DON’T LET THIS BE YOUR CARBON MONOXIDE ALARM!

RAISING AWARENESS AND SAVING LIVES
Everyday is a carbon monoxide safety day!

CAITLIN’S CHALLENGE

Learn about the hazards of carbon monoxide and poisoning!
Every home & building should have a carbon monoxide alarm!

Carbon Monoxide Safety Association
www.cosafety.org
Poisoning from carbon monoxide (referenced by the chemical symbol CO) can go undetected though a person might be experiencing symptoms everyday. **We are not all of equal health** so it is vital we all have gainful knowledge about what CO is, how it is formed, how it gets to where it is breathed in and how we can reduce exposures.

**Carbon monoxide is a poison.**

It is often referenced as “The Silent killer” in that CO is odorless, tasteless and invisible. It is also very important to know that some common odors also contain harmful or deadly levels of carbon monoxide. These odors may be around us everyday and because of their commonality might be why they are often overlooked as hazardous or the contributing factor to some everyday illness symptoms.

**It is of primary importance that the health effects and the symptoms of CO poisoning are clearly understood,** recognized, tested for, and remediated. Carbon monoxide at high concentrations is a deadly poison and can cause illness symptoms for all people and in lesser concentrations for people of vulnerable health. This booklet contains general information specific to carbon monoxide and suggestions for detection and prevention. Everyone is vulnerable to CO poisoning.

**How does Carbon Monoxide harm you?** Quite simply, carbon monoxide prevents oxygen from being used by your body. Every part of our body needs oxygen. Air is made up of approximately 20.9% oxygen and 70.9% nitrogen. The hemoglobin within our blood carries oxygen to every cell in our body. With a good diet, fresh air and working parts, a human has an ability to maintain equilibrium and a healthy metabolism.

If harmful amounts of carbon monoxide are in the air you breathe it displaces the oxygen you also breathe in. This displacement of oxygen in your blood begins a process that generates a free radical or disassociated molecule reaction. Slower reaction time, weak muscular movement & dexterity, hampered visual focus, headache or nausea may be immediate symptoms or it can be poisonous enough to cause heart stresses in compensation for the loss of oxygen. CO can also harm your central nervous system because of the disruption of oxygen delivery.

When carbon monoxide is inhaled into the lungs and bonds with hemoglobin in blood, it forms **Carboxyhemoglobin (COHb).** This displacement of oxygen in the blood stream affects all major organs and muscles.
There is not always an odor when CO is present, though you may smell lawn mower or motor vehicle exhaust and motor boat and other blended exhausts most of the time when they are running or idling. CO itself is odorless. In our culture we often get used to the smells of combustion and often take them for granted. The smell associated with gas cooking systems especially when the exhaust gas is not vented out of the space is also a familiar but ignored odor.

You may be exposed to Carbon Monoxide when you leave your car, truck or van running in a garage. This is a dangerous practice, especially when there is living space above or connected to the garage. People have been sickened and some have died while sitting in a running motor vehicle talking or romantically engaged. Some people have died while sleeping in their cars when they’ve pulled over to rest during a long trip. Deep snow, mud, brick walls, ditches, even prevailing winds all have contributed to automotive CO poisoning and death.

You may be exposed when you burn charcoal, alcohol or gasoline in an enclosed tent, camper or room. You may also be exposed to CO when there is cigar, cigarette or pipe tobacco smoke. Garbage, leaf, brush or forest fires also can produce sickening to deadly levels of carbon monoxide. Always pay attention to the air you breathe.
Your home or building may contain malfunctioning oil, gas or wood furnaces, water heaters, space heaters, cooking systems or fireplaces that are already producing large amounts of CO.

You may also be exposed to CO on a boat, on a bus, in a car, in a house, on a street, at a construction site, almost everywhere; be careful!

The misuse of gasoline powered electric generators is resulting in the death & injury to people at work and during power outages. Use them cautiously, safely and far away from buildings, campers & your air. Never use outdoor barbecue’s inside. Never use gas or gasoline powered tools inside. Be careful with unvented portable heaters.

DO NOT USE UNVENTED SYSTEMS INDOORS FOR EMERGENCY HEAT!

A carbon monoxide alarm/detector should be used whenever a combustion system is used. The choice of alarms, detectors and monitors may be a matter of life, better health or death. Your awareness is a matter of life or death!

There are approximately 50,000 Emergency Room visits for CO poisoning in the USA annually. More and more states and communities are requiring carbon monoxide alarms in living quarters, including motels. Though many of these laws are limited in their protective scope, they are a start at society recognizing a method to encourage safe practices to the silent killer. Many of these laws are named with recognition to children and other loved one’s who have died from carbon monoxide.

Every day of the year CO news reports from around the world underline the prevalence and common occurrences of accidental poisonings. Often these deaths and illnesses could have been prevented if the people affected were more aware or better educated in the realities of this deadly gas. Perhaps if the building had a carbon monoxide alarm the injury could have been avoided.
How much CO is too much?

The health effects can vary significantly due to age, sex, weight and overall state of health. CO is measured in Parts per Million or PPM; out of a million molecules of air, how many are carbon monoxide. The time given respective to the levels referenced in this chart, are for healthy people unless otherwise stated.

<table>
<thead>
<tr>
<th>Concentration (PPM)</th>
<th>Symptom Description</th>
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<tbody>
<tr>
<td>12,000 PPM</td>
<td>Death within 1 – 3 minutes</td>
</tr>
<tr>
<td>1,600 PPM</td>
<td>Nausea within 20 minutes, death within 1 hour</td>
</tr>
<tr>
<td>800 PPM</td>
<td>Nausea and convulsions – death within 2 hours</td>
</tr>
<tr>
<td>400 PPM</td>
<td>Frontal headaches within 1-2 hours; life threatening within 3 hours; UL 2034 alarms should sound within 4 and 15 minutes.</td>
</tr>
<tr>
<td>200 PPM</td>
<td>NIOSH (National Institute for Occupational Safety &amp; Health Administration) A worker will not be exposed to more than this amount.</td>
</tr>
<tr>
<td>150 PPM</td>
<td>UL 2034 Listed alarms must respond within a range of 10 to 50 minutes if this concentration or higher is present.</td>
</tr>
<tr>
<td>70 PPM</td>
<td>If CO at this level for 50 minutes up to 4 hours, UL 2034 alarm should be sounding.</td>
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<tr>
<td>50 PPM</td>
<td>Maximum average level for continuous exposure in an 8 hour workday per federal law.</td>
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<tr>
<td>35 PPM</td>
<td>8 hour exposure TWA (time weighted average); NIOSHA (National Institute of Occupational Safety and Health Administration) of the CDC (Center for Disease Control).</td>
</tr>
<tr>
<td>10-35 PPM</td>
<td>Marginal - Small children, elderly, and those suffering respiratory or heart problems are cautioned if these are chronic exposures concentrations. May increase heart stresses.</td>
</tr>
<tr>
<td>25 PPM</td>
<td>8 hour TWA limit; ACGIH (American Conference Of Governmental Industrial Hygienists)</td>
</tr>
<tr>
<td>9 PPM</td>
<td>This concentration is often measured around busy city streets &amp; intersections.</td>
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What are the symptoms of CO poisoning? Consult with your physician!

Carbon monoxide poisoning mimics many common illnesses, such as the flu and food poisoning. The following is a list of common symptoms.

- headaches
- loss of hearing
- dizziness
- depression
- blurry vision
- cardiac arrest
- disorientation
- respiratory failure
- weakness
- vomiting
- coma
- painful discomfort
- loss of consciousness
- muscle aches & soreness
- memory disorders
- seizures
- nausea
- rapid heartbeat

This list is not meant to serve as a diagnosis of carbon monoxide poisoning. It is meant to provide general information on poisoning symptoms. Oxidative stress causes a chain reaction in the body due to the interruption of oxygen intake.

Carbon monoxide poisoning is best treated with supplemental oxygen or pressurized oxygen in a hyperbaric chamber where CO is forced out of the hemoglobin of the blood. The longer CO stays in the body, the more disruption in body functions and symptoms are likely.
Traditional testing for carbon monoxide required a blood sample and might be a reason why low level symptoms were ignored.

Non-invasive testing is quick, painless and accurate; as simple as testing the end of your finger with a spot test. Ask your doctor.

The human body naturally produces some carbon monoxide endogenously or from within. Carbon monoxide measured in the blood determines the per cent of CO in the hemoglobin of your blood. This measurement gives the caregiver a carboxyhemoglobin % (COHb%). Normal COHb% levels with non-smokers are in the 1-3% COHb range. Smokers can be in the 1-15% range, depending upon how much they smoke. Ask your doctor to give you a baseline COHb% test.

Most people don’t think of themselves as combustion systems, but they are. Air is approximately 20.9% oxygen and almost 79% nitrogen. The food we eat and drink is made of predominantly hydrogen, carbon & proteins. When we mix the oxygen, nitrogen, carbon, hydrogen & proteins into our system we generate heat & energy and exhaust gases, similar to an oil burning combustion system. Since humans are not perfect combustion systems, some levels of CO are produced. 1 to 3% COHb is often referenced as “normal”. Baseline & periodic testing can verify “normal”. Normal is specific to measured levels outside in air in PPM and in blood by % when exogenous (outside) sources are limited.

Do you know someone who doesn’t test the air they work in?

Every technician entering a building should recognize health symptoms associated with carbon monoxide exposures. They should also be aware that if they are not monitoring the CO levels they are working in, their own safety may be in jeopardy. What’s the value in not testing?

Who is responsible for the air you breathe? The health effects of CO poisoning are related to the concentration, length of exposure and overall health of the victim.

Some workplace environments have more exposure to CO than others. New studies indicate that chronic, low level exposure can have serious health consequences and may be misdiagnosed. These may be nagging symptoms which are often self-treated with medication and might be masking more serious problems. Get tested for CO; if you don’t test for it, you won’t know! The test is simple. If you have a symptom, test! It is your health that is at stake.
There are times after a known poisoning when carbon monoxide is hard to find. Sometimes the source drives away. There may be times when a combustion fuel cleaning system like a propane fueled floor buffer is used inside buildings. The buildings may have been tightened to save energy and can trap this pollutant inside for long periods of time. The buildings we live and work in also have currents of air and air pressure in them that could cause occasional generation of CO and its’ dispersion. A building pressure test verifies the condition.

Buildings operate like chimneys. Warmer, less dense air rises in the structure. Air leaks out of the holes near the top of the structure (exfiltration) and leaks into the holes near the bottom of the structure (infiltration). This driving force is sufficient to back-draft combustion equipment and distribute combustion gases.

When exhaust fans (bathroom, kitchen, clothes dryer, attic fans) operate they may exceed some gas, oil or wood furnace or water heater’s draft pressure and result in combustion gas dispersion and perhaps carbon monoxide exposures & poisoning inside the home or building. Have your home pressure tested when your appliances are tested.

What can I do to protect myself and my family? This booklet contains many cautions. It is highly recommended that unvented combustion systems be used with caution and with carbon monoxide and perhaps CO2 (carbon dioxide) monitors to ensure healthy air. Don’t start and leave running cars, generators, trucks, or other vehicles in an enclosed area especially the garage. Even with the big doors open it can still be dangerous. CO can also get into rooms above! Keep generators far away from windows, doors and other entries into buildings.

Every home should have at least one carbon monoxide detector that is more sensitive to the health needs of vulnerable populations. It is very important to know that CO Alarms Listed by the UL 2034 Standards may not be the best for some people of vulnerable health. They are not required to sound off until 70 PPM of CO is present for as long as 4 hours. They do not meet OSHA workplace standards for alarming. The test button does not tell you the sensors works, just that the audible sound works. This certifying group suggest people of vulnerable health use a better alarm. COSA describes these people to include: pregnant women, infants and people with heart or respiratory complications, chronic depression or similar symptoms described in this brochure.

Gas & oil furnaces and water heaters and fireplace chimneys can get blocked by snow, bird nests or accidental clogging and can result in carbon monoxide production and eventual poisoning.

Have your furnace and other fuel burning appliances tested and inspected by a qualified professional once a year or before each heating season to each manufacturer’s measurable standards found in the instructions. You should receive a measurement report verifying what tests were taken and the results. A certified professional should have a variety of certifications and continuing education credentials available for consumer viewing. The real certification is in the work performed that is verified and documented. Don’t assume classroom certifications achieved by heating contractors equal work performed. The technicians still has to do the work & conduct the tests. If they don’t or can’t, don’t pay for the service. Find out what tests will be performed before you schedule service.

Don’t wait until illness symptoms occur or until something breaks! Have your appliances checked at least annually. Get a baseline on your house and your family. BE SAFE! If you are sick, go to the doctor and get tested.
Without testing, it is only guesswork!

Make sure your service professional tests each appliance using a testing instrument that can detect carbon monoxide or analyze the combustion gases. Today’s HVAC technician should also be able to measure building, duct and fuel pressures; this information may aid in the prevention of combustion system failure and CO generation. If you have symptoms described as carbon monoxide poisoning, seek medical testing!

Supporting Carbon Monoxide Safety Education

COSA is fortunate to have the opportunities to work with manufacturers of test instruments and warning devices, HVAC business owners and their technicians, fuel suppliers, home inspectors and energy auditors, furnace and appliance manufacturers, educators, emergency responders, physicians and health technicians, building managers and consumers. COSA instructors conduct technical seminars and work with all services and communities to better understand carbon monoxide and the prevention of poisoning through preventative practices.

Safety Through Awareness, Training and Testing

Visit www.cosafety.org for more information about this Not-for-Profit Organization.
Bob Dwyer, Director of Training; 877-546-3726; Erik Rasmussen, Director International Instruction

Supporting the following organization in their efforts of carbon monoxide safety!

The Caitlin Brondolo Charitable Foundation:

Caitlin Brondolo was an athletic, bright, energetic & talented 12 year old, who tragically lost her life on May 31, 2009 to carbon monoxide poisoning. She and her best friend Amber Wilson were having a sleepover at Amber’s house while a car was mistakenly left running in the garage. Lack of awareness and understanding about the dangers and prevention of carbon monoxide were a contributing factor in the girls deaths. The Caitlin Brondolo Charitable Foundation was founded to create awareness programs to ensure that this tragedy never happens again. Awareness = Prevention. We need to learn about the hazards of carbon monoxide and to understand how important a carbon monoxide alarm is in protecting your family. The information in this educational booklet is a good start. Carbon Monoxide never takes a day off. www.caitlinfoundation.org