

# Appendix C

## Air Sampling Procedures

### Lumidor MicroMax -Operating and Calibration instructions

The MicroMax you will use in confined space entries is set up as a four gas detector — oxygen, combustible gas, carbon monoxide and hydrogen sulfide. The Campus model has an internal pump which brings a steady stream of air into contact with the built in gas sensors. It will provide continuous feedback on the concentrations of these four gases and will alarm when acceptable limits are exceeded for any of these gases. It must be used whenever a Campus employee enters a space designated as a permit-required confined space.

#### Operating Instructions:

1. If unit is not fully charged, install fresh alkaline batteries before turning on. To turn on press the On/OFF switch until the word "ON" appears on the display.
2. Unit will go through a "Self-Test" and "Auto Zero" which will take approximately 45 seconds. After completing these two functions, the alarm setpoints are displayed and then the current readings for the four gases (oxygen, combustible gas (LEL), carbon monoxide and hydrogen sulfide) will be displayed.
3. If unit has not been calibrated within the last 30 days, calibrate the unit following the Calibration instructions below.
4. The unit will continue to provide current readings for the four gases until shut off. While unit is operating it is possible to obtain additional information by cycling through the mode functions. This is done by depressing the "MODE" switch. There are five modes:
  - a. Battery voltage provides information about the current battery voltage. Full charge is 2.5-2.7 volts. The battery alarm will come on at 2.1 volts and low battery fail occurs at 1.9 volts. Elapsed time is also displayed in this mode.
  - b. Peak (P) mode displays the peak readings for combustible gas, carbon monoxide and hydrogen sulfide and the lowest oxygen reading. You can clear these readings by depressing the ON/OFF switch while in this mode.
  - c. STEL (S) mode will provide the short term exposure limit values for each of the gases.
  - d. TWA (A) mode will provide the time weighted average for oxygen, combustible gas (LEL), carbon monoxide and hydrogen sulfide.
  - e. Clear memory mode allows you to clear the Peak, STEL and TWA values from the memory. While in the mode, depress the ON/OFF switch to clear these values.

Press the MODE switch to move from one function to another or wait 15 seconds and the unit will automatically return to the current readings.

6. Alarms — Whenever the unit goes into alarm mode, evacuate the area immediately. The unit will alarm in the following situations:

- a. One or more gas concentrations exceed the set alarm limit. You will hear an audible alarm and see two visual alarms — a flashing red LED and a flashing display which alternates between gas ranges and "ALM"
  - b. Low battery warning which occurs when battery voltage drops to 2.1 v. You will hear a beep every 15 seconds which means you have approximately 15 minutes of operation left before the unit shuts down.
  - c. Low battery alarm which occurs when battery voltage reaching 1.9 V. You will hear a constant audible and visual alarm for 10 seconds and then the unit shuts down.
  - d. Low flow alarm occurs when the flow rate drops below an acceptable level.
  - e. Sensor fail alarm occurs during startup, calibration or operation when the sensor voltage drops below an acceptable level.
6. Turn the unit off by pressing and holding the ON/OFF switch until 5 or 6 beeps occur and beeping tone changes to a steady tone, then release.

Calibration — Unit must be calibrated every 30 days or before each use.

1. Make sure unit is in a clean air environment and fully charged.
2. Use hex wrench to remove calibration port screw.
3. Turn monitor on.
4. With monitor in operating mode, use hex wrench to tap switch inside the post once. Monitor will beep and display will read "CALIBRATING."
5. After 30 seconds, tap switch again and display will read "APPLY GAS."
6. Attach regulator to the GFV207 gas cylinder. Turn regulator valve on to release gas, and with gas flowing, connect hose to inlet on monitor. Allow gas to flow for 2 minutes when calibrating the sensors.
7. Before removing the gas, tap the calibration switch again at which time the display should indicate the gas levels of the calibration gas cylinder. Monitor will then return to normal operating mode.
8. Remove hose from monitor and turn gas valve off.
9. Remove regulator from gas cylinder.
10. Clear memory.
11. Replace calibration port screw.

Please see MicroMax Operator's Manual for additional information.

Sampling an area prior to entry:

1. Turn MicroMax on in fresh air and allow to cycle through the self-test and auto zero functions.
2. Calibrate unit if it has not been calibrated within the last 30 days.

3. Attach 10 foot hose to the unit inlet.
4. For vertical entry, lower hose to within 1 foot of the bottom surface of space to be entered. Wait two minutes and take readings. Raise hose two feet, wait two minutes and take readings. Repeat this process until entire vertical space has been sampled at 2 foot intervals. Note: When entry to a confined space is by means of a manhole or vertical shaft, the cover must be pried open on the downwind side to allow just enough room for insertion of the hose.
5. For horizontal entry, insert hose into area of confined space where work will be done without breaking plane of confined space with body. Wait two minutes and take readings. Sample horizontal entry route at two foot intervals waiting two minutes each time before taking readings.