

## **The Long Haul by Tom Stetter, Transducer Technology, Inc.**

The trucking industry employs over 9 million Americans and 227,000 Canadians, making it one of the top occupations in both countries. In fact, according to Statistics Canada, the occupation of truck driver is the most frequently cited among Canadian men. These almost 10 million highly skilled and constantly tested drivers work on average 60 hours a week, according to the U.S. Department of Labor, to contribute to a revenue stream approaching the trillions of dollars every year. With so many drivers on the road, in garages, and at fuel stations, one would think that carbon monoxide exposure would be a top priority. In fact it is exactly the opposite. A blown tire, dead battery, or faulty air line, while all still dangerous, vastly outweigh CO exposure as a top worry among drivers. Truckinfo.net says 51% percent of truckers are worried about shredding a tire compared to less than 1% concerned about carbon monoxide poisoning. This is not because truck drivers are uneducated, rather, it is due to a lack of awareness about what carbon monoxide is, how often exposure can happen, and how dangerous it can really be. This awareness should be provided by OSHA, the EPA, and our employers and employer organizations, but sometimes unfortunately it is not.

Carbon monoxide is an odorless, colorless, tasteless, and highly toxic gas. Because of this, it can kill you before you are even aware it is there. Carbon monoxide is produced by incomplete oxidation of carbon in combustion. Simply put, CO can be produced by virtually any source of combustion, from vehicle engines and poorly burning or improperly vented kerosene and gas heaters or generators, to cigarettes, faulty furnaces, campfires, and charcoal grilles among hundreds of other sources. For most truck drivers, the greatest threat is from diesel exhaust, whether exposure happens inside the cab of a truck from a cracked header, or outside the vehicle by running it inside a garage.

Carbon monoxide works by combining reversibly with hemoglobin in the bloodstream, creating carboxyhemoglobin. This causes a reduction in the amount of oxygen your blood can carry to the tissues of your body. At low concentrations, an exposed person may experience flu-like symptoms like fatigue, headache, nausea, dizziness, and irritability. As exposure increases, symptoms such as impaired brain function, confusion, chest pain, and eventually unconsciousness set in. Continued exposure at very high concentrations can be fatal within minutes.

Therefore, OSHA (Occupational Safety and Health Administration), NIOSH (National Institute for Occupational Safety and Health), ACGIH (American Conference of Governmental Industrial Hygienists), and other agencies issued Permissible Exposure Limits for carbon monoxide. These exposure limits are expressed in terms of ppm (parts per million) which basically means one part CO in one million parts air. The OSHA limit is 50 ppm as a time-weighted average, the NIOSH limit is 35 ppm as a time-weighted average with a 200 ppm ceiling value, and the ACGIH limit is 25 ppm as a time-weighted average for a normal 8-hour workday or 40-hour work week, which we all know would virtually be a vacation for most truckers. These limits were established because even at these low concentrations, people will begin to see the symptoms of CO poisoning and some people are more sensitive to exposure than others. To put this in perspective, if you

were to open your window on the highway in fairly heavy, slow-moving traffic, you could easily be exposed to somewhere between 10 ppm and 45 ppm of CO. You may experience a headache (which you most likely would attribute to frustration over the traffic conditions), mild dizziness, or mild nausea. Now imagine a truck driver being exposed to those conditions 10 or more hours a day, 6 days a week. Fortunately, we do get some open road time, and if the truck is not contributing to the exposure, the clean fresh air will help clear out the carbon monoxide that is present. But, you can see how chronic CO exposure at this level can become problematic, not to mention what would happen if a crack in your exhaust header, a near worst-case scenario, caused diesel exhaust to pour into the cab of your truck. The result could be catastrophic to both the driver and the other vehicles on the road.

Now don't get me wrong, I am not in the business of trying to scare people, rather, I am in the business of educating those of you who are not aware of this potential danger. It is a real possibility, and every effort should be made to avoid excessive CO exposure. Fortunately there are readily available products out there that can alert you if you are in imminent threat of carbon monoxide exposure and poisoning. Your easiest line of defense is a CO detector that can warn you when exposure occurs so you can minimize it and avoid it.

Carbon monoxide detectors come in all shapes and sizes, all for various applications, from plug-in models for the home, to high tech, industrial grade instruments for more stringent laboratory and occupational environments. With all the choices in CO detectors out there, it is hard to tell what to look for when you are going to make that purchase. Here are the most important things to consider when buying a carbon monoxide detector:

1. Cost. I know the number one concern for a truck driver is cost, especially those of you who are owner-operators. Every dollar spent is one more dollar out of your or your company's pocket. Now CO detectors can range in price from \$20 to almost \$1000 for the super advanced models, and many times, you truly do get what you pay for. A truck driver doesn't necessarily need all the bells and whistles on a \$1000 model, so take that out of the equation completely. Now on the low end you are looking at a detector with limited capabilities, sometimes not alarming until well over the recommended exposure limits, if at all, and most of those "cheap" detectors will also alarm if they come in contact with something as harmless as water vapor. Look for a detector in the \$100 to \$200 range. There are many out there to choose from, but in this price range you will find the best combination of affordability, accuracy, reliability, and operational features. This may sound like a lot of money for a CO detector when home versions go for \$20 or \$30, and we don't want to break the bank, but ask yourself at what value do I put my health and safety?

2. Portability. As a driver, you are constantly on the move, not only in your vehicle, but outside of it as well, whether you are refueling or pushing a load onto the docks while your truck idles away in the garage. Look for a CO detector that is small enough to carry with you, on a lanyard, on your belt, or clipped to your shirt pocket. You are not going to want to carry around a CO detector the size of a Big Mac attached to your chest, let alone

trying to find an out-of-the-way place to stick it inside your cab. The smaller size detector will hardly be noticeable, until of course the alarm goes off, warning you of dangerous levels of carbon monoxide.

3. Alarm. Speaking of the alarm, you should look for a detector with at least an 85dB alarm. Even better if the detector has multiple alarms such as a flashing LED and/or a vibrator alarm like a cell phone. If the LED and vibration don't get your attention, the 85dB will certainly do the trick, even if you are at highway speed with the stereo blasting "Sweet Home Alabama". These alarms should also be set to sound when your exposure exceeds the recommended OSHA, ACGIH, or NIOSH air quality standards. You can usually find that information from the individual product descriptions. Beware of detectors that do not give you that information, usually those are substandard detectors that may not sound until the level reaches close to 100 ppm, which may already be too late, depending on how long you have been exposed to that level. Ideally, your CO detector should have all the alarm settings above, and let you know.

4. Sensitivity. Find a detector that says it is a "low-level" CO detector. You want the detector to be able to read at least down to 5 ppm so you can see exactly how much CO you are being exposed to, and potentially fix any problems before they get to the "alarm" level. The digital display (yes, it must have a digital display) should also be able to read up to 400 ppm. Any higher, and it doesn't really matter what the exact concentration is, it's bad news and you need to get to fresh air fast.

5. Features. Many of the high-priced CO detectors come with a myriad of different features, most of which will never be used by the average driver. Not to worry, there are only a few must have capabilities that you need to look for in a carbon monoxide detector. Not only should it have a digital display telling you how much CO you are being exposed to as I mentioned above, it should also have dosimeter capabilities, meaning it should be able to tell you what your total "dose" of CO was over the time you were measuring. A detector should be advanced enough to tell you the time-weighted average exposure (NIOSH, ACGIH, and OSHA all set limits in these terms), the total exposure over a period of time, the maximum exposure during that time, and when that maximum concentration occurred during that time period or similar parameters. Only with these features can you get a realistic picture of how much CO you are being exposed to as well as where you were when the exposure happened so you can prevent yourself being poisoned repeatedly. The detector should also have different time modes, such as one that gives you short term readings immediately for on the spot CO checks, and another mode, 8 to 10 hours for example, so you can get a solid picture of exposure during an entire workday. And it should be simple to operate, don't buy a detector with a 300 page manual and 16 buttons on the front; look for simplicity. There are a few detectors in this price range that feature single button operation which is very easy to use.

6. Manufacturer. Don't get caught up in only looking at the big-box retailers when choosing a CO detector. Look around, do your research (the internet is a great place to start), and you will come out ahead of the game. Because CO detector technology is advancing so rapidly, many times the smaller companies will be able to offer a better

product at a lower price. Those smaller companies tend to have a narrower product and industry focus plus low overhead, leading to the most cutting edge technology being offered in their reasonably priced detectors. After all, these small companies are trying to compete with the big boys, so they are forced to work extra hard to produce an affordable, superior product. Don't overlook the little guy.

I realize that this is a lot of information to digest, but it is so vital to getting the most for your hard-earned money. Keep these suggestions in mind when you go shopping and you won't be sorry.

Carbon monoxide is a problem that faces every one of the millions of truck drivers on the road all over the world. Through education, prevention, and a little good old common sense, you can steer clear of the dangers of carbon monoxide. The first step is go get a good CO detector, that way you can stay on the road, and well ahead of this "silent killer". Drive safely, and happy trails.

Trucking Stats, Truckinfo.net, [www.truckinfo.net/trucking/stats.htm](http://www.truckinfo.net/trucking/stats.htm) Occupational Outlook Handbook 2006-07 Ed., U.S. Department of Labor, Bureau of Labor Statistics, [www.bls.gov/oco/print/ocos246.htm](http://www.bls.gov/oco/print/ocos246.htm) Environmental Protection Agency, An Introduction to IAQ, [www.epa.gov/iaq/co.html](http://www.epa.gov/iaq/co.html) Occupational Safety and Health Guidelines for Carbon Monoxide, U.S. Department of Labor, Occupational Safety and Health Administration, [www.osha.gov/SLTC/healthguidelines/carbonmonoxide/recognition.htm](http://www.osha.gov/SLTC/healthguidelines/carbonmonoxide/recognition.htm)