TENNECO POLYMERS DIVISION

AUTHORIZED OPERATING PROCEDURE

PASADENA PLANT

Procedure No.: 8
Date:

TITLE: HNU PHOTOIONIZATION DETECTOR OPERATION AND MAINTENANCE

AUTHORIZED BY:

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PURPOSE: The purpose of this procedure is to standardize the operation and maintenance of the HNU Photoionization portable hydrocarbon detector.

EQUIPMENT: The HNU Photoionization detector is an instrument designed to measure organic materials in air, with a sensitivity of less than 1 ppm and a range of 2000 ppm. The detector uses the principle of photo-ionization for detection. The sample gas stream is exposed to a sealed ultraviolet light source which ionizes the hydrocarbons to a collector electrode, where the current measured is proportional to the concentration of hydrocarbon.

The instrument has two basic parts, a hand-held probe and a readout box. The probe contains the ultraviolet light source, the ionization and detection chamber, a signal preamplifier, and a pump to draw the sample into the instrument. The readout box contains the battery power, detection and ionization electronics, and a visual readout meter.

PROCEDURE: 1.0 Startup of Instrument

1.1 Check the function switch on the control panel of the instrument and make sure that it is in the off position.

1.2 Check the probe to ensure that plastic end cap is properly secured. If not properly secured, reseat the end cap and secure into place.

1.3 Attach the probe to the readout unit via the 12 pin connector. Match the Alignment Key carefully then twist the connector until a distinct snap and lock is felt.

1.4 Turn the function switch to the battery check position. The needle on the meter should indicate a reading within or beyond the green battery arc on the scale plate. If the indication is in the lower portion of the battery arc, the instrument should be recharged prior to making any measurements. If red LED comes on, the battery should be recharged.

PROCEDURE: 1.5 A brief description of the instrument control functions is given below:

Six Position Switch	OFF - Shuts off all power and removes DC voltages.
	ON - In any other function position or measuring mode, the electronics are on.
	BATTERY CHECK - Indicates the condition of the battery. If needle position is below green battery arc, the instrument should be recharged.
	STANDBY - UV lamp is off but electronics are on. This position will conserve power and extend the useful operating time between recharges of the battery. The position is also utilized to adjust the electronic zero.
	RANGES - 0-20, 0-200, 0-2000 direct reading ranges available at minimum gain for benzene. More sensitivity is available by adjusting the span potentiometer.
Zero Potentiometer	A ten turn potentiometer is employed to adjust the zero electronically when the instrument is placed in the standby position with the probe attached. This eliminates the need for a hydrocarbon free zero gas.
Span Potentiometer	A ten turn counting potentiometer is utilized for upscale setting of the meter on calibration gas. Counter-clockwise rotation increases the sensitivity (~ 10 times). This pot can increase the sensitivity to make the instrument direct reading for nearly any gas which the instrument responds to.

2.0 Zero Adjustment

2.1 To zero the instrument, turn the function switch to the standby position and rotate the zero potentiometer until the meter reads zero. Clockwise rotation of the zero potentiometer produces an upscale deflection while counterclockwise rotation yields a downscale deflection. NOTE: No zero gas is needed, since this is an electronic zero adjustment.

2.2 Wait 15 or 20 seconds to ensure that the zero reading is stable. If not, readjust the zero.

PROCEDURE:

2.3 If the span adjustment setting is changed after the zero is set, the zero should be rechecked and adjusted, if necessary.

3.0 Calibration of Instrument

3.1 For normal operation, the span setting should be set at approximately 4.5. This will allow direct readout of vinyl chloride in ppm on all scales. If the span setting is grossly different from 4.5, the instrument should be recalibrated.

3.2 On a routine basis, the instrument should be recalibrated as follows.

3.3 Connect one side of a "T" to a pressurized container of calibration gas, another side of the "T" to a tedlar or aluminized mylar bag (0.5 or 1 liter capacity) and the third side of the "T" directly to the 8" extension to the photoionization probe.

3.4 Crack the valve of the pressurized container and fill the bag.

3.5 Close the valve and allow the instrument to sample the contents of the plastic bag.

3.6 Adjust the span pot so that the instrument is reading the exact value of the calibration gas. (If the instrument span setting is changed, the instrument should be turned back to the standby position and the electronic zero should be readjusted, if necessary.)

4.0 Battery Charging

To charge the battery, place mini phone plug into jack on left side of bezel prior to plugging charger into 120 VAC. When disconnecting charger, remove from 120 VAC before removing mini phone plug. The battery is completely recharged overnight (ca. 14 hours). To ensure that the charger is functioning, turn the function switch to the battery check position, place phone plug into jack and plug charger into AC outlet. The meter should go upscale if charger is working and is correctly inserted into the jack.

5.0 Troubleshooting

If problems occur while using the photoionization analyzer, it is recommended that the following troubleshooting guide be followed before consulting the factory.

5.1 General Aid to Fault Determination

Check battery condition. Recharge if necessary. Turn instrument on. A violet colored glow from the UV light source should be observed in all positions of the mode switch except the standby position. If unstable readings are obtained a faulty probe cable or electrical connection could be the problem. To check, hold the probe normally and flex the cable firmly. Watch the meter for fluctuations as the cable is stressed. Individual wires in the readout can be checked in a similar way. Check the coaxial connector on the amplifier board in the probe.

PROCEDURE:

In the more sensitive ranges, a fluctuation in the reading may be noted if a hand or other large object is placed in very close proximity to the probe. This is normal for the instrument and will not result in an error in the measurement as long as the probe is held stationary while the measurement is being taken.

If the probe is held close to AC power lines or power transformers an error may be observed. If measurements are to be made in close proximity to such items, their effect on measurements can be determined by the following procedure. Zero the instrument in an electrically quiet area in the standby position, then move the instrument to the questionable area involved. If AC pickup is going to be a problem, the meter (in the standby position) will indicate the magnitude of the error.

5.2 Disassembly of Instrument

Probe - Turn the function switch to the OFF position and then remove the probe connector from the readout unit. Unsnap the connectors on the side of the probe. Remove the end cap. The ionization chamber which is housed inside the end cap can then be removed. Place a hand over the end of the probe and slightly so that light source slides out into the hand. Then place two fingers inside the probe and tug gently to remove the lamp housing assembly. The amplifier board can be removed from the lamp housing assembly by unsnapping the coaxial connection and then removing the retaining screw.

To reassemble this unit, place lamp housing assembly into probe taking care to align the fan exhaust extension with the vent hole in the probe. Slide assembly all the way in. Replace the lamp housing or the ion chamber will not go into place. (This piece will only go on one way.) If there is any problem getting it on, make sure that it is correctly aligned. Place end cap on probe assembly, align and snap fasteners into place.

Readout Unit - Turn the function switch to the OFF position and disconnect the probe from the readout unit before any disassembly is conducted. To remove the case, loosen the screw on the bottom of the case and, holding the instrument by the bezel, remove the case. The power supply board can be removed by removing two screws and two nuts. The entire panel including the function switch and zero and span pots is removed in this operation. No soldering is necessary to electrically disconnect this module since all connections are made with molex connectors.

5.3 Specific Faults

1. No meter response in any switch position (including BATT CHK)

   A. Broken meter movement

      (1) Tip instrument rapidly from side to side. Meter needle should move freely, and return to zero.

PROCEDURE:

B. Electrical connection to meter is broken

(1) Check all wires leading to meter and clean the contacts of quick-disconnects.

C. Battery is completely dead

(1) Disconnect battery and check voltage with a volt-ohm meter.

D. If none of the above solves the problem, consult the factory.

2. Meter responds in BATT CHK position, but reads zero or near zero for all others

A. Power supply defective

(1) Check power supply voltages per Figure 11. If any voltage is out of specification, consult the factory.

B. Input transistor or amplifier has failed

(1) Rotate zero control; meter should deflect up/down as control is turned.

(2) Open probe. Both transistors should be fully seated in sockets.

C. Input signal connection broken in probe or readout

(1) Check input connector on printed circuit board. Should be firmly pressed down.

(2) Check components on back side of printed circuit board. All connections should be solid, and no wires should touch any other object.

(3) Check all wires in readout for solid connections.

3. Instrument responds correctly in BATT CHK, and STBY, but not in Measuring mode.

A. Check to see that light source is on. (See General Faults section.)

(1) Check high voltage power supply (see Figure 11).

(2) Open end of probe, remove lamp and check high voltage on lamp contact ring.

(3) If high voltage is present at all above points, light source has most likely failed. Consult the factory.

4. Instrument responds correctly in all positions, but signal is lower than expected.

A. Check span setting for correct value.

B. Clean window of light source.

PROCEDURE:

C. Double check preparation of standards.

D. Check power supply 180 V output. See Figure 11.

E. Check for proper fan operation. Check fan voltage. See Figure 11.

5. Instrument responds in all switch positions, but is noisy (erratic meter movement.

A. Open circuit in feedback circuit. Consult factory.

B. Open circuit in cable shield or probe shield. Consult the factory.

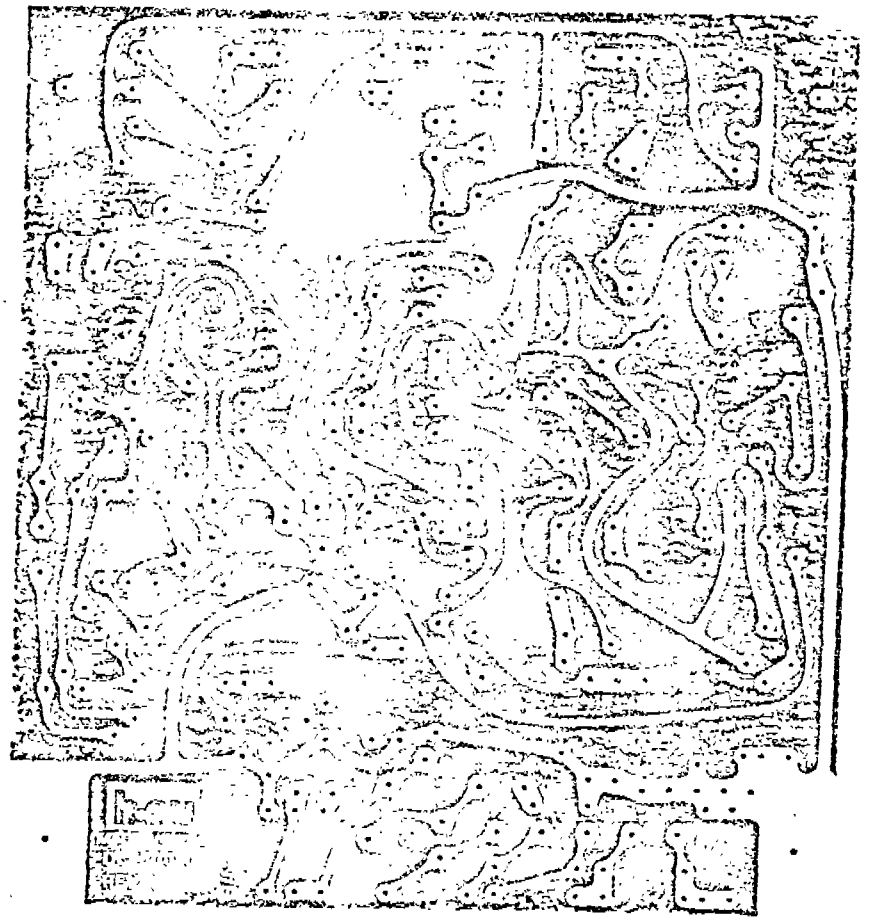
6. Instrument response is slow and/or irreproducible.

A. Fan operating improperly. Check fan voltage. See Figure 11.

B. Check calibration and operation.

1. All voltages measured with probe connected and instrument mode switch in BATT CHK position.

2. All measurements referred to ground (Pads 1, 2, 3, and 27) except Pad 21 measured to Pad 19.



ad 8
1 Volts

Pad 17
+180 to 185 Volts

Pad 18
+18 to +21 Volts

Pad 20
-9.5 to -10.5 Volts

Pad 21 to 19
(19 low side)
(4.5 to 5.5 Volts)

Figure 11. Power Supply PC Board.

3/26/79

1200 — 240 [illegible]
300 — 480 F

[illegible] 75 Emission Inventory 21 TPY (150 [illegible])
79 2 TPY

Jan EPA
[illegible] TEXPA [illegible] 007
[illegible] control
[illegible] [illegible] file for review
5th Circuit Court

[illegible] delay
proper procedures public hearing
$1500-3000

3/26/79

VCM Emissions

Burkeville

	1975	1976	After S.D.
Reactor Exhaust	70	41.0	41.0
Stripper	64.5	"	"
Vent Condenser	78.80	—	—
Dryer Train	320.90	65.0	63.85
Misc Exhaust Streams	15.80	7.9	7.90
	550.00	73.90	72.75

Pasadena

	Before S/D	After S/D
Reactor	21.0	2
Strip/Dry	288.0	72
Misc @ 5%	14.4	3.6
	323.4	77.6

Fleming-Todd

Reactor	39.7	2.9
S/D	30.9	18.0
Vent Condenser	45	0.03
	115.6	18.93