



Electrical Solutions Corporation

2368 Eastman Ave, Suite 13, Ventura, CA 93003
Phone (805) 658-0848 ~ Fax (805) 658-0868

Gas Chromatograph Operation – Gas Company GC

Initial setup - 6 Feb 2007

The Gas Company Gas Chromatograph (GC) data now come into Wonderware and can be accessed from the *Gas Chrom* button on the Wonderware Menu Bar. The **Gas Chromatograph** page displays all the **alarms** and **shutdowns** associated with the gas chromatograph, as well as the analog values of the most important gas stream components. (More data can be found on the **Detail** page).

The Gas Company GC takes samples roughly every 8 minutes. (The actual sample rate seems to fluctuate in a 5-part cycle: 495 seconds, 495 seconds, 511 seconds, 495 seconds, 404 seconds and then repeating...) If the GC sample indicates that any of the gas values are above their Gas Company shutdown setpoints, then the **Gas Quality Shutdown** bit is set and an alarm is generated, but the Gas Shipping Valve does not shut down, yet: it takes (2) bad samples to close the valve and (1) good sample to open it back up. If the second sample is also bad, then the Gas Shipping Valve closes.

ALARMS

There are 4 alarms which are provided to give the operators a better understanding of what is going on with the GC. These are for information only. No operator action is required.

- **Low Helium** (this is used to purge / calibrate the GC)
- **Low Cal Gas** (this will invalidate the daily GC calibration)
- **AC Power** (active only after a power failure when the UPS has totally drained)
- **GC Fail** (this is a type of equipment failure)

SHUTDOWNS – NON-LATCHING

A non-latching shutdown occurs when gas quality is out of spec for 2 cycles of the Gas Company gas chromatograph. After the first cycle, an alarm is generated to alert operators to the out-of-spec condition. After the second cycle, the Shipping Valve is closed. After one good cycle, the valve is reopened.

<u>Component</u>	<u>Shutdown Setpoint</u>
O ₂	2000 ppm
CO ₂	3 %
Total Inerts	4 %
Dry BTU High	1150
Dry BTU Low	970
Benzene	200 ppm
H ₂ S	4 ppm



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SHUTDOWNS – LATCHING

Critical shutdowns do not require 2 cycles of the GC before they shutdown. In fact, they are not related to the GC at all. They indicate a serious condition which **MUST** be resolved. The Shipping Valve will be immediately closed and locked-out. This type of a “latching” shutdown requires that the operators call the Gas Co. A service technician will be dispatched. Once he has verified that the equipment is operating correctly he will reset the shutdown and the Shipping Gas Valve will open... as long as the gas quality is good.

- **High H₂S** Shutdown (this come from the Del Mar)
- **H₂S Fail** (this also comes from the Del Mar)
- **Odorant Shutdown** (this comes from the YZ Odorant Injection skid)



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Print	LACT		Gross Oil	P18 Reset	Overview	Gas Stage 1	Vapor Rec	Trends	Alarms	Bypass	ACK
Retrieve	Water		FWKO	P16 Reset		Gas Stage 2	V5	Trends		PID Loops	
Area Ric	Fire/Gas 1	Fire/Gas 2		Gas Chrom	Log On	Gas Sales	Glycol	Setpoints	Reports		

Gas Chromatograph

Detail

Seconds Since Last Update sec

Oxygen	O2	<input type="text" value="0.005"/>	ppm
CO2	CO2	<input type="text" value="2.591"/>	%
Total Inerts	Inerts	<input type="text" value="2.979"/>	%
Dry BTU	Dry BTU	<input type="text" value="1138.2"/>	%
Benzene	?	<input type="text" value="0.000"/>	ppm
Hydrogen Sulfide	H2S	<input type="text" value="1.1"/>	ppm
H2S Valve	SOV1	<input type="text" value="Open"/>	
Gas Quality Valve	SOV2	<input type="text" value="Open"/>	
	Helium	<input type="text" value="Normal"/>	Alarm
	Cal Gas	<input type="text" value="Normal"/>	Alarm
	AC Power	<input type="text" value="Normal"/>	Alarm
	GC Fail (equipment)	<input type="text" value="Normal"/>	Alarm
	GC Shutdown (gas quality)	<input type="text" value="Normal"/>	Shutdown
	High H2S Shutdown	<input type="text" value="Normal"/>	Latching
	H2S Fail	<input type="text" value="Normal"/>	Latching
	Odorant Shutdown	<input type="text" value="Normal"/>	Latching

1. The *H* button opens the **Historical Trend** window.
2. The *Detail* button opens the **Detail** window showing additional, non-critical, values for the gas stream, e.g., methane or ethane.
3. The *Gas Chrom* button opens this window (the **Gas Chromatograph** window).
4. *Seconds Since Last Update* counts the number of seconds since the PLC numbers have changed. If the PLC loses communications with the GC this number will just keep counting. Usually this number resets to 0 after 400-500 seconds.

1. The analog values of O2, CO2, Inerts, BTU, Benzene, and H2S are shown in blue. When any of these values rises above the Venoco alarm setpoints, the background changes to yellow and a process alarm is initiated.
2. There are 2 separate solenoid valves at the gas shipping area which control the same shutdown valve. If either of these SOVs are activated, the appropriate box will appear in red and the display will read Closed.

CREW	02/26/07 12:53:41	BH-SCADA2		CO2 2.54 %	N2 0.39 %	1138 BTU	332 MCFD
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Area Rate	Fire/Gas 1	Fire/Gas 2		Gas Chrom	Log On	Gas Sales	Glycol	Setpoints	Reports		

Gas Chromatograph



Detail

Seconds Since Last Update sec

Gas Company: Gas Quality Shutdowns and Alarms

	<u>Shutdown</u>	<u>Alarm</u>	<u>Alarm Clear</u>	
O2:	2,000	1,800	1,800	ppm
CO2:	3.0	2.8	2.7	%
Total Inerts:	4.0	3.5	3.4	%

Oxygen	O2	<input type="text" value="0.005"/>	ppm
CO2	CO2	<input type="text" value="2.591"/>	%
Total Inerts	Inerts	<input type="text" value="2.979"/>	%
Dry BTU	Dry BTU	<input type="text" value="1138.2"/>	%
Benzene	?	<input type="text" value="0.000"/>	ppm
Hydrogen Sulfide	H2S	<input type="text" value="1.1"/>	ppm
H2S Valve	SOV1	<input type="button" value="Open"/>	
Gas Quality Valve	SOV2	<input type="button" value="Open"/>	
	Helium	<input type="button" value="Normal"/>	Alarm
	Cal Gas	<input type="button" value="Normal"/>	Alarm
	AC Power	<input type="button" value="Normal"/>	Alarm
	GC Fail (equipment)	<input type="button" value="Normal"/>	Alarm
	GC Shutdown (gas quality)	<input type="button" value="Normal"/>	Shutdown
	High H2S Shutdown	<input type="button" value="Normal"/>	Latching S/D
	H2S Fail	<input type="button" value="Normal"/>	Latching S/D
	Odorant Shutdown	<input type="button" value="Normal"/>	Latching S/D

1. The **Alarm** and **Clear** setpoints are driven by the company PLC. These are hard-coded into the PLC, but they can be changed by the programmer if Operations decides that different setpoints will provide for better operator control.
2. The background color for the analog values is determined by the company alarm setpoints, not the Gas Co. shutdown setpoints.
3. When any of these analog values exceed the Gas Co. shutdown setpoints, an alarm is generated, and the "Gas Quality" background changes to red. The text changes from **Normal** to **Shutdown**.
4. This means that at least 1 bad sample has been detected, NOT that the sales gas valve is closed!

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Gas Chromatograph



Detail

Seconds Since Last Update sec

Gas Company: Gas Quality Shutdowns and Alarms

	<u>Shutdown</u>	<u>Alarm</u>	<u>Alarm Clear</u>	
O2:	2,000	1,900	1,800	ppm

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CO2	CO2	<input type="text" value="2.591"/>	%
Total Inerts	Inerts	<input type="text" value="2.979"/>	%
Dry BTU	Dry BTU	<input type="text" value="1138.2"/>	%
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Gas Quality Valve	SOV2	<input type="text" value="Open"/>	
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	H2S Fail	<input type="text" value="Normal"/>	Latching S/D
	Odorant Shutdown	<input type="text" value="Normal"/>	Latching S/D

1. The **Shutdown** setpoints for "Gas Quality" are driven by the Gas Co. gas chromatograph. These setpoints are not adjustable. If any of the analog values rises above its setpoint, the GC trips the Gas Quality Shutdown Bit.
2. When this happens, the background for the Gas Quality shutdown turns red. This will happen after the first bad sample to the GC, but the Gas Quality SOV will still show **Open** until after the 2nd bad sample.
3. After the second bad sample, the Gas Quality SOV will show **Closed**.
4. Once the Gas Quality at the GC clears the Gas Quality SOV will show **Open** and the "Gas Quality" will again show **Normal**.
5. At least one analog value will probably still be yellow. It will stay yellow until it drops below the Alarm Clear setpoint.

CREW

02/26/07 12:53:41

BH-SCADA2



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Gas Chromatograph



Detail

Seconds Since Last Update sec

Gas Company: Gas Quality Shutdowns and Alarms

Shutdown	Alarm	Alarm Clear
0.005	2.591	1.000
2.979	1.1	1.000

Helium, Cal Gas, AC Power, and GC Fail are Gas Co. alarms and are only provided to give the operators a better understanding of what is going on with the GC. No operator action is required.

Oxygen	O2	<input type="text" value="0.005"/>	ppm
CO2	CO2	<input type="text" value="2.591"/>	%
Total Inerts	Inerts	<input type="text" value="2.979"/>	%
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	H2S Fail	<input type="text" value="Normal"/>	Latching S/D
	Odorant Shutdown	<input type="text" value="Normal"/>	Latching S/D

1. The **Gas Quality Shutdown** is a non-latching shutdown. It takes 2 bad samples to close, 1 good sample to open. The valve opens automatically.
2. The **High H2S Shutdown, H2S Fail, and Odorant Shutdown** are all latching shutdowns. Operators need to call the Gas Co. and have them come out and reset their equipment before the Gas Shipping Valve will reopen.
3. I believe all 3 latching shutdowns will close the H2S SOV, but I am not sure. Need to verify with the Gas Co.

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