

## DATA SHEET

### **CARBON MONOXIDE & CO DETECTORS**

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The acute high level affects effects of carbon monoxide (CO) are well known-- headache, nausea, vomiting, bright red nail beds and lips, and eventually collapse and death. However there are more subtle effects at lower levels. These include:

**CENTRAL NERVOUS SYSTEM EFFECTS.** The behaviors most sensitive to disruption from CO are those requiring sustained attention or performance such as fine motor skills and reaction time. There is consistent evidence that these effects occur at when carbon monoxide levels in the blood are only a few percentage points above normal. Accidents are more likely at these levels.

**EFFECTS ON THE FETUS.** The fetus may be particularly vulnerable to the toxic effects of CO exposure because fetal development often occurs at or near critical tissue oxygenation levels. Fetal COHb levels tend to be naturally elevated due to differences in uptake and elimination of CO from fetal hemoglobin.

There is no experimental data on the fetus for obvious ethical reasons. However, maternal smoking has been associated with a number of adverse health effects, many of which can be attributed to very high amount of CO (500-1000 parts per million) in cigarette smoke. These effects include spontaneous abortion and subsequent fetal death due to low birth weight, increased numbers of hospital admissions during the first 5 years of life, and poorer than predicted school performance during the first 11 years of life.

## AIR QUALITY STANDARDS

**WORKPLACE LIMITS** The Occupational Safety and Health Administration (OSHA) has a permissible exposure limit (PEL) for an eight hour work day of 50 part per million (ppm). In 1989, OSHA tried to lower their PEL to a safer level of 35 ppm. A coalition of industries took OSHA to court and had the 1989 PELs set aside and the PELs reverted to the old limits.

More reasonable workplace standards are those of the American Conference of Governmental Industrial Hygienists. Their Threshold Limit Value for the eight hour work day is 25 ppm. But these levels are designed to protect only most healthy adult workers. For protection of more diverse types of people, we must turn to the Environmental Protection Agency's (EPA) standards.

EPA STANDARDS In 1999, EPA set air quality index reporting guidelines for CO which state health officials can use to inform people about air quality. The table below shows that the OSHA 8-hour limit of 50 ppm is considered Ahazardous@ by EPA for the general public.

#### EPA AIR QUALITY INDEX (AQI)- SUB INDEX FOR CO <sup>1</sup>

description	8-hour limit in ppm
good	0-4.4
moderate	4.5-9.4
unhealthy for sensitive groups	9.5-12.4
unhealthy	12.5-15.4
very unhealthy	15.5-30.4
hazardous	30.4-50.4

#### CARBON MONOXIDE DETECTORS

A few years ago, inexpensive CO detectors like Nighthawk7 and First Alert7 were introduced. These detectors originally were set to alarm at the following levels:

##### OLD HOUSEHOLD CO DETECTOR LIMITS:

- 16 ppm averaged over 30 days;
- 60 ppm averaged over 28 minutes; and
- 100 ppm averaged over 16 minutes; etc.

Even the lowest level at which the these detectors alarm is considered "unhealthy" by the EPA.

But then things got even worse. Because the detectors alarmed frequently, homeowners kept calling fire and emergency services. Emergency services complained about these calls because the levels they measured when they got to these homes were not immediately life-threatening. The manufacturers and the Underwriters Laboratory (UL) responded by setting even higher limits. These current limits are:

##### NEW HOUSEHOLD CO DETECTOR LIMITS:

- 100 ppm averaged for less than 90 minutes;
- 200 ppm averaged for less than 35 minutes; and
- 400 ppm averaged for less than 15 minutes.

At these levels, your CO detector will alarm in time to save your life, but certainly not your health.

A BETTER MONITOR At last, a manufacturer has addressed this problem and has produced a monitor that displays CO concentrations from 5 ppm to 70 ppm. And it has three types of alarms which are triggered by CO at concentrations that can affect your health.

#### AEROMEDIX CO DETECTOR LIMITS

LEVELS	ALARM
10 to 25 ppm peak limits*	beeps and flashes every 60 seconds
25 to 50 ppm peak limits*	beeps and flashes every 10 seconds
50 ppm averaged for 1 hour or 70 ppm averaged for 15 min.	high-level alarm of beeps & flashes every 6 seconds

\* peak limits are instantaneous readings as opposed to the higher readings which are concentrations averaged over time.

Because the unit begins to alarm at 10 ppm, people may not want to buy the monitors if they live or work in areas where outdoor carbon monoxide concentrations are commonly at 10 ppm and above where the monitors would always be beeping. This includes areas of the country near heavy manufacturing or concentrated vehicle traffic. Call your local department of environmental protection and ask what the average outdoor CO levels are.

#### RECOMMENDATIONS

If you have heart problems or are pregnant, avoid spending any time at all in locations where carbon monoxide is generated. Children also should never be in locations in which carbon monoxide or other combustion emissions are present in any quantity.

Equip all areas in which CO could be generated with a monitor that has detection limits that will protect your health, not just your life. There are three ways you can do this:

1. Buy an inexpensive CO detector like the Nighthawk7 which has a digital display of CO concentrations for about \$55. Push the button to see the highest peak reading. Reset the detector when the peak is high and see how long it takes to get back to that level.<sup>2</sup>
2. Buy the Aeromedix monitor for about \$100. It will automatically monitor both peak levels and the average concentrations. Contact Aeromedix, P.O. Box 14730 982 West Broadway, Jackson Hole WY 83001, 307/732-2542, or visit [www.aeromedix.com](http://www.aeromedix.com)
3. Buy one of the continuous reading and recording CO monitors that are available in the range of \$500 to \$3000. These are useful you need a record of CO levels. Artists wishing use these high tech detectors may call me and I'll provide information on several of these products.

## FOOTNOTES:

1. The AQIs were published in the Federal Register: 64 FR 42529-42573, August 4, 1999 and these are the updated version from 73 FR 164354-165-14, March 27, 2008.
2. Neither Local 829, ACTS nor I benefit financially from my recommendations. We do not take donations, gifts, grants or advertising from manufacturers or distributors. In making this recommendation I have looked at data presented by the manufacturer which, to the best of my knowledge, I believe to be accurate.