



# OPERATION OF THE RICH GAS SYSTEM

## PHENIX Procedure No. 2.5.3.14-07

Revision: 0

Date: 04-10-00

### Hand Processed Changes

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

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PHENIX S E & I    Date

\_\_\_\_\_  
Cognizant Scientist/Engineer Date  
/Activity Manager

\_\_\_\_\_  
PHENIX QA/Safety    Date

\_\_\_\_\_  
RHIC ES&H    Date

REVISION CONTROL SHEET

LETTER	DESCRIPTION	DATE	WRITTEN BY	APPROVED BY	TYPED BY
0	First Issue. (Note: Rev letter "0" <numeric> is not in compliance with customary practice. Next revision to be given "B" designation.	04/10/2000	n/a	M. Sivertz, A. Frawley, W. Lenz, Y. Makdisi	n/a

## **1.0 Purpose and Scope**

The scope of this procedure is those operations that are necessary for running the PHENIX Ring Imaging Cherenkov Counter (RICH) with CO<sub>2</sub> gas, using the RICH gas system. Operations in this procedure include the following:

1. Purging the RICH with CO<sub>2</sub> to remove air.
2. Maintaining a CO<sub>2</sub> purge on the RICH for long term running.

## **2.0 Responsibilities - See Attachment 4**

## **3.0 Prerequisites**

- 3.1 Required training to operate the gas system in the manner described in 1.0 above:
  - 3.1.1 BNL Compressed gas safety course (OSH026)
  - 3.1.2 RICH gas system training with a previously qualified gas system operator listed in Attachment 4 of this procedure.

## **4.0 Precautions**

- 4.1 Overpressurization of the RICH (above 1.75' water column) could result in structural damage. Primary care should be given to monitoring the internal pressure of the RICH throughout the duration of this procedure, especially when adjusting flow rates and when the hardware and software alarms are bypassed.

## 5.0 Procedure

### 5.1 Purging the RICH with CO2 to remove air

Refer to fig. 1 for a flow control diagram for the RICH west arm, and Fig. 2 for a flow control diagram for the RICH east arm. All gas system controls and readouts for the RICH are located in the PHENIX gas mixing house. The two RICH arms may be purged at the same time.

1. Go to the appropriate "RICH Gas Supply Panel" in the PHENIX gas mixing house gas room. They are labelled "West Arm" and "East Arm".
2. Close the valves from the CO2 supply to the flowmeters (V7 and V8 for the West Arm, V1 and V2 for the East Arm).
3. Go to the appropriate "RICH Gas Monitoring and Control Panel" in the PHENIX gas mixing house monitoring room. They are labelled "West Arm" and "East Arm".
4. Open the bubbler bypass valve (V10 for the west arm, V4 for the east arm).
5. Open the RICH gas inlet valve (V9 for the west arm, V3 for the east arm).
6. The water supply valves (V11 and V12 for the west arm, V5 and V6 for the east arm) can be open or closed.
7. Check the high pressure set point by toggling the switch next to the "RICH Gas Pressure" readout. If it is not set at 1.5" water column, set it to 1.5" using the "High Set Point Adjustment" potentiometer. This is important - if the RICH pressure exceeds the high pressure set point, the RICH gas inlet valve will close, preventing damage to the RICH.
8. Go to the "RICH Gas Supply Panel" in the gas room. Open the manual ball valve to the high volume flowmeter (V7 for the West Arm, V1 for the East Arm), and adjust the flow rate to 25 liters/minute.
9. Monitor the RICH pressure on the "RICH Gas Pressure" display until it stabilizes. It should stabilize at a pressure of less than 0.5" water column.
10. Note the purge start time in the log book. The purge should continue for at least 80 hours to provide three volume changes for each RICH vessel.
11. To terminate the purge, go to the "RICH Gas Supply Panel" in the gas room, and close the valve to the high volume flowmeter (V7 for the West Arm, V1 for the East Arm). Then go to the "RICH Gas Monitoring and Control Panel" in the monitoring room, and close the bubbler bypass valve (V10 for the West Arm, V4 for the East Arm).

### 5.2 Maintenance Purge for normal operation

Refer to fig. 1 for a flow control diagram for the RICH west arm, and Fig. 2 for a flow control diagram for the RICH east arm. All gas system controls and readouts for the RICH are located in the PHENIX gas mixing house.

1. Go to the appropriate "RICH Gas Supply Panel" in the PHENIX gas mixing house gas room. They are labelled "West Arm" and "East Arm".

2. Close the valves from the CO<sub>2</sub> supply to the flowmeters (V7 and V8 for the West Arm, V1 and V2 for the East Arm).
3. Go to the appropriate "RICH Gas Monitoring and Control Panel" in the PHENIX gas mixing house monitoring room. They are labelled "West Arm" and "East Arm".
4. Close the bubbler bypass valve (V10 for the West Arm, V4 for the East Arm).
5. Open the RICH gas inlet valve (V9 for the west arm, V3 for the east arm).
6. The water supply valves (V11 and V12 for the West Arm, V5 and V6 for the East Arm) should be open during operation to provide cooling for the RICH PMT's.
7. Check the high pressure set point by toggling the switch next to the "RICH Gas Pressure " readout. If it is not set at 1.5" water column, set it to 1.5" using the "High Set Point Adjustment" potentiometer. This is important - if the RICH pressure exceeds the high pressure set point, the RICH gas inlet valve will close, preventing damage to the RICH.
8. Go to the "RICH Gas Supply Panel" in the gas room. Open the manual ball valve to the low volume flowmeter (V8 for the West Arm, V2 for the East Arm), and adjust the flow rate initially to 2.5 liters/minute.
9. Monitor the RICH pressure on the "RICH Gas Pressure" display until it reaches about 0.5" water column (this is set by the bubbler back-pressure). This should take roughly 2 to 4 hours. Then reduce the flow rate to 1.0 liters/minute.
10. Note the time in the log book.
11. To stop the gas flow for short periods, go to the "RICH Gas Monitoring and Control Panel" in the monitoring room, and close the RICH gas inlet valve (V9 for the West Arm, V3 for the East Arm). If the gas flow has to be stopped for long periods, go to the "RICH Gas Supply Panel" in the gas room, and close the valve to the low volume flowmeter (V8 for the West Arm, V2 for the East Arm).

## **6.0 Documentation**

- 6.1 All notes and observations should be recorded in the RICH gas system logbook. A gas system log sheet (attachment 5) should be completed every 8 hours and placed in the log sheet binder during data taking.

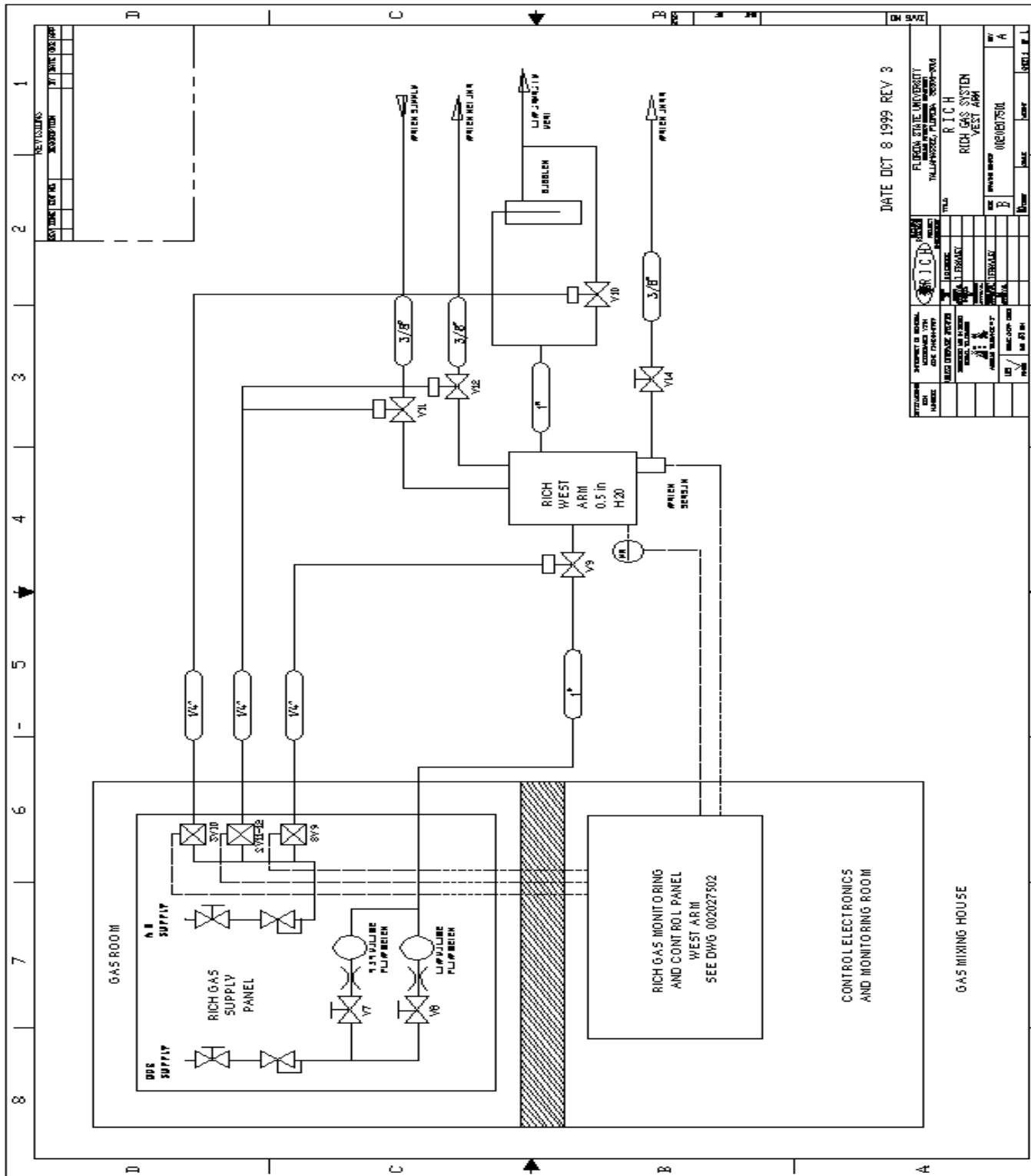
## **7.0 References**

1. RICH gas system schematic for west arm- PHENIX Drawing #0020207501
2. RICH gas system schematic for east arm - PHENIX Drawing #0020207500
3. RICH gas monitoring and control panel layout- PHENIX Drawing #0020207502

## **8.0 Attachments**

1. Figure 1 - RICH gas system flow control schematic for the west arm.

2. Figure 2 - RICH gas system flow control schematic for the east arm.
- 3 Figure 3 - RICH Gas Monitoring and Control Panel layout for west and east arms
- 4 Responsible People/Operators
- 5 Data Log Sheet
- 6 Hardware Alarm Conditions



DATE OCT 8 1999 REV 3

PROJECT NO.	002027502	DATE	10/08/99
PROJECT NAME	RICH GAS SYSTEM WEST ARM	SCALE	AS SHOWN
PROJECT LOCATION	RICH STATE UNIVERSITY TALLAHASSEE, FLORIDA 32309-5002	DESIGNED BY	W. J. ...
CLIENT	RICH STATE UNIVERSITY	CHECKED BY	...
DESIGNED BY	...	DATE	...
CHECKED BY	...	SCALE	AS SHOWN
DATE	...	PROJECT NO.	002027502
SCALE	AS SHOWN	PROJECT NAME	RICH GAS SYSTEM WEST ARM
DESIGNED BY	...	PROJECT LOCATION	RICH STATE UNIVERSITY TALLAHASSEE, FLORIDA 32309-5002
CHECKED BY	...	CLIENT	RICH STATE UNIVERSITY
DATE	...	DESIGNED BY	...
SCALE	AS SHOWN	CHECKED BY	...
PROJECT NO.	002027502	DATE	10/08/99

Fig. 1 RICH west arm gas system schematic

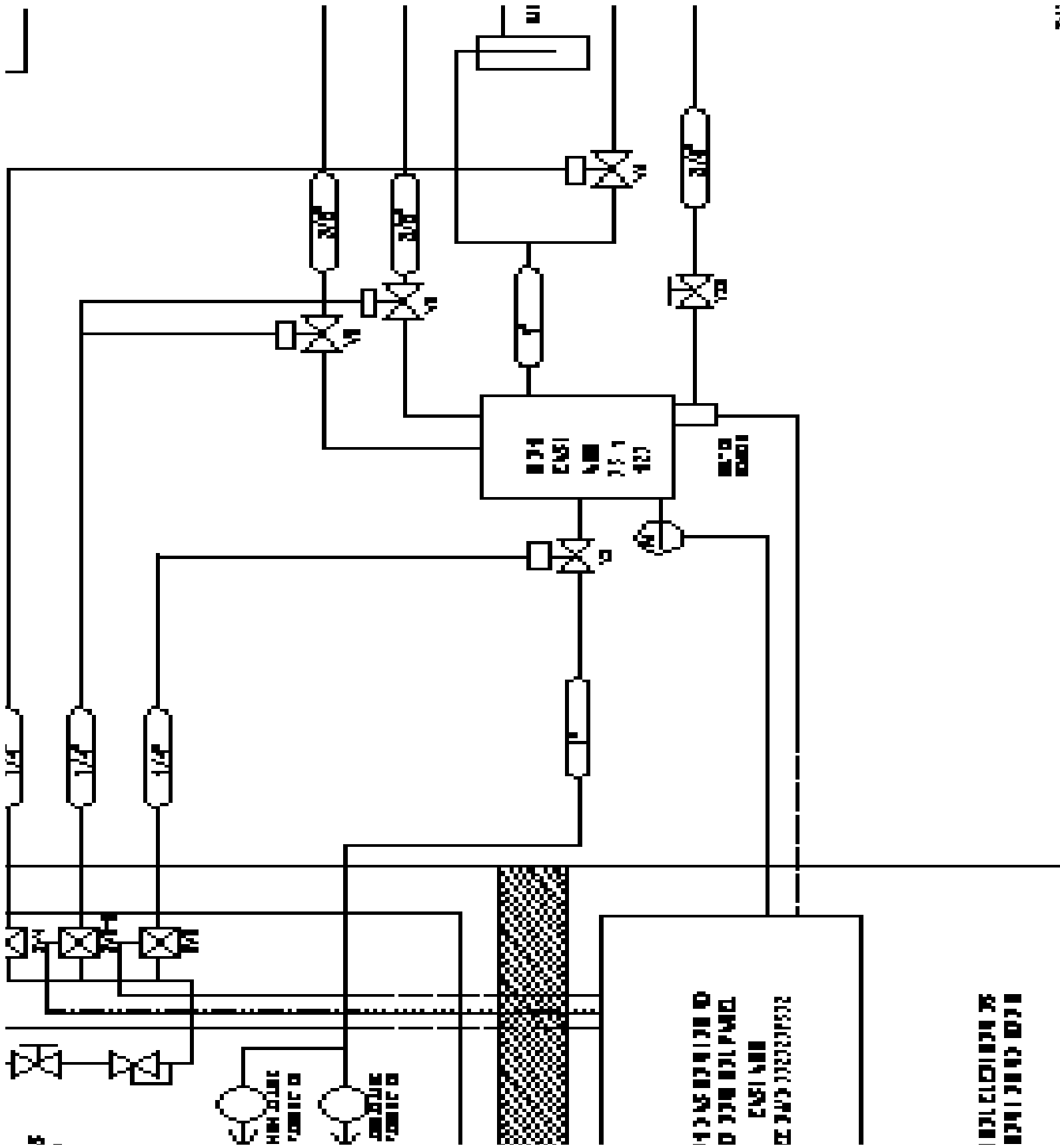


Fig. 2 RICH East arm gas system schematic.



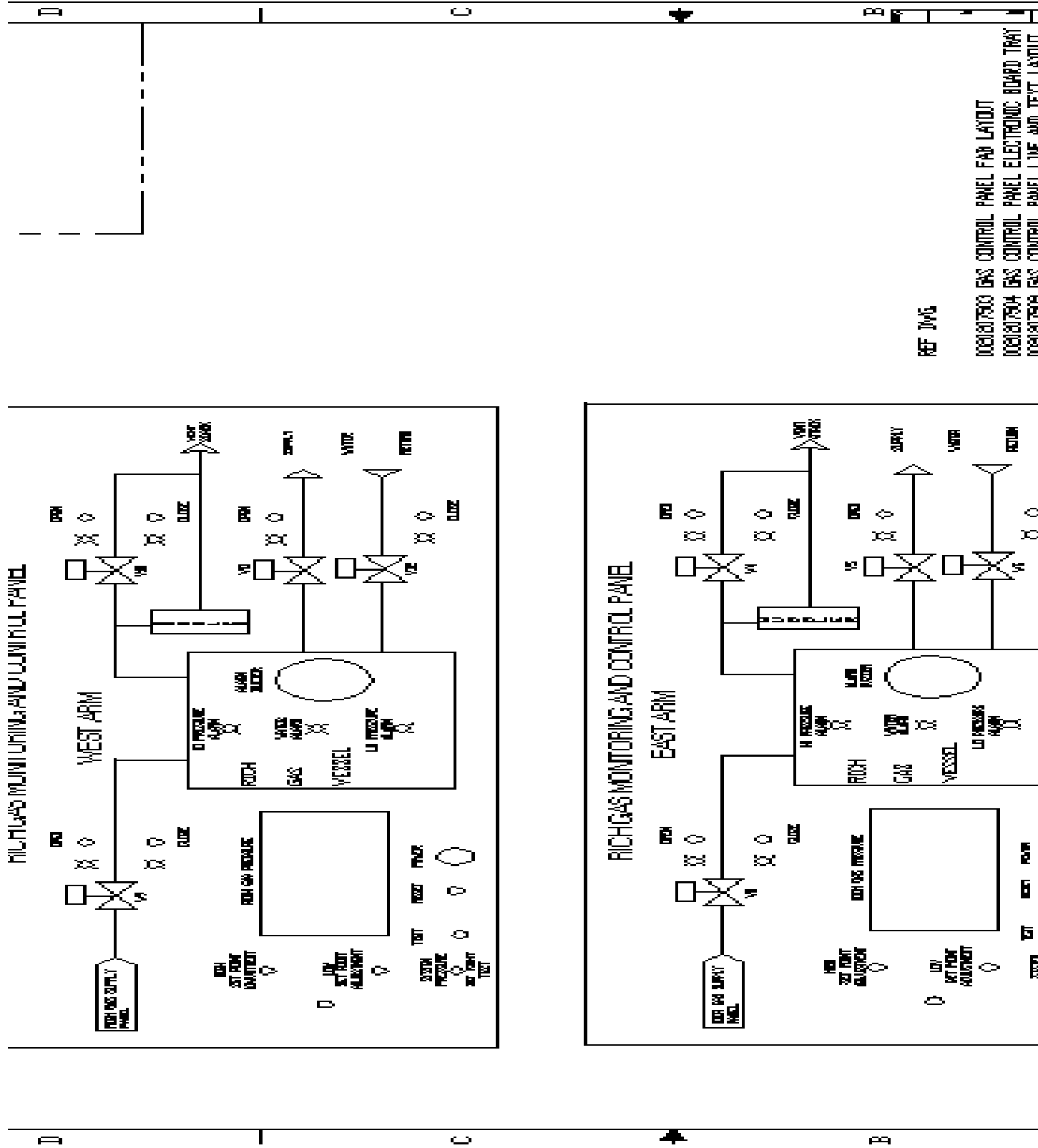


Fig. 3 RICH monitor and control system front panels.

Attachment 4: Responsible People/Operators

The following people have been trained to operate the PHENIX RICH gas system within the scope described in section 1.0 above. They have completed the prerequisite BNL training courses (see 3.1).

Tony Frawley  
Yasuyuki Akiba  
Kenta Shigaki

Additional qualified users are to be listed below and posted in the RICH gas system mixing room:

<u>Name</u>	<u>Approved by</u>	<u>Date</u>

Attachment 5. PHENIX RICH GAS SYSTEM DATA LOG SHEET:

(To be filled out once per shift and placed in Gas System Binder)

**Computer Monitored Sensors:**

**West Arm**

Sensor	Function	Value	Range	Comments
North PMT temp 1	ADAM readout of temp		15 C - 30 C	
North PMT temp 2	ADAM readout of temp		15 C - 30 C	
North PMT temp 3	ADAM readout of temp		15 C - 30 C	
South PMT temp 1	ADAM readout of temp		15 C - 30 C	
South PMT temp 2	ADAM readout of temp		15 C - 30 C	
South PMT temp 3	ADAM readout of temp		15 C - 30 C	
RICH Gas Pressure	ADAM readout of pressure		0.3 - 0.7 in wc	

**East Arm**

Sensor	Function	Value	Range	Comments
North PMT temp 1	ADAM readout of temp		15 C - 30 C	
North PMT temp 2	ADAM readout of temp		15 C - 30 C	
North PMT temp 3	ADAM readout of temp		15 C - 30 C	
South PMT temp 1	ADAM readout of temp		15 C - 30 C	
South PMT temp 2	ADAM readout of temp		15 C - 30 C	
South PMT temp 3	ADAM readout of temp		15 C - 30 C	
RICH Gas Pressure	ADAM readout of pressure		0.3 - 0.7 in wc	

**Gas Mixing House:**

**West Arm**

Sensor	Function	Value	Range	Comments
Low Vol Flowmeter	CO2 flow to west arm		0.75- 1.25 lit/min	
RICH Gas Pressure	West arm RICH pressure		0.3 - 0.7 in wc	

**East Arm**

Sensor	Function	Value	Range	Comments
Low Vol Flowmeter	CO2 flow to east arm		0.75- 1.25 lit/min	
RICH Gas Pressure	East arm RICH pressure		0.3 - 0.7 in wc	

**Gas Pad:**

CO2 Bank	Pressure		0 - 100%	
CO2 Bank	Pressure		1 or 2 or 3	

Operator \_\_\_\_\_

Date & Time \_\_\_\_\_

Attachment 6: Hardware Alarm Conditions:

**Overpressure alarm**

Results in the following automatic actions:

- Closes the RICH gas input valve (V9 west arm, V3 east arm)
- Turns on the RICH trouble light in the control room

Operator Response:

- Call a RICH expert immediately

Requires manual reset using the "reset" button on the "RICH Gas Monitoring and Control Panel" in the gas mixing house monitoring room

**Underpressure alarm**

Results in the following automatic actions:

- Turns on the RICH trouble light in the control room only

Operator response:

- Check to see that CO<sub>2</sub> gas is flowing to the RICH
- If necessary, restart gas flow to the RICH
- Call a RICH expert if the problem is not due to interrupted CO<sub>2</sub> flow to RICH

Alarm resets automatically when the RICH pressure rises above the low set point again.

**Water alarm**

Results in the following automatic actions:

- Closes the RICH cooling water valves (V11 & V12 west arm, V5 & V6 east arm)
- Turns on the RICH trouble light in the control room

Operator Response:

- Call a RICH expert immediately

Requires manual reset using the "reset" button on the "RICH Gas Monitoring and Control Panel" in the gas mixing house monitoring room.