognizant PHENIX SE & I Date

[Signature] 6/23/16

Cognizant PHENIX SE & I Date

[Signature] 6/23/16

Cognizant PHENIX SE & I Date

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CAD ES&H Date

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REVISION CONTROL SHEET

LETTER	DESCRIPTION	DATE	AUTHOR	APPROVED BY	CURRENT OVERSIGHT
A	First Issue	5/29/2013	C. Biggs	D. Lynch, P. Giannotti, C. Biggs and Y. Makdisi	C. Biggs
B	Corrected info in sec 4.7 on C-A-OPM 3.16 per rev A HPC	6/23/2016	C. Biggs	D. Lynch, P. Giannotti, R. Pisani	C. Biggs

## Introduction

The purpose of this document is to describe in detail the procedures by which the PHENIX ethane gas system is managed, operated and maintained. This includes assignment of responsibilities, required qualifications, and detailed operating procedures for routine, abnormal and emergency conditions.

Ethane is a critical component of the operating environment for certain PHENIX detector subsystems. A precise, consistent, reliable and safe supply of the gas to these subsystems is crucial to the success of the PHENIX experimental objectives. This procedure describes the manner in which this system shall be operated, the engineering and administrative controls to assure its reliability and safety, and the documentation necessary to certify the implementation of these procedures.

### **1. Responsibilities**

It is the responsibility of the PHENIX Operations Manager to assign appropriately qualified and experienced personnel as PHENIX Ethane gas system experts to oversee the operation, maintenance and documentation of the system. It is also the responsibility of the PHENIX Operations Manager to assure that all PHENIX collaborators who may have the need to attend to the PHENIX ethane gas system (e.g. respond to an alarm) are fully trained in the appropriate response(s).

It is the responsibility of the PHENIX Chief Engineer to assure that the assigned gas system engineers are properly equipped and trained to carry out all tasks associated with this assignment.

It is the responsibility of the assigned gas system experts to assure that they follow the procedures described here-in, maintain their training up-to-date, and assure that no changes, updates, or modifications to equipment, procedures, or documentation are implemented without appropriate review and approval.

### **2. Prerequisites**

PHENIX ethane gas system experts shall have appropriate training and experience managing and operating a flammable gas system including, as a minimum:

- PHENIX Awareness
- CA User Training (or equivalent)
- Lock-Out/Tag-Out (affected)
- Compressed Gas Safety

Prior to implementing the ethane operating procedures described herein, a review of this procedure

and all related hardware and documentation described or implied herein shall be undertaken by the BNL CAD Experimental Safety Review Committee (ESRC). The ESRC committee shall call upon such subject matter experts as necessary to thoroughly review all aspects of the system to assure that operation of the system is in full compliance with all entities have jurisdiction over such operation. Approval from the ESRC committee shall be a necessary pre-condition to the operation of the ethane system.

**3. Precautions**

Ethane is a highly flammable gas. No changes to the system design, components, or operating procedures may be undertaken without an appropriate review of the safety implications.

**4. Ethane Gas System Operating Procedure**

**4.1. PHENIX Ethane gas supply system**

**4.1.1. Ethane Six Packs**

Six (6) size 1A vertical cylinders of Ethane in a cradle on wheels. There is a shut off valve on each cylinder, as well as a main shut off valve located on the incorporated manifold joining all the cylinders.

**4.1.2. Ethane Twelve Packs**

Twelve (12) size 1A vertical cylinders of Ethane in a cradle on wheels. There is a shut off valve on each cylinder, as well as a main shut off valve located on the incorporated manifold joining all the cylinders.

**4.1.3. Ethane Tube Trailer**

Seven horizontal compressed gas cylinders, each with its' own shut off valve at the rear of the trailer and pressure relief valve on the other end. These are mounted on a movable DOT approved and inspected trailer.

**4.2. Receiving Ethane Deliveries**

**4.2.1. Ethane Six Packs**

Receipt and return off-loading requires the assistance of BNL riggers using fork lift or a crane device lifting from the top.

**4.2.2. Ethane Twelve Packs**

Twelve packs are to be delivered on a truck with a boom for off-loading by the vendor's driver.

**4.2.3. Ethane Tube Trailer**

Tube trailers are to be delivered by the vendor, pre-filled, with enough gas to last to the end of the current physics run. The vendor shall remove the trailer at the end of the run and re-weigh it for billing purposes.

**4.3. Disposition of used Ethane Containers**

All empty six and twelve packs shall be returned to the vendor as soon as possible. The tube trailer shall be returned to the vendor immediately after the end of the current physics run at RHIC.

**4.4. Required Signs and Markings**

There shall be approved "No Smoking" and "Flammable Gas" signs posted within 25 feet of the outdoor storage area (in accordance with the FCNYS Chapter 27),

**4.5. Ethane System Normal Operation**

**4.5.1. Pre Start-Up**

- 4.5.1.1. The tube trailer shall comply with all RHIC ESRC safety requirements before being delivered on-site.
- 4.5.1.2. When the tube trailer is delivered and put in place for the run, it shall be installed into the existing Ethane system in compliance with all RHIC ESRC safety rules and the Fire Code of NYS.
- 4.5.1.3. The BNL Transportation Safety Officer shall be notified in advance of the arrival of the trailer on site and inspect the trailer if deemed necessary.
- 4.5.1.4. The trailer shall be backed into place following the BNL backing/spotter procedure.
- 4.5.1.5. Once in place, the wheels shall be chocked to prevent movement, and the "landing gear" shall rest on plates so as not to dig into the ground

surface (as per the vendor's safety requirements). Trailer shall be electrically bonded to ground as required by codes.

**4.5.1.6.** The trailer is protected from damage by vehicles on three sides. After backing in and setting up, there shall be a 20-foot cement "Jersey" barrier place in front of the trailer to protect it from damage from that direction.

**4.5.2.** Trapped air needs to be purged out of the system at the stanchion, and the Ethane manifold prior to supplying the main system from the trailer.

**4.5.2.1.** Additionally, a downstream gas purge (vented to the atmosphere) should be performed at the Gas Mixing House Ethane Distribution Panel. Once completed, direct gas supply from the trailer can be initiated. This shall be completed by qualified PHENIX gas technicians.

**4.5.3. Operations**

A reserve six or twelve pack of Ethane should remain connected in line in case of a failure of the tube trailer supply. Note: Tube trailer valves shall be tagged and isolated to limit the maximum quantity of gas that may be released in a release scenario. Trailer valves shall be opened to supply a maximum of one month's supply of gas to the experiment.

**4.6. Ethane System During Non-Operating Periods**

Reserve twelve or six pack cylinder valves shall be shut off and disconnected from the manifold. After all tubes on the trailer have been isolated from the system, lines from the trailer to the Gas Mixing House shall be purged with Nitrogen gas. The trailer shall then be disconnected from the stanchion and the vendor shall remove it from site.

**4.7. Emergency Procedures**

In the unlikely event of a gas emergency follow the procedures outlined in CAD OPM 3.16 *Emergency Procedure for the PHENIX Detector Building 1008 Complex* as detailed below.

**4.7.1.** In the event of a fire, a gas line failure, or fire alarm in Building 1008, 1008F, or PHENIX Gas Pad, members of the PHENIX Shift Crew shall (in order of priority).

**4.7.1.1.** Pull the nearest fire alarm box if the alarm is not already sounding (Attachment 1 gives the layout of the building 1008 showing the location of the gas system area and the fire alarm pull stations in the

area).

- 4.7.1.2. Go to a safe location and call 911 or x2222.
- 4.7.1.3. Call one of the PHENIX GAS Experts, Carter Biggs (work 631-344-7515, cell 631-879-1811), or Rob Pisani (work 631-344-5301, cell 631-553-0252). You will be instructed by the gas expert on what action(s) to take next, along with the steps below. The expert may ask you to turn off the gas. The Shut-off locations are:
  - 4.7.1.3.1. At the trailer itself.
  - 4.7.1.3.2. The connecting stanchion next to the trailer has a ¼ turn shut off, plainly marked.
  - 4.7.1.3.3. Two shut off valves located on the Gas Pad Manifold
  - 4.7.1.3.4. One across from the south side of the Gas Mixing House on the retaining wall of the berm.
- 4.7.1.4. Shift leaders and the Fire Department First Responders shall be instructed in the location of the main shut off and other safety features of the system.
- 4.7.1.5. Await the arrival of the Fire/Rescue Group
- 4.7.1.6. The Shift Leader shall report to the Fire/Rescue Captain upon arrival at the Command Post. (per PHENIX Procedure # PP-2.5.2.4-01)

## 5. **PHENIX Ethane System Documentation**

5.1. Schematic of Ethane delivery system (*See attachments*)

## 6. **References**

<https://www.phenix.bnl.gov/WWW/run/13/FireEmergency.pdf>

<http://www.c-ad.bnl.gov/ESSHQ/SND/OPM/Ch03/03-16.PDF>

**7. Attachments**

**7.1. Layout of the PHENIX site indicating:**

**7.1.1. Fire alarms and fire extinguishers**

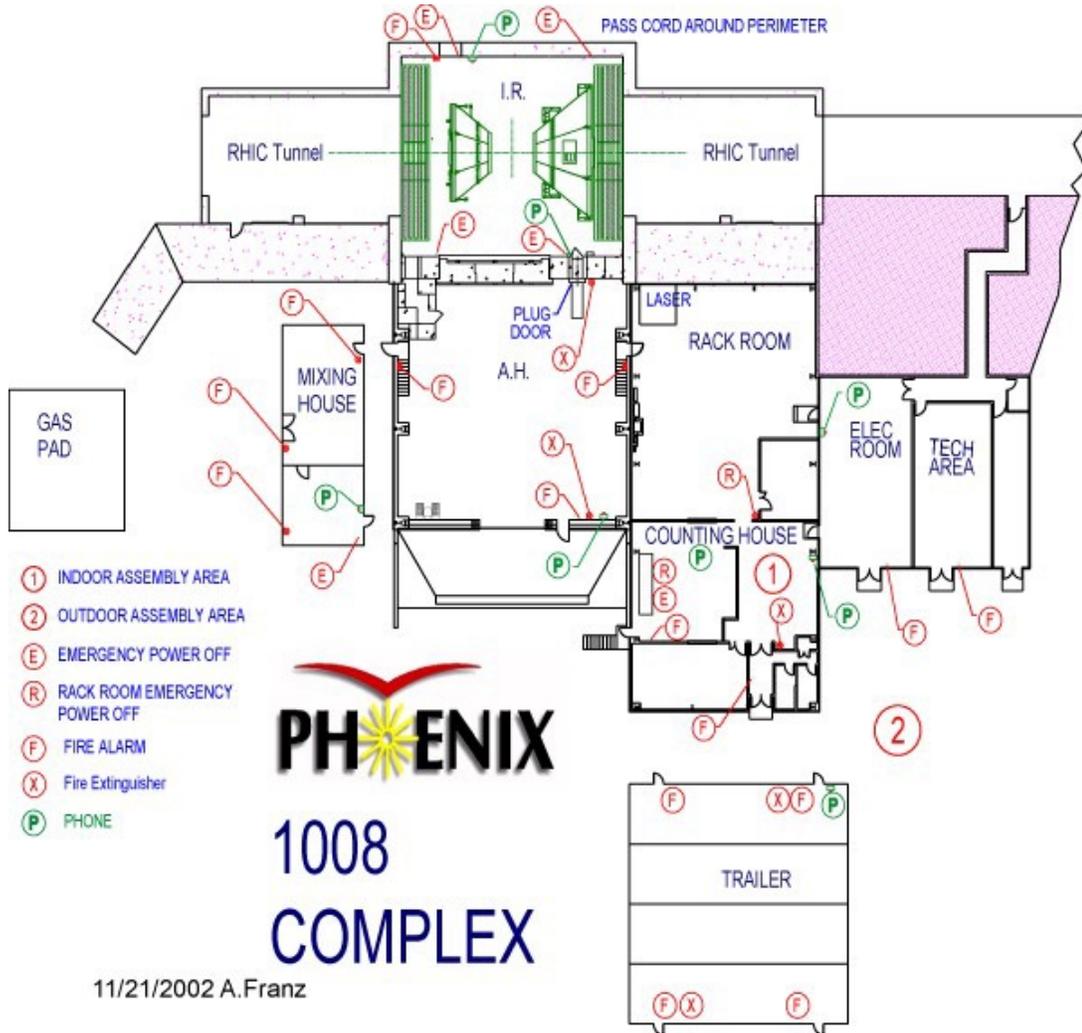
**7.1.2. Telephones and intercom systems**

**7.1.3. Gas pad**

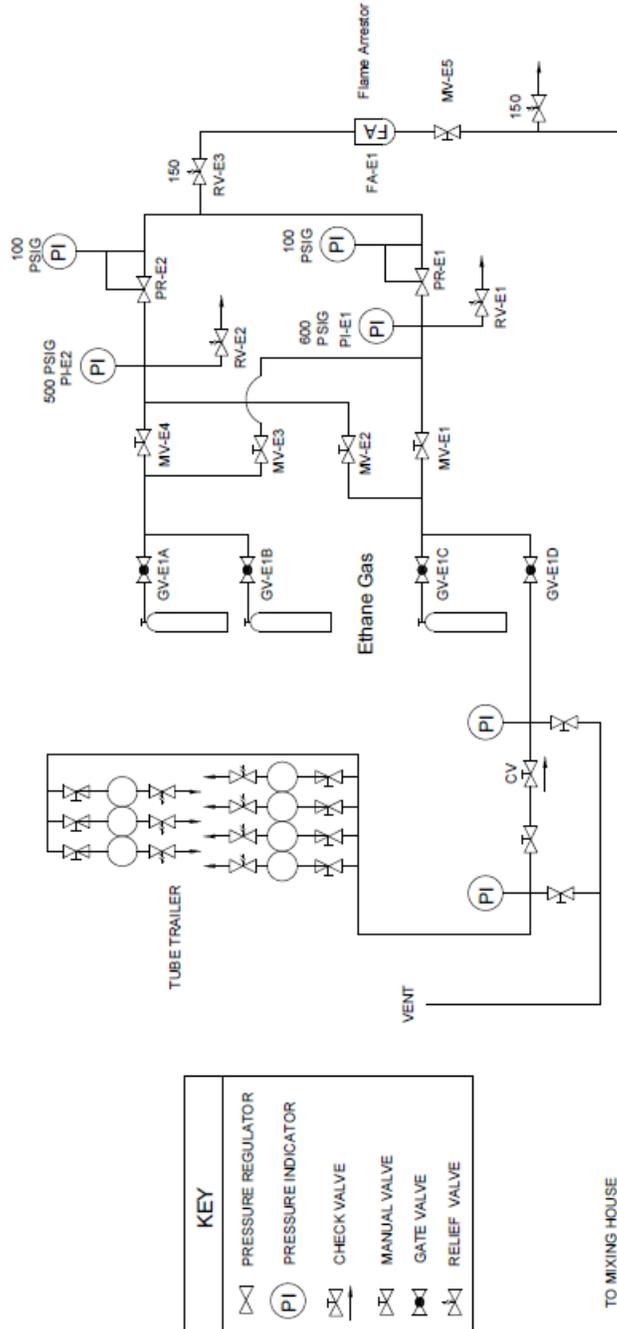
**7.1.4. Emergency Assembly area inside (Counting House)**

**7.1.5. Evacuation Assembly area outside (outside Counting House)**

**7.1.6. Emergency power buttons**



7.2. PHENIX Ethane Gas Schematic



KEY	
	PRESSURE REGULATOR
	PRESSURE INDICATOR
	CHECK VALVE
	MANUAL VALVE
	GATE VALVE
	RELIEF VALVE