THIS WEEK IN TRAINING

CO INCIDENTS, DETECTORS & OUR METERS

It seems we are responding to a lot of nonsense calls. Automatic alarms by the hundreds, Carbon Monoxide (CO) calls too. But if you really think about it, about 1/3 of the CO calls we respond too, that's 1 in 3, we get readings and something has malfunctioned in the house. It's our job to figure out what it is that is causing the deadly gas to leak and our responsibility to know how & what can be a source, how to use our meters and how a CO detector actually works.

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Incidents

On every incident in which we find readings, a source must be identified and removed from service. We've all been on enough of these calls to know that. The issue is, however, some of us, because were not on *every* call may not realize what can be a source. I walked down into a basement on one occasion and junior firefighter was telling the homeowner that because the furnace was natural gas, it couldn't be a source. When I pulled the firefighter aside and explained to him that what he was telling the homeowner was wrong and asked him where he had heard that, he stated he was on another call where that's what the officer on the call told the homeowner on that particular occasion.

With this thought in mind although it may be basic, it should be explained that ANYTHING that emits a flame emits Carbon Monoxide. Carbon Monoxide is a byproduct of combustion…any combustion. Anything that burns, emits CO. Whether it's an oil burning appliance, natural gas or propane, it does not matter. So, stoves, boilers, ovens, gas dryers, natural gas furnaces, hot water heaters, *any type* of fireplaces, vehicles or gasoline powered yard equipment being used inside garages and any natural gas or otherwise, electrical generators are all sources.

Aside from the obvious car running in the garage, what causes CO to leak into the living space of a structure? In a furnace it can be a cracked firebox, a flu pipe with a hole or a clog or it's possible that the flu is not getting enough draft. That means either, the room is too small, and/or it's enclosed too tight and the appliance can't draw in enough fresh air to get the draft it needs to expel the by-products of combustion. The same can be said for

DRAGER AND YOUTUBE

Drager has its own youtube channel that has a ton of videos on the meters we have.

Also youtube.com itself has a large volume of videos on atmospheric monitoring as well.

This can be a good source of information but you may have to weed out some of the nonsense…

Remember:

"Let No Mans Ghost Say His Training Let Him Down"

a hot water heater, boiler or oil burner. A gas dryer can have a cracked firebox as well along with a dust clogged vent pipe. In a fireplace, a smoldering log can cause CO to leak into a room because there's not enough heat coming off of it to create a draft, and/or sometimes people think the fire is out and close off the flu manually.

The only way to figure out which of these appliances that may be in a structure that is causing the problem is by trial and error. You must use the process of elimination, venting until you have readings of zero CO, and then turning each appliance back on one at a time and testing the atmosphere again until you whittle it down to the appliance that is causing the problem. Also remember there if is a shared flu pipe, you *should* shut both appliances using that pipe.

This may seem very basic and very obvious to some, but it is not, to all. We don't really train on it, probably because we respond to so many of these types of incidents that for the most part, we handle them correctly. But if a newer member who may not be as adept at it as some others can be, how can they really know what to look for and what to do? Hopefully after reading this, they will.

CO Detectors

Unbeknownst to most, is the way in which a CO detector works. CO detectors do not work the same way smoke detector works and this should always be explained to a homeowner. "UL 2304 The Standard for the Detection and Operation of Carbon Monoxide Detectors" is the standard that all CO detectors are built to meet. In a very basic reiteration, the standard states if the sensor detects dangerous levels Carbon Monoxide, it sends an electronic pulse to the alarm. The higher the amount it detects, the sooner the alarm will activate. So if the detector senses 70 PPM for one hour, it will activate, however if it senses levels of CO measuring 400 PPM or more, it has to activate in as little as four minutes. It is all about time & concentrations so as the numbers go up, the time to activation goes down (Fig.1). The higher the concentration, the faster it will activate and that is where it differs from the smoke detector which activates immediately upon the sensing of smoke. This should always be explained to an occupant that has called us out, it helps puts their mind at ease. This is also the reason why you can't put a card with all the meters stating what levels are dangerous and so forth, the amount of variables is too great.

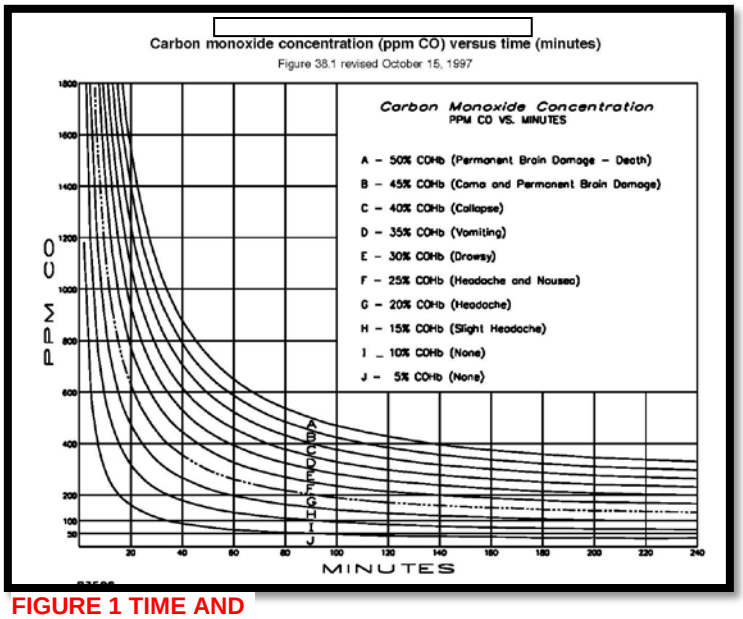


FIGURE 1 TIME AND CONCENTRATIONS

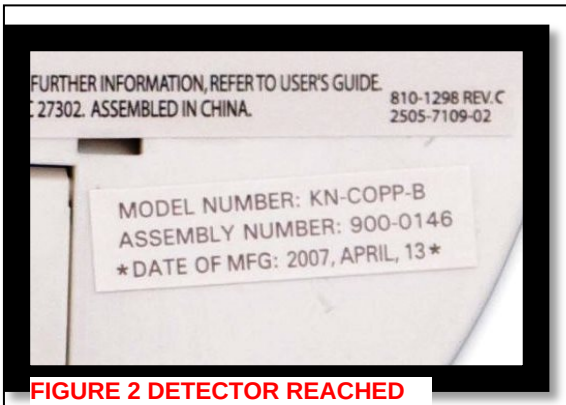


FIGURE 2 DETECTOR REACHED END OF SERVICE LIFE

ALL CO detectors must have a date of manufacture printed on them and reach the end of their service life at the 7 year mark from that date (Fig.2). All CO detectors manufactured after 2012 are required to alert the same way for the same conditions and will have this information along with what each alert signal means printed on the back of them. Most detectors, even the ones built before 2012 will sound a single chirp every 30 seconds to alert for a low battery condition. Some detectors will speak along with 4 quick beeps "WARNING CARBON MONOXIDE PRESENT, LEAVE THE AREA IMMEDIATELY" while others will just beep 4 quick beeps with a 5 second pause followed by 4 more quick beeps in a continuous cycle (Fig.3). You must realize that if you or the occupant removes the detector to fresh air and it stops going off, then bring it back in and it doesn't activate, it means nothing. You must remember how it works "Time & Concentrations"

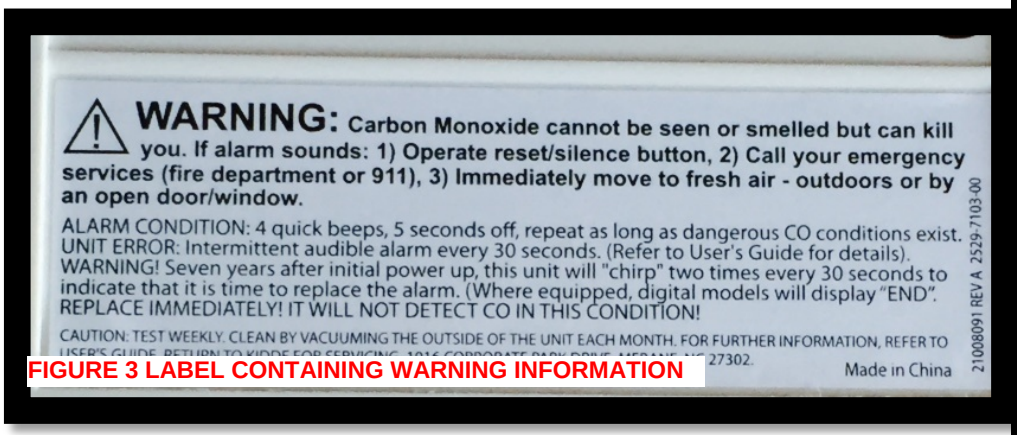


FIGURE 3 LABEL CONTAINING WARNING INFORMATION

Meters & Metering

There are multiple things to think about when metering for CO. First is that CO is initially lighter than air and will be found high up at the ceiling level when it is produced. The reason for this is, because as it is a by-product of combustion, it is hot as it is expelled from whatever is burning and as we know, anything hotter than the ambient air will rise. Once the CO cools and comes down to the ambient temperature of the atmosphere it's in, it falls and settles down low near the floor. However, although it is heavier than air, its only slightly heavier, so once you start walking around in the area, it will readily mix with the oxygen in the room and different levels can be metered at different heights. One thing to help you with the process of elimination though is if you're getting readings up high in the room that are higher than on the floor or in the middle of the room, start with the appliance that was used most recently because the CO could still be warmer than the ambient air, thereby concentrating at the ceiling area.

Something else to be sure you do when using meters to detect CO or any metering frankly, you must meter the atmosphere with two different meters, just in case one meter isn't working properly. That is standard operating procedure for any metering operation.

Some *other* gasses can “mimic” CO tricking not only your meter but the detector as well. Acetylene, Acetone and Ammonia are some that I have seen do this. If there is a refrigerator and/or a freezer in the area you are metering, you should check that unit as well, especially if it is an older model, as it could be using anhydrous ammonia for a refrigerant, but even more recent refrigerants have tricked the meter at times. If you are getting readings for CO and readings for another chemical too, it’s possible you don’t have a CO problem but something else may be going on instead. These instances are just from experience, I have not found any real documentation of this other than many firefighters in chat rooms and blogs having the same things happen to them. It should be noted too that this could happen with any chemical and any sensor on any meter as the molecular make-up of many chemicals are similar to each other. This is one of the reasons why “UL 2304” states, do not install within 5’ of any household chemicals.

Realizing that a tag with co levels and symptoms doesn’t really work, we should think about a different type of tag. With our meters being set up the way that they are, and really only one member that I know of as being a “Haz-Mat Technician”, a useful thing to do may be to connect a tag to each meter stating what each gas is. For instance H2S = Hydrogen Sulfide, Cl= Chlorine and so forth. Basically because the last time I checked, none of us are chemists…

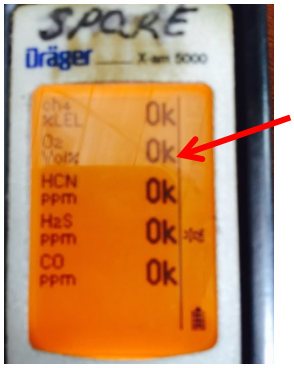
There have been some questions about “Fresh Air Calibration” (FAC) and how to do it with the meters we currently have.

1.) Every time you turn the meter on, an exclamation point will be visible on the upper right hand side of the screen, after the meter is on for up to 5-6 minutes, this will clear, it is then ready to do an FAC

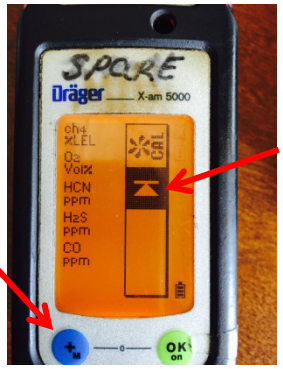
2.) When the exclamation point clears, go outside into a clean environment and hit the blue button three times and you will be taken to the FAC and “Peak Values” (PV) screen. Large FAC symbol will be highlighted

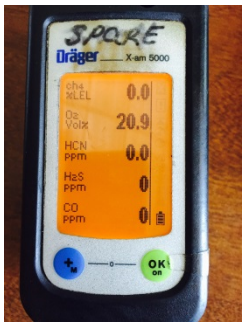
3.) Press Green “OK” button which will bring you too the FAC screen, the numbers will flash on and off and a small FAC symbol will be on the lower right side

4.) Wait about 30 seconds, press the green “OK” button again, all the numbers will flash OK



5.) Press the green “OK” button again which will bring you back to the FAC/PV screen again, this time the “Peak Values” symbol will be highlighted, hit the blue button and your done and back to the monitoring screen





1 minute vid how to FAC: https://www.youtube.com/watch?v=1Wn3bYGptJw

Conclusion

OSHA states that 70 PPM is an acceptable level to work in for 8 hours daily causing no harm. So who cares if we go into a house and get readings of 20 or 30 PPM? The problem with that is, 30 ppm now, can turn into 300 ppm after we leave because the leak got worse, causing numbers to go up rapidly. Or far worse, we didn't identify the correct source.

You must identify the source, remove it from the equation, clear the atmosphere and make sure you have the occupant sign a CO form and give it to the dispatcher after the call. He has to staple it to the run sheet that gets turned into the district.

Always use two meters, know how to use the meters and keep an open mind as to what the source may or may not be. If something doesn't seem right, it probably isn't and you'll need to think on your feet to figure out what the problem actually is…

Have a safe week and thanks for reading…

Joe Digiose