

SUBSTANTIVE POLICY STATEMENT

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Propane Injection Audit Procedure for Gordon-Darby (Variable Flow System)

Contact for information: Contract Compliance Unit

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General Description:

Auditing by propane injection is accomplished using a Critical Flow Orifice (CFO) to deliver a known amount of propane into the analyzer sample system and verifying the amount of propane using the hydrocarbon (HC) analyzer to determine the integrity of sample system. Most failures are attributed to a leaking or restricted sample system.

Note Read through this procedure carefully before you start.*

Equipment Required for Procedure:

1. State Station Procedures Manual
2. Propane, Instrument Grade (99.5 percent)
3. Regulator with CGA 510 fitting and 12" adjustable wrench
4. Critical Flow Orifice Kit and 8" adjustable wrench
5. Barometer
6. Thermometer
7. Lap Top Computer

Forms Required for Procedure:

1. Notice of State Station Equipment Failure Report.

Preparation for Audit (Before leaving VEI/ICU office)

1. Calibrate the Barometer. Follow the procedure outlined in attachment 1; Calibrating Barometer.
2. Obtain the CFO from the Contract Oversight Supervisor. The State Inspector shall

ensure the CFO is calibrated and ready for the audit. If the CFO has not been calibrated, immediately contact the Contract Oversight Supervisor.

3. Connect the battery charging attachment to the lap top, attach the mouse, Turn on, and log into the ICUs lap top computer. If unfamiliar with this procedure, see attachment 2; Lap Top Computer Set-up. Double click on the Shortcut to Propane Audits; window will open to the stations. Click on the station you our auditing.
4. This file is Read Only. To prevent inadvertent corruption of the master file. Once the file is open verify that the CFO serial number (S/N), found on the handle of the CFO case, matches the CFO Kit Number found in cell C7"of the spreadsheet. If the CFO S/N does not match the number listed in cell C7, immediately notify the Contract Oversight Supervisor
5. Telephone the station manager of each station that you will be auditing that evening and notify them that you will conducting an audit that evening. Ask the manger to ensure that position 1 is left up and the gas bottle valves be left open.

Procedure for Auditing System Integrity *(At the state station)*

1. Ensure all calibration and support gases are on, and all exhaust emissions analyzers are turned on and stabilized at operating temperature.
2. Plug in all electrical devices and turn on for stabilization (if applicable).
Using the braided steel lines:
Connect liquid propane cylinder regulator to the CFO Gas Supply; connect the propane output line to the High or large CFO output orifice and place the Turn propane cylinder on and adjust regulator for **80 psi**. Adjust **CFO pressure gauge** (display) to **40 psi** and let stabilize.
3. Insure the **printer has enough paper, and at the top of the page record the lane number, ambient temperature and the back ground number.**
4. The Gordon Darby computer should display the system main menu screen. Now depress the "M" key (managers menu) depress "F8" to bypass the Radio Frequency Identification, now enter in your code followed by the "enter" key. Then hit the "esc" key (exit). Now you should be back at the main menu from here depress the "A" key Followed by your code. Now you should be in Dos Appliance menu.

Note Look at bottom right corner of screen **EMP ID**, verify that this is **your individual number that appears.***

The **Dos Appliance menu** will now be displayed.

From the Dos Appliance menu, select "S for Service".

A message screen will appear, Dyno Lift will be lowered to Cancel

Hit ESC. The **Service Menu** will appear.

5. From the Service Menu select "**U** for Unit State Configuration". From the Unit State Configuration Menu select "**9**" for Mass and Calculated Flow"

Note-the screen displayed on the computer has the capability to manually control the Gordon Darby's analytical system. This display has two fields of control.*

To switch between these fields press "Tab". The left side of the display (analog output field) controls measurement devices that display a calculated value. The right side of the display (digital output field) controls electrical devices (solenoids, motors, switches). Areas that are highlighted on this display indicate that they are activated.

6. The analog/digital output field screen will appear.
From the analog output field, select "**E for HC (Hydrocarbon analyzer)**".
Press "**Tab**" to switch to digital output field and select "**F for (Flow Sol 1)**" and select "**P for Main Pump**".

Remove exhaust collector from hook and lay on top of wheel shock or jack stand.
DO NOT LAY TUBE ON FLOOR.

7. Adjust "**Z for Blower Out**" (located at lower right side of screen of the analog output field) until **CVS FLOW (SCFM)** (located at the bottom left of the analog output field) displays approximately 500.

Note-In the digital output field use the **UP and DOWN ARROWS** for a course adjustment and the **RIGHT and LEFT ARROWS** while pressing "**CTRL**" for fine adjustment for the voltage at "Z for Blower Out".*

*Wait for the value to stabilize at "E for HC".
When reading stabilizes, hit print screen*

Note: When reading the CFO pressure gauge the pressure is read when you can not see the reflection of the needle in the gauge mirror.

Insert the propane output manifold 8 to 12 inches inside exhaust sample collection cone.

Still in the digital output field, use the UP ARROW to adjust the voltage displayed (volts will appear in the far right column) in "**Z for Blower Output**" to (9.99) volts.

Write down on the printer paper in the printer the propane temperature. Wait for the value at "E for HC" to stabilize.

Hit print screen.

Note: All numbers you are entering are from the **Value** column.

Example of required data from Gordon Darby computers are Enter these values into the lap top:

CVS FLOW (SCFM),
E for HC (Hydrocarbon analyzer),
INLET TEMP.

Examples of required data from CFO kit are:

TEMPERATURE of PROPANE.

- Using the **DOWN ARROW**, then the **RIGHT or LEFT ARROW** while pressing "**CTRL**" adjust the voltage displayed in "**Z for Blower Out**" to the next voltage listed on the Propane Injection Audit

Record required data for each of the following settings. After each volt, **print screen**

9.99 Volts
8.00 Volts
5.00 Volts

- When Propane Injection Audit is complete remove the quick release, from the propane bottle, Enter the information into the laptop, if all lanes pass return system to original configuration by hitting **ESC** - The UNIT STATE CONFIG screen will appear.

Hit **ESC** again - The Service Menu screen will appear.

Hit **X** for exit - The service screen will appear.

A message screen may appear, Dyno Lift will be lowered @ <ESC> to Cancel

Hit ESC (if prompted to)

The Main Menu will appear.

Hit **L** to Log-off.

Hit enter and check the upper right hand corner EMP ID to ensure that your number no loner appears. The enter user code screen should appear.

The Gordon Darby computer system is now in stand by.

CALIBRATING BAROMETER

Set-up of Master Barometer

- Adjust Mercury Column:
Located at the bottom of the mercury column is a glass view port of the mercury reservoir. Inside the reservoir (visible through the view port) will be a pointed adjustment probe. A knob will be located below the view port. Adjust the knob to lower the mercury to below the end of the point on the adjustment probe, then slowly turn the knob to raise the mercury until it is just touching the end of the

probe (the end of the probe should make a small indent in the mercury).

2. **Adjust the Slide Indicator:**
Located on the side of the mercury column is a knob for adjusting the indicator. Turn the knob until the indicator is level with the top of the mercury in the column.
3. **Reading the Slide Indicator:**
On either side of the mercury column will be a graduated lines (English and Metric) look the lines displaying inches (17 to 32). Look across from the mark on the indicator to the lines to determine the inches (17 to 32), then count the marks between the inch lines up to the mark on the indicator, to determine tenths of an inch (0 to .9), look on the indicator for the lines (0 to 10) and determine which line on the indicator matches up with the line (inch side) on the side of the mercury column, the line on the indicator will determine the hundredth on an inch.
Example: first reading is 28, second reading is .6, third reading is .05 = 28.65
4. **Correction to Barometric Pressure from Master Barometer:**
The pressure reading from the Master Barometer must be corrected for temperature and gravity. Look at the Correction Tables attached to the barometer, use correction for the English readings (inches). The first page is the correction for temperature, read the thermometer on the barometer (mercury column). Match the temperature and the barometric pressure rounded to the nearest whole number (28.65 = 29) and subtract the number from the barometric pressure reading (example 78EF at 29 inches equals 0.129 from the table, $28.65 - 0.129 = 28.521$).
Now turn to the gravity correction for English measurements, the latitude for this location is approximately 33.4E, match the latitude with the barometric pressure rounded to the nearest whole number (28.65 = 29). Now subtract the number from barometric pressure reading minus the temperature correction (example 33.4E at 29 inches equals 0.032 from the table, $28.521 - 0.032 = 28.489$ or 28.49).

LAP TOP COMPUTER SET-UP

Plug in Laptop Computer and setup as follows:

1. Log-on screen will appear
*Enter your **LAN ID** user name*
2. **Hit Tab**
3. Enter your **regular password** (the one you used when you first logged-on to lap top)
Screen with Icons will appear

4. **Double click** on **Icon** called Shortcuts to April or October and (year)
6. Pick the station you are auditing

Double click on the folder containing the **month and year** of current audit
- . **Transfer** the information required from the **Propane Injection Audit Report** sheet.

Note All shaded areas on the lap top screen will require information in order to calculate the lane results.*

When all lane information has been entered.

1. Go to **file**. Hit **file save**, then **close file**.
2. Go to **Start** at lower left corner
3. Proceed with a normal Windows shut down

ZERO/SPAN ADJUSTMENTS

Note: No Zero & Span Procedure will be performed.

FAILURES AND RE-AUDITS

If any of the blower speeds fail the CVS audit, repeat the same process to perform a re-audit of the equipment within the same blower speed voltage of the original.