

# ROCIS Low-Cost Monitoring Project

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## **Equipment Summary & Features**

### **DYLOS 1700 AIR QUALITY MONITOR (3 per kit)**

- ✓ According to the Dylos literature, it measures particles above 0.5 microns “Dylos small particle count” & above 2.5 microns “Dylos large particle count.” Particles are measured in microns ( $\mu\text{m}$ ), by count. *NOTE: Human hair is 60-70  $\mu\text{m}$  in diameter.*
- ✓ The scale (on back of monitor) “excellent to poor” only relates to the small particle scale
- ✓ Can store up to 1 week of minute data before overwriting it
- ✓ Can run on battery for short period (~2 hours)
- ✓ Manual view (toggle through “mode” button) can provide minute average counts for the past 60 minutes, the hourly average counts for the past 24 hours or the daily average counts for the past 30 days
- ✓ For more info: <http://www.dylosproducts.com/dc1700.html>

### **AIRTHINGS DIGITAL RADON MONITOR (2 per kit)**

- ✓ Provides 1-day, 7-day, & long-term average radon levels (reading switches back & forth)
- ✓ Measures radon concentration in pico-Curie’s per Litre
- ✓ No data logging or downloading option
- ✓ We recommend not moving for the 3-week duration; reset data only if you change location
- ✓ For more info: <http://www.airthings.com>

### **CO MONITOR (Experts Model 2015) (1-2 per kit)**

- ✓ Monitors low level carbon monoxide (CO) down to 7 part per million (ppm)
- ✓ Conventional US residential CO alarms do NOT measure levels of CO below 60 ppm
- ✓ No data logging or downloading option
- ✓ Can view CO levels over time to identify the time of the incident
- ✓ Ideally the CO monitor should read “0” at all times
- ✓ Sources of CO are combustion appliances (space & water heaters, dryers, cook stoves, wood stoves, & fireplaces), indoor smoking, & vehicles in attached garages
- ✓ For more info: <http://coexperts.com/>

### **CO<sub>2</sub> MONITOR (TIM12 Datalogging Meter) (1 per kit)**

- ✓ CO<sub>2</sub> is an indication of the ventilation rate & occupancy of a building
- ✓ CO<sub>2</sub> levels will vary with occupancy – CO<sub>2</sub> goes up when more people are present
- ✓ This CO<sub>2</sub> monitor stores CO<sub>2</sub>, temperature, & RH; (1 month @ 15 minute resolution)
- ✓ Note: some settings can be lost when monitor is unplugged for an extended period
- ✓ Confirm your monitor shows the correct date & time stamp, & that “rec” is visible on the screen
- ✓ For more information: [www.co2meter.com](http://www.co2meter.com)

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**Equipment Locations** *(If indoors, place in breathing zone, 3 to 4 1/2' above the floor)*

**Basement – or Lowest Level**

Radon and CO monitor. Both monitors run on batteries.

**Outside in a Secure and Sheltered Place**

Outside (O) Dylos monitor. Both require electricity. Place 18" apart

**Primary Living or Work Area**

Indoor (I) Dylos and radon monitors. Electricity needed for Dylos. Place 12" apart

**Master Bedroom (or Other Bedroom) or Workplace Conference Room**

CO<sub>2</sub> meter and Roamer (R) Dylos. Both require electricity. Place 12" apart

## **Instructions on Equipment Set-up**

**Radon Monitor:** Push reset (on back). Radon monitors will calibrate for 24 hours, and then begin registering. Initially there will be no reading. Do not ever remove the batteries. *Note: the bottom of the two readings alternates between the "1 day" and "7 days" readings. It takes five seconds between switches and sometimes both readings will be the same.*

**CO Monitor:** If not already on, slide on back plate to switch on internal battery. Monitor will beep once when turned on or when "test" button is pushed. Move the CO monitor to areas where combustion appliances, wood stoves, fireplaces, and gas cook stoves are located, as well as in an attached garage.

**CO<sub>2</sub> Monitor:** Plug it in. Follow CO<sub>2</sub> Setup Instructions (yellow) to set time and date, turn alarm off, set logging frequency to 15 minutes, and set to record. The display will alternately flash "REC" and a number (CO<sub>2</sub>). If it reads "0" or error hit the reset button.

**Dylos:** Plug it in. Make sure the button on right is pushed in at the top. Operate in "Continuous" mode. The numbers will bounce around in this mode. The 3<sup>rd</sup> Dylos can also be used to check calibration of the other Dylos monitors.

## **Air Quality – How Good is Good Enough?**

**Radon:** 4 pCi/L (measured in the lowest living area) is the US EPA action level; WHO (the World Health Organization) recommends 2.1 pCi/L max, and notes that there is no threshold of safe exposure.

**CO (Carbon Monoxide):** various health organizations have set CO guidelines at 25 ppm maximum for 1 hour and 10 ppm maximum for 8 hours or longer. We recommend that, if CO is detected, its source be identified and corrected so that there is no detectable CO.

**CO<sub>2</sub> (Carbon Dioxide):** is commonly used as an indicator of the ventilation rate of a building. It is not considered harmful in levels found in a building; though greater alertness & productivity have been associated with levels under 1,000 PPM. Recent studies indicate possible benefits at ~700 PPM. Higher levels of CO<sub>2</sub> (2,000 - 3,000 PPM) can make you drowsy (crowded conference room).

**Particles:** Ideally, both large (Dylos) and small (Dylos) particle readings would consistently be in the good range. There is very strong evidence that increased levels of particles in outdoor environments are correlated with higher hospital admissions and mortality for those with respiratory illnesses. What is being measured in your home does not necessarily correspond to the particle size or methods used in health studies. If we follow the precautionary principle, lower particles counts are better. We do not know how much of an effect these reductions will have on health outcomes.

**Everything Else:** Many pollutants are expensive to measure. An absence of a detectable problem with the low cost monitors we are using ***does not mean one has good air quality!***